



U.S. NUCLEAR REGULATORY COMMISSION
STANDARD REVIEW PLAN
OFFICE OF NUCLEAR REACTOR REGULATION

2.3.2 LOCAL METEOROLOGY

REVIEW RESPONSIBILITIES

Primary - ~~Accident Evaluation Branch (AEB)~~ Emergency Preparedness and Radiation Protection Branch (PERB)¹

Secondary - None

I. AREAS OF REVIEW

Information for a construction permit (CP), operating license (OL), combined license (COL), standard design certification, or early site permit² is presented by the applicant and reviewed by the staff concerning the local (site) meteorological parameters, an assessment of the potential influence of the plant and its facilities on local meteorological conditions, and 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 of the plant and its facilities on the local meteorological parameters listed in (1), 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 plant structures, including the site boundary, exclusion zone, and low population zone.

For a standard design certification review, the information listed in (1) should be provided in the site parameter envelope that must be met by the plant design.³

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USNRC STANDARD REVIEW PLAN

Standard review plans are prepared for the guidance of the Office of Nuclear Reactor Regulation staff responsible for the review of applications to construct and operate nuclear power plants. These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Standard review plans are not substitutes for regulatory guides or the Commission's regulations and compliance with them is not required. The standard review plan sections are keyed to the Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants. Not all sections of the Standard Format have a corresponding review plan.

Published standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C. 20555.

Review Interfaces⁴

The reviewer provides findings on meteorological parameters to the Civil Engineering and Geosciences Branch (ECGB) and other branches, as necessary, to review whether structures, systems, and components important to safety are adequately designed.⁵ The ECGB, under SRP Section 2.3.6 (proposed), reviews the adequacy of the site parameter envelope specified in standard design certification applications.⁶

II. ACCEPTANCE CRITERIA

The information regarding the local meteorological and topographic descriptions of the site area applicable ~~both before plant construction and during plant operation~~ for a CP, OL, COL, or early site permit licensing action⁷ should be adequately documented such that meteorological impacts on plant design and operation as well as the impact of the plant on local meteorological conditions can be reliably predicted. The information should be fully documented and substantiated ~~as to its representativeness of~~ to ensure that it represents⁸ conditions at and near the site. For a standard design certification licensing action, local meteorological parameters should be presented in the site parameter envelope specified for the proposed plant design.⁹ 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," 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,~~¹⁰ 100.10(c) 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 summaries of meteorological data based on onsite measurements in accordance with Regulatory Guide 1.23 and National Weather Service station summaries or other standard installation summaries from appropriate nearby locations should be presented as specified in Regulatory Guide 1.70, Section 2.3.2.
2. A complete topographical description of the site and environs out to a distance of ~~50 miles~~ 80 km (mi)¹¹ from the plant, as described in Regulatory Guide 1.70, Section 2.3.2.2, should be provided.
3. A discussion and evaluation of the influence of the plant and its facilities on the local meteorological and air quality conditions should be provided. A discussion of potential changes in the normal and extreme values as presented in the ~~SAR~~ safety analysis report (SAR)¹² resulting from plant construction and operation should be made. The

acceptability of the information is determined through comparison with standard assessments.

Technical Rationale¹³

The technical rationale for application of the above acceptance criteria is discussed in the following paragraphs:¹⁴

1. Compliance with GDC 2 requires that nuclear power plant structures, systems, and components important to safety be designed to withstand the effects of natural phenomena such as snow, ice, earthquake, tornado, hurricane, flood, tsunami, and seiche without loss of their safety functions.

To ensure that the nuclear plant is designed to withstand specified natural phenomena associated with the local meteorology, it is necessary to identify the most severe local weather phenomena reported for the site and its surrounding area. Thus, historical data must be obtained on snow and ice load; meteorological conditions affecting the ultimate heat sink; tornado parameters; wind speed; rainfall and freezing rain; and dust, sand, and atmospheric pollution. To meet GDC 2 requirements for all meteorological phenomena, these data (as well as the regional meteorological data from Standard Review Plan (SRP) Section 2.3.1) are used to specify design requirements for structures, systems, or components of the nuclear plant that may be affected by the meteorological phenomena.

