



U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

2.3.3 ONSITE METEOROLOGICAL MEASUREMENTS PROGRAM

REVIEW RESPONSIBILITIES

Primary - Organization responsible for the review of the onsite meteorological monitoring program

Secondary - None

I. AREAS OF REVIEW

Chapter 2 of the SRP discusses the site characteristics that could affect the safe design and siting of the plant. The staff reviews information presented by the applicant for a construction permit (CP), operating license (OL), design certification (DC), early site permit (ESP), or combined license (COL) concerning the onsite meteorological monitoring program and the resulting data. This SRP section applies to reviews performed for each of these types of applications. The review covers the following specific areas:

1. Meteorological instrumentation, including siting of sensors, sensor performance specifications, methods and equipment for recording sensor output, the quality assurance program for sensors and recorders, data acquisition and reduction procedures, and special considerations for complex terrain sites.

Rev. 3 - [Month] 2007

USNRC STANDARD REVIEW PLAN

This Standard Review Plan, NUREG-0800, has been prepared to establish criteria that the Office of Nuclear Reactor Regulation staff responsible for the review of applications to construct and operate nuclear power plants intends to use in evaluating whether an applicant/licensee meets the NRC's regulations. The Standard Review Plan is not a substitute for the NRC's regulations, and compliance with it is not required. However, an applicant is required to identify differences between the design features, analytical techniques, and procedural measures proposed for its facility and the SRP acceptance criteria and evaluate how the proposed alternatives to the SRP acceptance criteria provide an acceptable method of complying with the NRC regulations.

The standard review plan sections are numbered in accordance with corresponding sections in the Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)." Not all sections of the standard format have a corresponding review plan section. The SRP sections applicable to a combined license application for a new light-water reactor (LWR) will be based on Regulatory Guide DG-1145, "Combined License Applications for Nuclear Power Plants (LWR Edition)," as superceded by the final guide, until the SRP itself is updated.

These documents are made available to the public as part of the NRC's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Individual sections of NUREG-0800 will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience. Comments may be submitted electronically by email to NRR_SRP@nrc.gov.

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2. The resulting onsite meteorological database, including consideration of the period of record and amenability of the data for use in characterizing atmospheric dispersion conditions.
3. Additional Information for 10 CFR Part 52 Applications: Additional information will be presented dependent on the type of application. For a COL application, the additional information is dependent on whether the application references an ESP, a DC, both or neither. Information requirements are prescribed within the "Contents of Application" sections of the applicable Subparts to 10 CFR Part 52.
4. Design Certification Applications: For DC applications, the details of the meteorological monitoring program are site-specific and will be addressed by the COL applicant.

Review Interfaces

The listed SRP sections interface with this section as follows:

1. For DC applications and COL applications referencing a DC rule or DC application, review of the site parameters in the Design Control Document (DCD) Tier 1, Chapter 2 of the DCD Tier 2, and the supporting information in DCD Tier 2 Section 14.3 submitted by the applicant is performed under SRP Section 14.3.1, "Site Parameters (Tier 1)."
2. Summaries of the hourly onsite meteorological data that are reviewed in this SRP Section may be presented in SRP Section 2.3.2.
3. The onsite meteorological data reviewed in this SRP section are used to generate the short-term (accident release) and long-term (routine release) atmospheric dispersion factors reviewed in SRP sections 2.3.4 and 2.3.5, respectively.
4. A review of the adequacy of instrumentation, including the control room displays, to assess plant and environs conditions during and following an accident is performed in SRP section 7.5.
5. A review evaluating the capability of the meteorological monitoring system to provide the required near real-time meteorological information in the appropriate emergency response facilities for use in dose projections during radiological emergencies is performed in SRP Section 13.3.

The specific acceptance criteria and review procedures are contained in the referenced SRP sections.

II. ACCEPTANCE CRITERIA

Requirements

Acceptance criteria are based on meeting the relevant requirements of the following Commission regulations:

