



U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

OFFICE OF NUCLEAR REACTOR REGULATION

2.1.1 SITE LOCATION AND DESCRIPTION

REVIEW RESPONSIBILITIES

Primary - ~~Siting Analysis Branch (SAB)~~ Civil Engineering and Geosciences Branch (ECGB)¹

Secondary - None

I. AREAS OF REVIEW

Reactor location is reviewed (1) as identified by latitude and longitude and by the UTM⁽¹⁾ coordinate system; (2) with respect to political subdivisions; and (3) with respect to prominent natural and man-made features of the area to ascertain the accuracy of the applicant's safety analysis report (SAR) description and for use in independent reviews of the exclusion area authority and control (SRP Section 2.1.2), the surrounding population (SRP Section 2.1.3) and nearby man-made hazards (SRP Section 2.2.3).

The site area which contains the reactors and associated principal plant structures is reviewed to determine the distance from the reactor to boundary lines of the exclusion area, including the direction and distance from the reactor to the nearest exclusion area boundary line. ~~A scaled plot plan of the exclusion area is reviewed which permits distance measurements to the exclusion area boundary in each of the 22-1/2 degree segments centered on the 16 cardinal compass points. The location and orientation of plant structures within the exclusion area are reviewed to identify potential release points and their distances to exclusion area boundary lines.~~² The location, distance, and orientation of plant structures with respect to highways, railways, roads³, and waterways which traverse or lie adjacent to the exclusion area are reviewed to assure⁴ that

(1) Universal Transverse Mercator coordinate system as found on USGS topographical maps.

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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.

they are adequately described to permit analyses (SRP Section 2.2.3) of the possible effects on the plant of accidents on these transportation routes.

The description of the restricted area will be reviewed to verify that adequate information has been provided to determine general population doses from normal liquid and gaseous releases.⁵

An applicant for a standard design certification may postulate values for site parameters as a basis for plant design.⁶

Review Interfaces

1. The EGCB performs the following reviews as part of its primary review responsibility under the SRP sections indicated:⁷
 - a. ECGB reviews the applicant's authority to control activities in the exclusion area as part of its primary responsibility for implementation of SRP Section 2.1.2.
 - b. The ECGB reviews the population distribution in the exclusion area and the low population zone as part of its primary responsibility for implementation of SRP Section 2.1.3.
 - c. The ECGB reviews industrial, military, and transportation facilities within or near the exclusion area as part of its primary responsibility for implementation of SRP Section 2.2.3.
 - d. The ECGB coordinates and performs the review of site parameters postulated for design in a standard design certification application as part of its primary review responsibility for SRP Section 2.3.6.⁸
2. The EGCB will coordinate other branch evaluations that interface with the overall review of site location and description as follows:⁹
 - a. The Plant Systems Branch (SPLB) considers the boundaries of the restricted area as part of its primary responsibility for implementation of SRP Sections 11.1, 11.2, and 11.3.
 - b. The Emergency Preparedness and Radiation Protection Branch (PERB) considers activities in the exclusion area as part of its primary responsibility for implementation of SRP Section 13.3 and Section 15.

II. ACCEPTANCE CRITERIA

Information included in this SAR section should allow three types of safety analyses to be conducted. The first addresses exposure of the public to radiation at the boundary of the restricted area of the plant. The second addresses the consequences in the unlikely event that a serious release of radioactive material should occur. The third addresses the effect that accidents

on, or routine use of, transportation routes on or near the site will have on the operation of the plant.¹⁰

The acceptance criteria for site location and description are based on meeting the relevant requirements of the following sections of Title 10 CFR: Part 20, "Standards for Protection Against Radiation," Subpart D, "Radiation Dose Limits for Individual Members of the Public;" Part 100, "Reactor Site Criteria;" and, Part 50, "Domestic Licensing of Production and Utilization Facilities," §50.34, "Contents of Applications, Technical Information."¹¹ The relevant requirements of these regulations are:

1. 10 CFR 20.1301 effectively places limits on the annual average releases in gaseous and liquid effluents at the boundary of the restricted area by placing limits on the exposure an individual would receive if continually present at the boundary of the restricted area.¹²

10 CFR 20.1003 defines restricted area.¹³

~~12¹⁴. 10 CFR Part 100, §100.10 as it relates to site acceptance being based on the consideration of factors relating to the proposed reactor design and the characteristics peculiar to the site,~~ "Factors to be Considered when Evaluating Sites," requires that the site location and the engineered features included as safeguards against the hazardous consequences of an accident, should one occur, should ensure a low risk of public exposure. In particular, in determining the acceptability of a site for a power reactor, the Commission will take into consideration population density and use characteristics of the site environs, including the exclusion area, low population zone, and population center distance.¹⁵

10 CFR Part 100.11(a)(1) requires that the applicant determine an exclusion area such that certain dose limits would not be exceeded in the event of a postulated fission product release.¹⁶