Meeting these requirements will provide assurance that structures, systems, and components important to safety will be designed to withstand the effects of natural phenomena, thus preventing meteorological phenomena from initiating accidents at the nuclear plant.¹⁵

2. 10 CFR 100.10(c)(2) specifies that meteorological conditions at the site and in the surrounding area should be considered when evaluating the acceptability of proposed sites for nuclear power plants.

The requirement to consider meteorological conditions at and near the site is imposed so that atmospheric diffusion for the proposed plant site can be determined and so that radiological doses from airborne effluents from the plant can be calculated. This calculation is performed (a) for normal operating conditions to demonstrate that offsite doses do not exceed either the limits specified in 10 CFR Part 20 and (b) for postulated accidents to demonstrate that offsite doses do not exceed the guideline doses stipulated in 10 CFR Part 100.

Meeting this requirement provides assurance that offsite doses during normal operation and as the result of accidents will not exceed those specified in applicable regulations.¹⁶

III. REVIEW PROCEDURES

The procedures outlined below are used during early site permit, CP, or COL reviews to determine whether meteorological data and analyses meet the acceptance criteria given in

subsection II of this SRP section. For review of OL or COL applications in which an early site permit is referenced, these procedures are used to verify that meteorological data and analyses remain valid and that the facility's design specifications are consistent with these data. OL and COL reviews include a determination that the content and intent of technical specifications related to continued meteorological surveillance are acceptable and consider any unique meteorological conditions identified.¹⁷

Section 2.3 of the SAR is reviewed for content based on the specifications outlined in Regulatory Guide 1.70.

1. The summaries listed in Section 2.3.2.1 of Regulatory Guide 1.70 are reviewed for completeness and adequacy of basic data. The wind and atmospheric stability data should be based on onsite data, since airflow and vertical temperature structure can vary substantially from one location to another and are inputs to the assessment of atmospheric diffusion conditions at the site. The other summaries should be based on nearby representative stations with long periods of record since the locally measured extremes in intensity and frequency are compared to design basis values presented in the safety analysis report or are used by other branches to determine whether these meteorological conditions are limiting conditions for design and emergency procedures. When offsite data are used, a determination is made of how well the data represent site conditions and whether more representative data are available. National Oceanic and Atmospheric Administration (NOAA) State meteorological summaries, local climatological data, and NOAA Environmental Data Service summaries pertinent to the site are used by the reviewer to evaluate ~~the representativeness of~~ whether the data represent¹⁸ 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 plant structures, 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 to standard assessments such as those presented in "Meteorology and Atomic Energy - 1968" and decides whether the standard regulatory atmospheric diffusion models (discussed in SRP Sections 2.3.4 and 2.3.5) are appropriate for this site.

3. The reviewer evaluates the contents of Section 2.3.2 of the SAR as follows:
 - a. Determine the terrain modifications that will occur as a result of plant construction such as removal of trees, leveling of ground, and installation of lakes and ponds.
 - b. Determine the location, size, and materials used for plant structures, including buildings, switchyard gear, parking lots, and roads.

- c. Determine and quantify the heat and moisture sources that will result from plant operations.
- d. Relate the input information in items a, b, and c, above, to local meteorological modifications.
- e. Determine air quality conditions used for design and operating basis considerations.
- f. Compare the reviewer's assessment with that of the applicant.

4. Early Site Permit Reviews

10 CFR Part 52 sets out requirements and procedures applicable to issuance of early site permits for approval of a proposed site. Information required for such a permit includes the number, type, and thermal power level of the facilities for which the site may be used; the types of cooling systems used; and a description of the meteorological characteristics of the proposed site. For this type of permit, the scope and level of detail for reviewing local meteorological data parallel those used in the CP review.¹⁹

5. Standard Design Reviews

For standard design certification reviews, site-related meteorological parameters must be identified in the site parameter envelope. These parameters should be representative of credible meteorological characteristics. The reviewer verifies that meteorological parameters in the site parameter envelope are consistent with the acceptance criteria given in subsection II of this SRP section.