1. For stationary power reactor site applications before January 10, 1997 (Ref. 1):
 - a. 10 CFR 100.10(c)(2) with respect to the meteorological conditions at the site and in the surrounding area which should be considered in determining the acceptability of a site for a power reactor.
 - b. 10 CFR 100.11(a) with respect to using the meteorological conditions pertinent to the site, along with an assumed fission product release from the core and the expected containment leak rate during postulated accidents, to ensure that prescribed dose limits for the EAB and LPZ are met.
2. For stationary power reactor site applications on or after January 10, 1997 (Ref. 2):
 - a. 10 CFR 100.20(c)(2) with respect to the meteorological characteristics of the site that are necessary for safety analysis or that may have an impact upon plant design in determining the acceptability of a site for a nuclear power plant.
 - b. 10 CFR 100.21© with respect to the meteorological data used to evaluate site atmospheric dispersion characteristics and establish dispersion parameters such that (1) radiological effluent release limits associated with normal operation can be met for any individual located off site, and (2) radiological dose consequences of postulated accidents meet prescribed dose limits at the Exclusion Area Boundary (EAB) and Low Population Zone (LPZ).
3. 10 CFR Part 50, Appendix A (Ref. 3), General Design Criteria (GDC) 19, "Control Room," with respect to the meteorological considerations used to evaluate the personnel exposures inside the control room during radiological and airborne hazardous material accident conditions. GDC are not applicable for ESP applications.
4. 10 CFR Part 50, Paragraphs 50.47(b)(4), 50.47(b)(8), and 50.47(b)(9) (Ref. 4), as well as Section IV.E.2 of Appendix E, (Ref. 5) with respect to the onsite meteorological information available for determining the magnitude and continuously assessing the impact of the releases of radioactive materials to the environment during a radiological emergency.
5. 10 CFR Part 50, Appendix I, (Ref. 6) with respect to meteorological data used in determining the compliance with numerical guides for design objectives and limiting conditions for operation to meet the requirement that radioactive material in effluents released to unrestricted areas be kept as low as is reasonable achievable (ALARA).
6. 10 CFR Part 20, Subpart D, (Ref. 7) with respect to the meteorological data used to demonstrate compliance with dose limits for individual members of the public.

SRP Acceptance Criteria

Specific SRP acceptance criteria acceptable to meet the relevant requirements of the NRC's regulations identified above are as follows for each review described in Subsection I of this SRP section. The SRP is not a substitute for the NRC's regulations, and compliance with it is not required. However, an applicant is required to identify differences between the design features, analytical techniques, and procedural measures proposed for its facility and the SRP acceptance criteria and evaluate how the proposed alternatives to the SRP acceptance criteria provide acceptable methods of compliance with the NRC regulations.

1. The pre-operational monitoring program should be described for CP and ESP applications and for COL applications that do not reference an ESP. The operational monitoring program should be described for OL and COL applications. The monitoring program description should include meteorological measurements at the site and any offsite satellite facilities. The description should include:
 - a. a site map (drawn to scale) that shows tower location and true north with respect to man-made structures, topographic features, and other features that may influence site meteorological measurements
 - b. distances to nearby obstructions of flow in each downwind sector
 - c. measurements made
 - d. elevations of measurements
 - e. exposure or instruments
 - f. instrument descriptions
 - g. instrument performance specifications
 - h. calibration and maintenance procedures and frequencies
 - i. data output and recording systems
 - j. data processing, archiving, and analysis procedures

Guidance on a suitable onsite meteorological monitoring program to provide the required meteorological data is presented in Regulatory Guide 1.23 (Ref. 8).

2. Meteorological data should be presented in the form of joint frequency distributions of wind speed and wind direction by atmospheric stability class in the format described in Regulatory Guide 1.23. A hour-by-hour listing of the hourly-averaged parameters should be provided in the format described in Regulatory Guide 1.23. If possible, evidence of how well these data represent long-term conditions at the site should also be presented, possibly through comparison with offsite data.

- a. For CP applications, at least one annual cycle of onsite meteorological data should be provided at docketing. For OL applications, at least two consecutive cycles (and preferably 3 or more whole years), including the most recent one-year period, should be provided at docketing.
 - b. For COL applications that do not reference an ESP and for ESP applications, at least two consecutive annual cycles (and preferably 3 or more whole years), including the most recent 1-year period, should be provided at docketing. If two years of onsite meteorological data are not available at the time the application is filed, the staff expects that the COL or ESP applicant will provide at least one annual cycle of meteorological data collected onsite with the application. These data should be used by the applicant to calculate (1) the short-term atmospheric dispersion estimates for accident releases discussed in SRP Section 2.3.4 and (2) the long-term atmospheric dispersion estimates for routine releases discussed in SRP Section 2.3.5. The applicant should continue to monitor the data and submit the complete 2-year data set when it has collected all the data. This supplemental submittal should also include a reanalysis of the Section 2.3.4 and 2.3.5 atmospheric dispersion estimates based on the complete 2-year data set.
3. The applicant should identify and justify any deviations from the guidance provided in Regulatory Guide 1.23.

