RS-002, "PROCESSING APPLICATIONS FOR EARLY SITE PERMITS"

ATTACHMENT 2

2.3.2 LOCAL METEOROLOGY

REVIEW RESPONSIBILITIES

Primary - Probabilistic Safety Assessment Branch (SPSB)

Secondary - None

I. AREAS OF REVIEW

This section of the site safety assessment for an early site permit (ESP) application concerns the local (site) meteorological parameters. It also addresses the potential influence of construction and operation of a nuclear power plant or plants of specified type (or falling within a plant parameter envelope [PPE]) on local meteorological conditions that might in turn adversely impact such plant(s) or their associated facilities. Finally, it covers a topographical description of the site and its environs. The review covers the following specific areas.

1. A description of the local (site) meteorology in terms of airflow, temperature, atmospheric water vapor, precipitation, fog, atmospheric stability, and air quality.

2. An assessment of the influence on the local meteorological parameters listed in (1) of construction and operation of a nuclear power plant or plants of specified type (or falling within a PPE) that might be constructed on the proposed site and its facilities, including the effects of plant structures, terrain modification, and heat and moisture sources due to plant operation.

3. A topographical description of the site and its environs, as modified by the structures of a nuclear power plant or plants of specified type (or falling within a PPE) that might be constructed on the proposed site, including the site boundary, exclusion zone, and low population zone.

II. ACCEPTANCE CRITERIA

Local meteorological and topographic descriptions of the site area both before construction and during operation of a nuclear power plant or plants of specified type (or falling within a PPE) that might be constructed on the proposed site should be presented so that meteorological impacts on plant design and operation, as well as the impact on local meteorological conditions of the nuclear power plant or plants and its/their facilities, can be predicted. The information should be fully documented and substantiated as to its representativeness of conditions at and near the site. The information is acceptable if it meets the requirements of the following regulations:

1. 10 CFR Part 50, Appendix A, General Design Criterion 2 (GDC 2), "Design Bases for Protection Against Natural Phenomena," (Ref. 1) with respect to information on the most

severe local weather phenomena that have historically been reported for the site and the surrounding area and that are reflected in the design bases for structures, systems, and components important to safety.

2. 10 CFR Part 100 (Ref. 2), §100.20(c) and §100.21(d) with respect to the consideration that has been given to the local meteorological and air quality characteristics of the site and other physical characteristics of the site that can influence the local meteorology.

Specific criteria necessary to meet the requirements of GDC 2 and 10 CFR Part 100 are as follows:

1. Local meteorological data based on onsite measurements and data from nearby National Weather Service stations or other standard installations should be presented in the format specified in Regulatory Guide 1.70, Section 2.3.2 (Ref. 3). Regulatory Guide 1.23[1] (Ref. 4) provides guidance related to onsite meteorological measurements.

2. A complete topographical description of the site and environs out to a distance of 50 miles from the site should be provided. Regulatory Guide 1.70 (Ref. 3), Section 2.3.2.2, provides guidance on the topographical description.

3. A discussion and evaluation of the influence of a nuclear power plant or plants of specified type (or falling within a PPE) that might be constructed on the proposed site and its/their facilities on local meteorological and air quality conditions should be provided. A discussion of potential changes in the normal and extreme values as presented in the safety assessment resulting from plant construction and operation should be made. The acceptability of the information is determined through comparison with standard assessments (Refs. 5 and 6).

III. REVIEW PROCEDURES

Section 2.3 of the safety assessment is reviewed for content based on the specifications outlined in Regulatory Guide 1.70 (Ref. 3).

1. The summaries listed in Section 2.3.2.1 of Regulatory Guide 1.70 (Ref. 3) are reviewed for completeness and adequacy of basic data. The wind and atmospheric stability data should be based on onsite data (Ref. 4), because airflow and vertical temperature structure, which can vary substantially from one location to another, are necessary for assessment of atmospheric diffusion conditions at the site. The other summaries should be based on data from nearby representative stations with long periods of record because the locally measured values are not likely to provide reliable estimates of the intensity or frequency of extremes. Extreme values are compared to design basis values presented in the safety assessment and are used by other branches to determine whether the meteorological conditions are limiting conditions for design and emergency procedures. When offsite data are used, a determination is made of how

[1]References in Regulatory Guide 1.23 to Appendix D to 10 CFR Part 50 should be read as references to 10 CFR Part 51. For ESP applications, references in Regulatory Guide 1.23 to 10 CFR 100.10 should be read as references to 10 CFR 100.20.

well the data represent site conditions and whether more representative data are available. National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center summaries (Refs. 7 and 8) and other standard climatological summaries related to structural design (Refs. 9 and 10) are used by the reviewer to evaluate the representativeness of stations and periods of record. The reviewer should be familiar with all primary meteorological data collection locations.

2. The reviewer ensures that all topographic maps and topographic cross sections presented by the applicant are legible and well labeled so that the information needed during the review can be readily extracted. Reference points and the direction of true north should be checked carefully. Points of interest such as structures of a nuclear power plant or plants of specified type (or falling within a PPE) that might be constructed on the proposed site, site boundary, and exclusion zone should be marked on the maps and diagrams.