For an application referencing a certified standard design, measured site-related meteorological parameters for the proposed site should be consistent with those identified in the site parameter envelope included in the standard design certification application.²⁰

- ~~6. The reviewer provides the findings on meteorological parameters to the Structural Engineering Branch and other branches as necessary for review of the adequacy of the design of structures, systems and components important to safety.²¹~~

For standard design certification reviews under 10 CFR Part 52, the procedures above should be followed, as modified by the procedures in SRP Section 14.3 (proposed), to verify that the design set forth in the standard safety analysis report, including inspections, tests, analysis, and acceptance criteria (ITAAC), site interface requirements and combined license action items, meet the acceptance criteria given in subsection II. SRP Section 14.3 (proposed) contains procedures for the review of certified design material (CDM) for the standard design, including the site parameters, interface criteria, and ITAAC.²²

IV. EVALUATION FINDINGS

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

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 this plant.

The staff concludes that the identification and consideration of the meteorological, air quality, and topographical characteristics at the site and in the surrounding area are acceptable and meet the requirements of 10 CFR ~~Part 100~~,²³ 100.10(c)(2) with respect to determining the acceptability of the site.

The staff also concludes that the identification and consideration by the applicant of the severe local weather phenomena at the site and the surrounding 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.

For a COL referencing a plant design that has received a standard design certification, the reviewer's evaluation must also support a concluding statement similar to the following:

Measured meteorological parameters for the proposed site are consistent with those identified in the site parameter envelope for the certified design.²⁴

These conclusions are based on the following:

- (1) The applicant has provided and substantiated information on local meteorological and air quality conditions and characteristics, including severe weather phenomena, in accordance with Regulatory Guide 1.70, Section 2.3.2, and in accordance with standard practice as promulgated by the National Oceanic and Atmospheric Administration; and
- (2) The applicant has met the regulatory positions in Regulatory Guide 1.23 with respect to reporting the onsite meteorological data.

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

For design certification reviews, the findings will also summarize, to the extent that the review is not discussed in other safety evaluation report sections, the staff's evaluation of inspections, tests, analyses, and acceptance criteria (ITAAC), including design acceptance criteria (DAC), site interface requirements, and combined license action items that are relevant to this SRP section.²⁵

V. IMPLEMENTATION

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

This SRP section will be used by the staff when performing safety evaluations of license applications submitted by applicants pursuant to 10 CFR 50 or 10 CFR 52.²⁶ 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.

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.²⁷

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 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants."²⁸
23. 10 CFR ~~Part 100, Section~~²⁹ 100.10, "Factors to be Considered When Evaluating Sites."
34. Regulatory Guide 1.23, "Onsite Meteorological Programs."
45. U.S. Department of Commerce, "State Climatological Summary," Environmental Data Service, NOAA, published annually by state.
56. U.S. Department of Commerce, "Local Climatological Data - Annual Summary with Comparative Data," Environmental Data Service, NOAA, published annually for all first-order NWS stations.
67. Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants."
78. D. H. Slade (ed.), "Meteorology and Atomic Energy - 1968," TID-24190, Division of Technical Information, USAEC-(1968).³⁰

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SRP Draft Section 2.3.2
Attachment A - Proposed Changes in Order of Occurrence

Item numbers in the following table correspond to superscript numbers in the redline/strikeout copy of the draft SRP section.