Technical Rationale

The technical rationale for application of these requirements to reviewing this SRP section is discussed in the following paragraphs:

1. For power reactor site applications before January 10, 1997, 10 CFR 100.10(c)(2) states that meteorological conditions at the site and in the surrounding area should be considered in determining the acceptability of a site for a power reactor. Likewise, for power reactor site applications on or after January 10, 1997, 10 CFR 100.20(c)(2) requires consideration of the meteorological characteristics of the site that are necessary for safety analysis or that may have an impact upon plant design in determining the acceptability of a site for a nuclear power plant. These requirements to consider meteorological conditions at or near the site of a proposed nuclear power plant are imposed (a) to ensure that these conditions will not compromise the plant's safety, (b) to provide descriptions of meteorological characteristics at or near the site to facilitate making atmospheric dispersion estimates for both postulated accidental and expected routine airborne releases of effluents, and (c) to compare offsite data sources for determining the appropriateness of climatological data considered during the plant phase. Meeting these requirements provides assurance that severe weather conditions will not compromise the safety of the proposed nuclear power plant and that sufficient meteorological data are available to make representative estimates of atmospheric dispersion.

2. For power reactor site applications before January 10, 1997, 10 CFR 100.11(a) specifies the manner in which the EAB, LPZ, and population center distance are determined given a fission product release from the reactor core, an expected leak rate from containment, and pertinent meteorological conditions. Identification of an EAB, LPZ, and population center distance is an integral aspect of the siting criteria for a nuclear power plant. Specified radiation dose guidelines are associated with the EAB and the LPZ. Verification that the proposed nuclear plant meets these radiation dose guidelines is accomplished by calculating expected offsite radiation doses using an assumed inventory of fission products available for release from the containment building, the expected containment leak rate, and site atmospheric diffusion characteristics. Diffusion characteristics are determined from meteorological measurements taken at the proposed plant site.
3. For power reactor site applications on or after January 10, 1997, 10 CFR 100.21© requires the evaluation of site atmospheric dispersion characteristics and the establishment of dispersion parameters such that (1) radiological effluent release limits associated with normal operation from the type of facility proposed to be located at the site can be met for any individual located off site, and (2) radiological dose consequences of postulated accidents meet the prescribed dose limits at the EAB and LPZ distances set forth in 10 CFR 50.34(a)(1). The maximum annual average atmospheric dispersion factor (χ/Q value) at or beyond the site boundary and the annual average atmospheric dispersion and deposition factors (χ/Q and D/Q values) at specific locations of potential receptors of interest are a significant input to the assessment performed to demonstrate that radiological effluent release limits associated with normal operation from the type of facility proposed to be located at the site can be met for any individual located off site. Likewise, site atmospheric dispersion characteristics are a necessary input to the assessment demonstrating that the safety features that are to be engineering into the facility, including the plant design features intended to mitigate the radiological consequences of accidents, are adequate to ensure that the offsite radiological consequences of accidents meet specified radiation dose guidelines for the EAB and LPZ.
4. The GDC set forth in Appendix A to 10 CFR Part 50 establish minimum requirements for the principal design criteria for water-cooled nuclear power plants. Specifically, GDC 19 requires that a control room be provided from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions. Adequate radiation protection must be provided to permit access to and occupancy of the control room for the duration of accident conditions. Atmospheric dispersion estimates are significant inputs in assessments performed to demonstrate compliance with this requirement.
5. 10 CFR 50.47 and Appendix E to 10 CFR Part 50 specify requirements for emergency preparedness planning. Some emergency preparedness planning requirements focus on determining the magnitude, and assessing the impact, of radioactive releases to the environment. Hence, methods, systems, and equipment are required for assessing and monitoring offsite consequences. Meteorological parameters provide an integral part of the data needed to establish atmospheric dispersion factors for assessing offsite doses from airborne releases of radioactive material. Meeting the requirements for

measurement of meteorological parameters during an accident or anticipated operational occurrence provides assurance that those personnel responsible for managing the event will be fully informed about the potential consequences of airborne radiological releases.

6. Applicants and licensees generally show compliance with 10 CFR 20, Subpart D, by demonstrating that the annual average concentrations of radioactive material released in gaseous (and liquid) effluents at the boundary of the restricted area do not exceed the values specified in Table 2 of Appendix B to 10 CFR 20. 10 CFR Part 50, Appendix I, provides numerical guidelines for the ALARA criterion concerning radioactive material in light-water-cooled nuclear power reactor effluents. Sections 50.34a and 50.36a contain provisions designed to ensure that releases of radioactive material from nuclear power reactors to unrestricted areas during normal operation, including anticipated operational occurrences, are kept as low as practicable. Appendix I provides numerical guidance for this requirement. Meeting the requirements of these regulations provides assurance that radiation doses from normal operation and from anticipated operational occurrences will not result in exposures that could cause measurable damage.