10 CFR 100.3(a) defines exclusion area, and sets forth requirements regarding activities in that area.¹⁷

~~23¹⁸. 10 CFR Part 50, §50.34 as it relates to the applicant submitting in its~~ requires that the preliminary and final safety analysis reports (PSAR and FSAR) include a description and safety assessment of the site on which the facility is to be located, with appropriate attention to features affecting facility design. ~~information needed for evaluating factors involving the use characteristics of the site environs.~~¹⁹

The information submitted by the applicant is adequate and meets the 10 CFR Part 50, §50.34 requirements if it satisfies the following criteria:

The site location including the boundaries of the restricted area, showing proposed effluent release points, is described in sufficient detail to allow determinations (in SRP Sections 11.1, 11.2, and 11.3) that 10 CFR 20, Subpart D will be met.²⁰

The site location including the exclusion area and the location of the plant within the area are described in sufficient detail to allow a determination (in SRP Sections 2.1.2, 2.1.3, and those in Section 15) that 10 CFR Part 100 is met.

Highways, railroads, and waterways which traverse the exclusion area are described in sufficient detail to allow a determination to be made by the reviewer that 10 CFR 100.3(a) is met. ~~sufficiently distant from plant structures so that routine use of these routes is not likely to interfere with normal plant operation (Ref. 1)~~²¹.

~~Information included in this SAR section should allow two types of safety analyses to be conducted. The first addresses the consequences in the unlikely event that a serious release of radioactive material should occur. The second addresses the effect that accidents on, or routine use of, routes on or near the site will have on the operation of the plant.~~²²

Technical Rationale

The technical rationale for application of the above acceptance criteria to the review of the site location and description is discussed in the following paragraphs.²³

1. Compliance with 10 CFR 20 Subpart D requires that each licensee conduct operations such that the potential radiation dose to the general public at the boundary of the restricted area be within specified limits.

The review performed under SRP Section 2.1.1 ensures that the application contains sufficient information to allow potential exposure at the boundary of the restricted area to be determined.

Meeting this requirement provides a level of assurance that exposure of the public to radiation during normal operation of the plant will be maintained within acceptable limits.²⁴

2. Compliance with 10 CFR 100.10 requires that use characteristics of the plant environs be reflected in siting and in plant design. In 10 CFR 100.11(a)(1) it is required that the applicant determine an exclusion area of such size that an individual located at any point on its boundary for two hours immediately following onset of the postulated fission product release would not receive a radiation dose exceeding prescribed limits. The exclusion area is further defined in 10 CFR 100.3(a). The licensee must have authority to determine all activities including exclusion or removal of personnel and property from the exclusion area. The exclusion area may be traversed by a highway, railroad, or waterway, provided these are not so close to the facility as to interfere with normal operations of the facility. Residence within the exclusion area shall normally be prohibited. Activities unrelated to operation of the reactor may be permitted in the exclusion area under appropriate limitations, provided that no significant hazards to the public health and safety will result.

The review performed under SRP Section 2.1.1 ascertains that the application contains information of sufficient accuracy and completeness to enable a determination of compliance with 10 CFR 100 to be made. The review further determines that transportation corridors within the exclusion area do not interfere with normal plant operation. Compliance with other substantive requirements of 10 CFR 100 is reviewed under SRP Sections 2.1.2, 2.1.3, 2.2.3, and parts of Section 15.

Meeting these requirements provides a level of assurance that an accidental release of fission products will be maintained within acceptable levels and that there is reasonable probability that appropriate protective measures can be taken in the event of a serious accident.²⁵

3. Compliance with 10 CFR 50.34 requires that the preliminary and final safety analysis reports (PSAR and FSAR) include a description and safety assessment of the site on which the facility is to be located.

The review performed under SRP Section 2.1.1 ascertains that the safety analyses contain this description and assessment.

Meeting these requirements provides a level of assurance that plant design and operation will reflect site considerations in a manner adequate to minimize the likelihood and the consequences of an accident.²⁶

III. REVIEW PROCEDURES

Selection and emphasis of various aspects of the areas covered by this SAR section will be made by the reviewer on each case. The judgment on the areas to be given attention during the review is to be based on an inspection of the material presented, the similarity of the material to that recently reviewed on other plants, and whether items of special safety significance are involved.

The information in this section of the SAR forms the basis for evaluations performed in various other sections. The purpose of this review is to establish the validity of the basic data, to check the UTM coordinates to assure that they include the zone number, and that the Northing and Easting are presented to within 100 meters. The latitude and longitude should be checked to assure²⁷ that they are expressed to the nearest second. A scaled plot plan of the exclusion area is reviewed which permits distance measurements to the exclusion area boundary in each of the 22-1/2 degree segments centered on the 16 cardinal compass points. The location and orientation of plant structures within the exclusion area are reviewed to identify potential liquid and gaseous effluent release points and their distances to restricted area and exclusion area boundary lines.²⁸

The reviewer should verify that the boundary of the restricted area is shown on the plot plan or site maps and is described relative to plant structures. Verify that proposed radiological effluent release points are shown and identified. Check with the SPLB reviewer to verify that the applicant will meet the limitations in 20 CFR Subpart D. If the applicant has proposed alternate effluent limitations, check with the PERB reviewer to ascertain that the application contains sufficient information to evaluate those alternate limitations. Check with the PERB reviewer to

verify that the application contains sufficient detail to allow an evaluation of proposed controls for radiation protection purposes.²⁹