Item	Source	Description
1.	Current PRB name and abbreviation	Changed PRB to Emergency Preparedness and Radiation Protection Branch (PERB).
2.	SRP-UDP format item	Identified the different types of review per 10 CFR Part 52.
3.	Integrated Impact No. 228	Identified site parameter envelope needed for standard design certification.
4.	SRP-UDP format item	Added "Review Interfaces" to AREAS OF REVIEW.
5.	SRP-UDP format item	Relocated review interfaces paragraph deleted from REVIEW PROCEDURES, paragraph 6.
6.	Integrated Impact 228	Included a review interface to new SRP section 2.3.6 for review of DC site parameter envelope.
7.	SRP-UDP format item	Identified the different types of review per 10 CFR Part 52.
8.	Editorial	Revised awkward phrase.
9.	Integrated Impact No. 228	Identified site parameter envelope needed for standard design certification.
10.	Editorial	Provided correct format for citing the Code of Federal Regulations.
11.	SRP-UDP format item	Converted "50 miles" to "80 km (50 mi)."
12.	Editorial	Defined "SAR" as "safety analysis report."
13.	SRP-UDP format item, develop technical rationale	Added "Technical Rationale" to ACCEPTANCE CRITERIA and used numbered paragraphs to describe bases for referencing GDC 2 and 10 CFR 100.10(c)(2).
14.	SRP-UDP format item, develop technical rationale	Added leadin sentence for "Technical Rationale."
15.	SRP-UDP format item, develop technical rationale	Added technical rationale for GDC 2.
16.	SRP-UDP format item, develop technical rationale	Added technical rationale for 10 CFR 100.10(c)(2).
17.	SRP-UDP format item	Added paragraph to differentiate between early site reviews, CP, OL, and COL data and analyses requirements.
18.	Editorial	Revised awkward phrase.

SRP Draft Section 2.3.2
Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
19.	SRP-UDP format item	Added paragraph to identify scope of review requirement for early site permits per 10 CFR Part 52.
20.	Integrated Impact No. 228	Added paragraph to identify scope of review requirements for standard design certification.
21.	Current PRB name and abbreviation/SRP-UDP format item	Changed PRB to Civil Engineering and Geosciences Branch (ECGB) and moved paragraph to AREAS OF REVIEW, "Review Interfaces."
22.	SRP-UDP Guidance, Implementation of 10 CFR 52	Added standard paragraph to address application of Review Procedures in design certification reviews.
23.	Editorial	Provided correct format for citing the Code of Federal Regulations.
24.	Integrated Impact No. 228	Identified COL compliance with site parameter envelope for certified standard design .
25.	SRP-UDP Format Item, Implement 10 CFR 52 Related Changes	To address design certification reviews a new paragraph was added to the end of the Evaluation Findings. This paragraph addresses design certification specific items including ITAAC, DAC, site interface requirements, and combined license action items.
26.	SRP-UDP Guidance, Implementation of 10 CFR 52	Added standard sentence to address application of the SRP section to reviews of applications filed under 10 CFR Part 52, as well as Part 50.
27.	SRP-UDP Guidance	Added standard paragraph to indicate applicability of this section to reviews of future applications.
28.	Integrated Impact No. 228	Added reference to 10 CFR Part 52.
29.	Editorial	Provided correct format for citing the Code of Federal Regulations.
30.	Editorial	Deleted repetition of date.

SRP Draft Section 2.3.2
Attachment B - Cross Reference of Integrated Impacts

Integrated Impact No.	Issue	SRP Subsections Affected
228	Modify review procedures of SRP Section 2.3.2 to require inclusion of site parameter envelopes in applications for standard design certification per 10 CFR Part 52.	<p>Subsection I, AREAS OF REVIEW, first paragraph, paragraph 1 and Review Interfaces paragraph.</p> <p>Subsection II, ACCEPTANCE CRITERIA, first paragraph.</p> <p>Subsection III, REVIEW PROCEDURES, paragraph 5.</p> <p>Subsection IV, EVALUATION FINDINGS, second paragraph.</p> <p>Subsection VI, REFERENCES, Reference 2.</p>
1175	Revise the Acceptance Criteria, Review Procedures, and Evaluation Findings as necessary to incorporate the guidance of the proposed draft Regulatory Guide ES 926-4 (second proposed revision 1 to RG 1.23).	No changes to SRP at this time, pending final issue of the Regulatory Guide.
1261	Revise the Acceptance Criteria, Review Procedures, and Evaluation Findings as necessary to incorporate the guidance of the proposed draft Regulatory Guide DG-4004 (previously DG-4003) (proposed revision 2 to RG 4.7).	No changes to SRP at this time, pending final issue of the Regulatory Guide.