III. REVIEW PROCEDURES

The staff will select and emphasize material from the procedures described below, as may be appropriate for a particular case.

The procedures outlined below are used to review CP applications, ESP applications, and COL applications that do not reference an ESP to determine whether data and analyses for the proposed site meet the acceptance criteria given in Subsection II of this SRP section. For reviews of OL applications, these procedures are used to verify that the data and analyses remain valid and that the facility's design specifications are consistent with these data. As applicable, reviews of OLs and COLs include a determination on whether the content of technical specifications related to the onsite meteorological monitoring program is acceptable and whether the technical specifications reflect consideration of any of any identified unique conditions.

For deviations from these specific acceptance criteria, the staff should review the applicant's evaluation of how the proposed alternatives to the SRP criteria provide an acceptable method of complying with the relevant NRC requirements identified in Subsection II of this SRP.

1. Meteorological Instrumentation

The basic meteorological parameters measured by instrumentation should include wind direction and wind speed at two levels, ambient air temperature difference between two levels, temperature, precipitation, and atmospheric moisture (at sites where water vapor is emitted, as from cooling towers or spray ponds).

a. Instrument Siting

Instrument types, heights, and locations are compared generally to the position stated in Regulatory Guide 1.23. Detailed review procedures follow.

(1) Local Exposure of Instruments

The local exposure of the wind and temperature sensors is reviewed to ensure that the measurements will represent the general site area. A determination is made whether the tower which supports the sensors will influence the wind or temperature measurements. Professional experience and studies have shown that wind sensors should be mounted on booms such that the sensors are at least two tower widths away from an open-latticed tower. For temperature sensors, mounting booms need not be as long as those for wind sensors but must be unaffected by thermal radiation from the tower itself. No temperature sensors may be mounted directly on stacks or closed towers. Mounting booms for all sensors should be oriented normal to the prevailing wind at the site.

A determination is made whether the terrain at or near the base of the tower will unnaturally affect the wind or temperature measurements. Heat reflection characteristics of the surface underlying the meteorological tower (grass, soil, gravel, paving, etc.) are estimated to ensure that localized influences on measurements are minimal. The position, size, and materials used in the construction of the recorder shack and nearby trees are also examined for potential localized influence on the measurements.

(2) General Exposure of Instruments

Since the objective of the instrumentation is to provide measurements which represent the overall site meteorology without plant structure interference, the tower position(s) should have been selected with this general objective in mind. Examination of topographical maps, which have been modified to show the likely finished plant grade, a site visit, and professional judgment on airflow patterns are used to determine and evaluate the representativeness of the location(s).

The proposed plant structure layout, including structure heights, is examined for potential influence on meteorological measurements. Sensors should be located at least 10 obstruction heights away from the obstruction to minimize this influence.

b. Meteorological Sensors

The type and performance specifications of the sensors are evaluated. Manufacturers' specifications and analysis, and operating experience for these sensors are considered in evaluation of adequacy with respect to accuracy and the potential for acceptable data recovery. Standardized evaluations such as Reference 9 and operational experience reports contained in research papers are utilized.

The suitability of the specific type of sensor for use in the environmental conditions at the site is evaluated. To this end, the range of wind conditions and the ability of the sensors to withstand corrosion, blowing sand, salt, air pollutants, birds, and insects are considered.

If the sensors are new and unique, a meteorological instrumentation expert may need to be consulted.

c. Recording of Meteorological Sensor Output

The methods of recording (e.g., digital or analog, instantaneous or average, engineering units or raw voltages) and the recording equipment, including performance specifications and location of this equipment, are evaluated. Manufacturers' specifications and operating experience for the recorders are considered in evaluation of adequacy with respect to accuracy and the potential for acceptable data recovery.

The controlled environmental conditions in which the recorders are kept (instrument shack or control room) are reviewed for adequacy in accordance with the manufacturers' specifications. The ability to obtain a direct readout from the recorders in situ during routine inspection of systems is checked to ensure that the inspector will be able to relate the recorder output directly to the sensor measurement. Some specific criteria are contained in Regulatory Guide 1.23.