   The reviewer compares the applicant's assessment of the effect of topography on local meteorological conditions to standard assessments such as those presented in "Meteorology and Atomic Energy - 1968" (Ref. 5) and "Atmospheric Science and Power Production" (Ref. 6) and decides whether the standard regulatory atmospheric diffusion models (discussed in Sections 2.3.4 and 2.3.5 of this review standard) are appropriate for the proposed site.

3. The reviewer evaluates the contents of Section 2.3.2 of the safety assessment as follows:

   a. Determine the terrain modifications that are likely to occur as a result of construction of a nuclear power plant or plants of specified type (or falling within a PPE) that might be constructed on the proposed site, such as removal of trees, leveling of ground, and installation of lakes and ponds.

   b. Determine the location, size, and materials used for structures of a nuclear power plant or plants of specified type (or falling within a PPE) that might be constructed on the proposed site, including buildings, switchyard gear, parking lots, and roads.

   c. Determine and quantify the heat and moisture sources that would be expected to result from operations of a nuclear power plant or plants of specified type (or falling within a PPE) that might be constructed on the proposed site.

   d. Relate the input information in items a, b, and c, above, to modification of local meteorology so that the impact of the modifications on plant design and operation can be determined.

   e. Determine air quality conditions used for design and operating basis considerations.

   f. Compare the reviewer's assessment with that of the applicant.

4. The reviewer provides the findings on the acceptability of the meteorological parameters identified at the ESP stage that will be used by the Mechanical and Civil Engineering Branch (and other branches as necessary) for review of the adequacy of the design of structures, systems and components (SSCs) important to safety during the combined license (COL) review. Acceptability at the ESP stage is based on a review of the justification for the values of meteorological site characteristics provided by the ESP applicant. The site characteristics also include any meteorological site characteristics related to potential facility operation considerations (such as heat dissipation) that may have an impact on safety issues such as fogging and icing. To the extent that the ESP applicant provides appropriate bounding information about the SSCs and facility operation in its ESP application, impacts of local meteorology on SSCs important to safety and on facility operation should be fully resolved at the ESP stage, subject to confirmation at the COL stage that the actual SSCs and facility operation are within the bounding parameters and values specified at the ESP stage.

IV. EVALUATION FINDINGS

The reviewer verifies that sufficient information has been provided and that the staff evaluation supports concluding statements of the following type, to be included in the staff's safety evaluation report:

> As set forth above, the staff has reviewed available information relative to local meteorological and air quality conditions that are of importance to the safe design and siting of a nuclear power plant of a type specified by the applicant [or a plant falling within the PPE submitted by the applicant] and its facilities that might be constructed on the proposed site. On this basis, the staff concludes that the identification and consideration of the meteorological and topographical characteristics of the site and the surrounding area meet the requirements of 10 CFR 100.20(c) and 100.21(d) and are sufficient for determination of the acceptability of the site. The staff has determined that the applicant has provided and substantiated information on local meteorological and air quality conditions and characteristics, including severe weather phenomena.
>
> Based on [summarize bases for conclusion], the staff also concludes that the applicant's identification and consideration of the severe local weather phenomena at the site and in the surrounding area are acceptable and meet the requirements of 10 CFR Part 50, Appendix A, General Design Criterion 2, "Design Bases for Protection Against Natural Phenomena," with respect to establishing the design bases for structures, systems, and components important to safety.

These statements will be preceded by a summary of local meteorological and air quality parameters appropriate for the site.

V. IMPLEMENTATION

The following is intended to provide guidance to applicants and licensees regarding the NRC staff's plans for using this section of this review standard.

This section will be used by the staff when performing safety evaluations of ESP applications submitted by applicants pursuant to 10 CFR Part 52. Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

Implementation schedules for conformance to parts of the method discussed herein are contained in the referenced regulatory guides.

VI. REFERENCES

1. 10 CFR Part 50, Appendix A, General Design Criterion 2, "Design Bases for Protection Against Natural Phenomena."

2. 10 CFR Part 100, Subpart B, "Evaluation Factors for Stationary Power Reactor Site Applications on or after January 10, 1997."

3. Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants."

4. Regulatory Guide 1.23, "Onsite Meteorological Programs."

5. D. H. Slade (ed.), "Meteorology and Atomic Energy - 1968," TID-24190, Division of Technical Information, USAEC (1968).

6. Darryl Randerson (ed.), "Atmospheric Science and Power Production," DOE/TIC-27601, U.S. Department of Energy (1984).

7. U.S. Department of Commerce, "State Climatological Summary," National Climatic Data Center, NOAA, published annually by state.

8. U.S. Department of Commerce, "Local Climatological Data - Annual Summary with Comparative Data," National Climatic Data Center, NOAA, published annually for all first-order NWS stations.

9. ASCE Standard No. 7-98, "Minimum Design Loads for Buildings and Other Structures," American Society of Civil Engineers," 2000.

10. U.S. Department of Commerce, "Engineering Weather Data," National Climatic Data Center, NOAA. CD-ROM.