d. Instrumentation Surveillance

The inspection, maintenance, and calibration procedures and their frequency are evaluated. These surveillance procedures and the frequency of attention that the instrumentation systems receive are compared to operating experience at this site and other sites with similar instrumentation with the objective of determining that acceptable data recovery, with acceptable accuracy, will be obtained throughout the duration of the meteorological program. The ability of instrumentation systems to function throughout the course of accidents is evaluated. Criteria for acceptable accuracy and acceptable data recovery are specified in Regulatory Guide 1.23. **Additional information is provided in Refs. 10, 11, and 12.**

e. Data Acquisition and Reduction

The procedures, including both hardware and software for data acquisition and reduction, are evaluated. Since there are many methods of acquiring data from meteorological measurement systems which are acceptable to the staff, the review procedure varies. The basic components of the program which are reviewed to ascertain the acceptability of data acquisition and reduction are:

- (1) Accuracy of direct measurements and their precision,
- (2) Accuracy in conversion of direct measurement units to meteorological units,

- (3) Adequacy of frequency and mode (instantaneous or average) of sampling,
- (4) Averaging time of system outputs for final disposition and accuracy of these data, and
- (5) Identification and handling of suspect data.

Since the instrument accuracy criteria in Regulatory Guide 1.23 refer to overall system accuracy for time-averaged values, the overall system accuracy is evaluated in addition to the component (sensor, recorder, and reduction) accuracies. The evaluation consists primarily of using statistical procedures for compound errors, based on sensor accuracy, recorder accuracy, conversion of units accuracy, and frequency and mode of sampling (Ref. 12).

f. Special Considerations for Complex Terrain Sites

At some sites, because of complex flow patterns in nonuniform terrain, additional wind and temperature instrumentation and more comprehensive programs may be necessary. For example, the representation of circulation for a hill-valley complex or a site near a large body of water may need additional measuring points to determine airflow patterns and spatial variations of atmospheric stability. Occasionally the unique diffusion characteristics of a particular site may also warrant the use of special meteorological instrumentation and/or studies.

2. Meteorological Data

Annual (i.e., representing the annual cycle) joint frequency distributions of wind direction and wind speed by atmospheric stability class are evaluated for sufficient detail to permit the staff to make an independent determination of the atmospheric dispersion conditions.

The format of the data (joint frequency distribution and hourly average) is reviewed to ensure that it will be usable by the staff. The formats in Regulatory Guide 1.23 are used for comparison. If a site has a high occurrence of low wind speeds, a finer category breakdown should be used for the lower speeds so data are not clustered in a few categories.

"Calm" wind conditions (which should be defined as wind speeds less than the starting speed of the anemometer or vane, whichever is higher) are checked for reasonableness. They should be in the distributions as a separate wind speed class, without directional assignment for each atmospheric stability class.

Data quality may be checked using the NUREG-0917 (Ref. 13) or similar methodology using a computer spreadsheet.

Annual joint frequency distributions for each expected mode of release (i.e., ground level and elevated) are checked for appropriateness of measurement heights for wind direction, wind speed, and atmospheric stability. Winds at the 10-meter level and the

temperature difference (ΔT) between the vent height and the 10-meter level are used for vent and penetration releases. Winds from near release height and ΔT between release height and the 10-meter level are used for stack releases.

If practical, the climatic representativeness of the joint frequency distribution is checked by comparison with nearby stations which have collected reliable meteorological data over a long period of time (10-20 years). The distributions are compared with sites in similar geographical and topographical locations to ensure that the data are reasonable.

References 9 through 12 are information sources that are used during the review.

3. Review Procedures Specific to 10 CFR 52 Application Type

a. Early Site Permit Reviews

Subpart A to 10 CFR Part 52 specifies the requirements and procedures applicable to the Commission's review of an ESP application for approval of a proposed site. Information required in an ESP application includes a description of the site characteristics and design parameters of the proposed site. The scope and level of detail of review of data parallel that used for a CP review.

In the absence of a compliance or adequate protection issue, 10 CFR 52.39 precludes the staff from imposing new site characteristics, design parameters, or terms and conditions on the early site permit at the COL stage. Accordingly, the reviewer should ensure that all physical attributes of the site that could affect the design basis of SSCs important to safety are reflected in the site characteristics, design parameters, or terms and conditions on the early site permit.

b. Standard Design Certification Reviews

DC applications do not contain general descriptions of site characteristics because this information is site-specific and will be addressed by the COL applicant. However, pursuant to 10 CFR 52.47(a)(1), a DC applicant must provide site parameters postulated for the design. The reviewer verifies that:

1. The postulated site parameters should be representative of a reasonable number of sites that may be considered within a COL application; e.g., the site parameter values should be reasonable as compared to site characteristics listed in previously docketed ESP applications;
2. The appropriate site parameters are included as Tier 1 information per SRP Section 14.3.1;
3. Pertinent parameters are stated in a site parameters summary table; and
4. The applicant has provided a technical basis for each of the site parameters.

c. Combined License Reviews

For a COL application referencing a certified standard design, NRC staff reviews that application to ensure sufficient information was presented to demonstrate that the characteristics of the site fall within the site parameters specified in the DC rule. Should the actual site characteristics not fall within the certified standard design site parameters, the COL applicant will need to demonstrate by some other means that the proposed facility is acceptable at the proposed site. This might be done by re-analyzing or redesigning the proposed facility.

For a COL application referencing an ESP, NRC staff reviews the application to ensure the applicant provided sufficient information to demonstrate that the design of the facility falls within the site characteristics and design parameters specified in the early site permit as applicable to this SRP section. Should the design of the facility not fall within the site characteristics and design parameters, the application shall include a request for a variance from the ESP that complies with the requirements of §§ 52.39 and 52.93.

In addition, long-term environmental changes and changes to the region resulting from human or natural causes may have introduced changes to the site characteristics that could be relevant to the design basis. The requirements of 10 CFR 52.39 preclude the Commission from changing or imposing new site characteristics, design parameters, or terms and conditions on an ESP, unless the change is necessary to assure adequate protection of the public health and safety or to bring the permit or site into compliance with the Commission's regulatory requirements in effect when the permit was issued. Consequently, the staff's review of a COL application referencing an ESP should not include a re-investigation of the site characteristics that have previously been accepted in the referenced ESP. However, in accordance with 10 CFR 52.6, "Completeness and Accuracy of Information," the applicant or licensee is responsible for identifying changes of which it is aware, that would satisfy the criteria specified in 10 CFR 52.39. Information provided by the applicant in accordance with 10 CFR 52.6(b) will be addressed by the staff during the review of a COL application referencing an ESP or a DC.

For a COL application referencing either an ESP or DC or both, the reviewer should review the corresponding sections of the ESP and DC FSER to ensure that any unresolved items, commitments, assumptions, and deferred issues identified in the FSERs are appropriately handled in the COL application.

IV. EVALUATION FINDINGS

The review should document the staff's evaluation of the onsite meteorological monitoring program and the resulting database against the relevant regulatory criteria. The evaluation should support the staff's conclusions as to whether the regulations are met. The reviewer should state what was done to evaluate the applicant's safety analysis report. The staff's evaluation may include verification that the applicant followed applicable regulatory guidance, performance of independent calculations, and/or validation of appropriate assumptions. The

reviewer may state that certain information provided by the applicant was not considered essential to the staff's review and was not reviewed by the staff. While the reviewer may summarize or quote the information offered by the applicant in support of its application, the reviewer should clearly articulate the bases for the staff's conclusions.

The reviewer verifies that the applicant has provided sufficient information and that the review and calculations (if applicable) support conclusions of the following type to be included in the staff's safety evaluation report. The reviewer also states the bases for those conclusions.

1. Construction Permit, Operating License, and Combined License Reviews

The following statements should be preceded by a summary of the onsite meteorological monitoring program used for the plant site:

As set forth above, the applicant has presented and substantiated information to establish relative to the onsite meteorological monitoring program and the resulting database important to the design and siting of this plant. The staff has reviewed the information provided and, for the reasons given above, concludes that the applicant has established consideration of the onsite meteorological monitoring program and the resulting database are acceptable and meet the requirements of 10 CFR 100.10 [or 10 CFR 100.20 and 10 CFR 100.21 for stationary power reactor site applications after January 10, 1997] with respect to determining the acceptability of the site.

The staff finds that the onsite data also provide an acceptable basis for making estimates of atmospheric dispersion for design basis accident and routine releases from the plant to meet the requirements of 10 CFR 100.11 [or 10 CFR 100.20 and 10 CFR 100.21 for stationary power reactor site applications after January 10, 1997], GDC 19, 10 CFR Part 20, and Appendix I to 10 CFR Part 50. Finally, the equipment provided for measurement of meteorological parameters during the course of accidents is sufficient to provide reasonable prediction of atmospheric dispersion of airborne radioactive materials in accordance with Appendix E to 10 CFR Part 50.

2. Early Site Permit Reviews

The following statements should be preceded by a summary of the site characteristics to be included in any ESP that might be issued for the ESP site:

As set forth above, the applicant has presented and substantiated information to establish the onsite meteorological monitoring program and the resulting database. The staff has reviewed the information provided and, for the reasons given above, concludes that the onsite meteorological monitoring system provides adequate data to represent onsite meteorological conditions as required by 10 CFR 100.20 and 10 CFR 100.21. The onsite data also provide an acceptable

basis for (1) making estimates of atmospheric dispersion for design basis accident and routine releases from a nuclear power plant or plants that might be constructed on the proposed site and (2) meeting the requirements of 10 CRP Part 20, 10 CFR Part 100 and Appendix I to 10 CFR Part 50.

If the ESP application contains proposed complete and integrated emergency response plans, add the following:

Finally, the equipment provided for measurement of meteorological parameters during the course of accidents is sufficient to provide reasonable prediction of atmospheric dispersion of airborne radioactive materials in accordance with Appendix E to 10 CFR Part 50.

V. IMPLEMENTATION

The staff will use this SRP section in performing safety evaluations of design certifications and license applications submitted by applicants pursuant to 10 CFR Part 50 or 52. Except when the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the staff will use the method described herein to evaluate conformance with Commission regulations.

The provisions of this SRP section apply to reviews of applications docketed six months or more after the date of issuance of this SRP section, unless superceded by a later revision.

VI. REFERENCES

1. 10 CFR Part 100, Subpart A, "Evaluation Factors for Stationary Power Reactor Site Applications Before January 10, 1997 and for Testing Reactors."
2. 10 CFR Part 100, Subpart B, "Evaluation Factors for Stationary Power Reactor Site Applications on or after January 10, 1997."
3. 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants."
4. 10 CFR 50.47, "Emergency Plans."
5. 10 CFR Part 50, Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities."
6. 10 CFR Part 50, Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion As Low As is Reasonably Achievable."
7. 10 CFR Part 20, Subpart D, "Radiation Dose Limits for Individual Members of the Public."
8. Regulatory Guide 1.23, "Onsite Meteorological Programs."
9. Darryl Randerson (ed.), "Atmospheric Science and Power Production," DOE/TIC-27601, U.S. Department of Energy (1984).

10. U.S. Environmental Protection Agency, Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-005, February 2000.
11. U.S. Environmental Protection Agency, Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV: Meteorological Measurements, EPA/600/R-94/038d, March 1995.
12. American Nuclear Society, "Determining Meteorological Information at Nuclear Facilities," ANSI/ANS-3.11-2005, December 2005.
13. NUREG-0917, "NRC Staff Computer Programs for Use with meteorological Data," July 1982.
14. 10 CFR Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants."

PAPERWORK REDUCTION ACT STATEMENT

The information collections contained in the draft Standard Review Plan are covered by the requirements of 10 CFR Part 50 and 10 CFR Part 52, and were approved by the Office of Management and Budget, approval number 3150-0011 and 3150-0151.

PUBLIC PROTECTION NOTIFICATION

The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.

SRP Section 2.3.3 Description of Changes

This SRP section affirms the technical accuracy and adequacy of the guidance previously provided in (Draft) Revision 3, dated April 1996 of this SRP. See ADAMS accession number ML061600247

In addition this SRP section was administratively updated in accordance with NRR Office Instruction, LIC-200, Revision 1, "Standard Review Plan (SRP) Process." The revision also adds standard paragraphs to extend application of the updated SRP section to prospective submittals by applicants pursuant to 10 CFR Part 52.

The technical changes are incorporated in Revision 3, dated 200X

Review Responsibilities - Reflects changes in review branches resulting from reorganization and branch consolidation. Change is reflected throughout the SRP.

REVIEW RESPONSIBILITIES - References to specific branches have been changed to indicate the organization responsible for the review of the onsite meteorological monitoring program and the resulting database. This type of change is reflected throughout the SRP.

I. AREAS OF REVIEW

- a. Added special considerations for meteorological instrumentation at complex terrain sites to the areas of review.
- b. Deleted the following text: "Additional meteorological measurement and information availability requirements for emergency preparedness pursuant to 10 CFR 50.47 and Appendix E to 10 CFR Part 50 are reviewed under Standard Review Plan (SRP) Sections 7.5 and 13.3 as described in the Review Interfaces below." This information belongs better in the "Review Interfaces" subsection.

Review Interfaces

- c. Added the following:
 - Summaries of the onsite meteorological data that are reviewed in this SRP section are presented in SRP section 2.3.2.
 - The onsite meteorological data reviewed in this SRP section are used to generate the short-term (accident release) and long-term (routine release) atmospheric dispersion factors reviewed in SRP sections 2.3.4 and 2.3.5, respectively.
 - The SRP section 7.5 review of the adequacy of instrumentation includes a review of the control room displays.

- The SRP Section 13.3 review of the capability of the meteorological monitoring system to provide the required near real-time meteorological information for use in dose projections during radiological emergencies includes a review that the information is available in the appropriate emergency response facilities.

II. ACCEPTANCE CRITERIA

- a. Clarified that 10 CFR 100 Subpart A criteria (e.g., 100.10 and 100.11) are applicable to stationary power reactor site applications before January 10, 1997.
- b. Added 10 CFR 100 Subpart B criteria (e.g., 100.20 and 100.21) for stationary power reactor site applications on or after January 10, 1997.
- c. Added 10 CFR Part 50, Appendix A, GDC 19 criteria.
- d. Added 10 CFR Part 20, Subpart D criteria.
- e. Added specific guidance concerning the type of information the description of the meteorological monitoring program should contain.
- f. Added that preferably 3 or more whole years of onsite data should be provided for OP, ESP, and COL applications that do not reference an ESP.
- g. Clarified that ESP applications should contain two (instead of just one) year of onsite data. If two years of onsite meteorological data are not available at the time the application is filed, the staff expects that the COL or ESP applicant will provide at least one annual cycle of meteorological data collected onsite with the application. These data should be used by the applicant to calculate (1) the short-term atmospheric dispersion estimates for accident releases discussed in SRP Section 2.3.4 and (2) the long-term atmospheric dispersion estimates for routine releases discussed in SRP Section 2.3.5. The applicant should be continue to monitor the data and submit the complete 2-year data set when it has collected all the data. This supplemental submittal should also include a reanalysis of the Section 2.3.4 and 2.3.5 atmospheric dispersion estimates based on the complete 2-year data set.
- l. Added that the applicant should identify and justify any deviations from the guidance provided in RG 1.23.

III. REVIEW PROCEDURES

- a. Added precipitation to the set of basic meteorological parameters that should be measured in accordance with the third proposed Revision 1 to RG 1.23.
- b. Added that additional guidance on instrumentation surveillance is provided in References 10, 11, and 12.

- c. Added that the procedures for the identification and handling suspect data should be evaluated.
- d. Added a subsection concerning special considerations for complex terrain.
- e. Added that the format of the joint frequency distribution and hourly average data are compared against the formats of RG 1.23.
- f. Added that if a site has a high occurrence of low wind speeds, a finer category breakdown beyond that specified in RG 1.23 should be used for the lower speeds to prevent the data from clustering in a few categories.
- g. Added that the data quality may be checked using the NUREG-0917 (Ref. 13) or similar methodology using a computer spreadsheet.

IV. EVALUATION FINDINGS

- a. No technical changes.

V. IMPLEMENTATION

- a. No technical changes.

VI. REFERENCES

- a. Deleted reference to RG 4.2 (although it was listed as a reference in the 1996 version, it was never referenced within the text of the main document).
- b. Deleted the following references:
 - R. C. Hilfiker, "Exposure of Instruments," Chapter in Air Pollution Meteorology Manual, Training Course 411 conducted by USEPA Air Pollution Training Institute, Research Triangle Park, North Carolina, August 1973.
 - D. A. Mazarella, "An Inventory of Specifications for Wind Measuring Instruments," Bull. Amer. Meteor. Soc. 53, 860 (1972).

Added the following references to replace the ones listed above:

- U.S. Environmental Protection Agency, "Meteorological Monitoring Guidance for Regulatory Modeling Applications," EPA-454/R-99-005, February 2000.
- U.S. Environmental Protection Agency, "Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV: Meteorological Measurements," EPA/600/R-94/038d, March 1995.

c. Deleted the following reference:

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

Added the following reference to replace the one listed above:

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

d. Deleted the following reference:

- C. E. P. Brooks and N. Caruthers, "Handbook of Statistical Methods in Meteorology," M.O. 538, Her Majesty's Stationary Office, London (1953)

Added the following reference to replace the one listed above:

- American Nuclear Society, "Determining Meteorological Information at Nuclear Facilities," ANSI/ANS-3.11-2005, December 2005.

e. Added the following references:

- 10 CFR Part 20, Subpart D, "Radiation Dose Limits for Industrial Members of the Public."
- 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants."
- 10 CFR Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants."
- 10 CFR Part 100, Subpart B, "Evaluation Factors for Stationary Power Reactor Site Applications on or after January 10, 1997."
- NUREG-0917, "NRC Staff Computer Programs for Use with Meteorological Data," July 1982.

VII. APPENDIX A

Deleted Appendix A, "Recommended Format for Hourly Meteorological Data to be Placed on magnetic tape." The information contained in this appendix has been moved to the Third Proposed Revision 1 to Regulatory Guide 1.23 (DG-1164), "Onsite Meteorological Programs."