The reviewer should cross-check the exclusion area distances with distances used in the Accident Analyses, SAR Section 15. The reviewer should³⁰ scale the map provided to check distances specified in the SAR and to determine the distance-direction relationships to exclusion area boundaries, roads, railways³¹, waterways, and other significant features of the area. At the operating license stage, the location and orientation of plant structures and effluent release points with respect to the exclusion area and plant property boundaries, transportation routes and political subdivisions will be reviewed to identify any changes since the construction permit (CP) review. Where changes have occurred, new analyses may be required to ensure that the findings reached during the CP review are not affected by these changes.

If, in the reviewer's judgment, maps of larger scale are desirable, they may be obtained from the U.S. Geological Survey (USGS). The USGS map index should be consulted for the specific names of the 7-1/2 minute quadrangles that bracket the site area. If available, these maps provide topographic information in addition to details of prominent natural and man-made features in the site area. This information may be supplemented by updated information as available, e.g., aerial photographs or information obtained on the site visit. The reviewer should check the plant layout to determine that the orientation of plant structures with respect to nearby roads, railways³², and waterways is clearly shown. The reviewer should³³ apply engineering judgement to confirm that ~~check to see that there are~~ there is³⁴ no obvious ways in which transportation routes which traverse the exclusion area can interfere with normal plant operations.

Site Visit

For an early site permit, CP or combined license (COL) review,³⁵ a visit to the site under review permits a better understanding of the physical characteristics of the site and its relationship to the surrounding area. It permits the reviewer to gather information, independent of that supplied in the Safety Analysis Report, which is useful in confirming SAR data.

Site visits should be made after initial review of the site data in the SAR has been completed and the reviewer has become generally familiar with the site and surrounding areas. Since one of the purposes of the site visit is to discuss the preliminary review findings with the applicant, the reviewer should plan to be in the site area one or two days in advance of the scheduled meeting with the applicant. This will permit gathering information from visits to local offices of Federal, State, and county governments, industries, military facilities, etc. Specific visits to these offices should be made on the basis of the particular site characteristics and is left to the judgment of the individual reviewer. The reviewer should note that some of the local offices may have been contacted by the environmental reviewer. Generally, information sought by the respective reviewers is similar in scope but will differ in emphasis. To avoid duplication of visits to local officials, the reviewer should contact the Project Manager and, where feasible, arrange for a joint visit to those local offices in which there is a common interest. Sources investigated should include such State and local agencies as those concerned with population and land use and land use controls (zoning boards). County engineers are sources of information on public roads and traffic volumes. Local Councils of Government may have information on population growth,

proposed new industries or transportation routes. Information sought should encompass, whenever possible, data in support of the review procedures for SRP Sections 2.1.3, 2.2.1, 2.2.2, and 2.2.3.

If information gathered indicates the need for clarification of data contained in the SAR, this should be discussed with the applicant in the subsequent meeting on preliminary review findings.

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.³⁶

IV. EVALUATION FINDINGS

For an early site permit, CP, OL, or COL review³⁷, the reviewer verifies that the information submitted by the applicant is in accordance with 10 CFR Part 50, §50.34 requirements so that compliance with 10 CFR Part 20, Subpart D, and³⁸ 10 CFR Part 100, §100.10, §100.11(a)(1), and §100.3(a)³⁹ can be evaluated. The reviewer determines that normal use of transportation routes traversing the exclusion area will not interfere with normal plant operation.⁴⁰

Summary descriptions of the site location, the site itself, and transportation routes on or near the site will be prepared for the staff safety evaluation report. Any deficiencies of site parameters with respect to the proposed plant will be noted.

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, including design acceptance criteria, site interface requirements, and combined license action items that are relevant to this SRP section.⁴¹

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 52.⁴² 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.⁴³

VI. REFERENCES

1. 10 CFR Part 20, "Standards for Protection Against Radiation," Subpart D, "Radiation Dose Limits for Individual Members of the Public."⁴⁴
2. 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," Section 50.34.
3. 10 CFR Part 100, "Reactor Site Criteria."
4. Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants."

SRP Draft Section 2.1.1
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 primary review branch name and abbreviation	Revised the primary review branch name and abbreviation, (ECGB).
2.	Editorial revision	Moved two sentences, instructing the reviewer to determine distances to the exclusion area boundary, to the section on Review Procedures because they provide details on how the review of the exclusion area will be performed.
3.	Editorial correction	Changed "railways" to "railroads." The regulations use the word railroad rather than railway. Regulatory Guide 1.70 uses railway. This SRP has been edited to be consistent in the use of the wording from the regulation (10CFR100.3(a)).
4.	Editorial correction	"Ensure" rather than "insure" is intended.
5.	Integrated Impact Number 1454	A sentence was inserted to show that the areas of review include the restricted area. In updating this SRP it was noted that Regulatory Guide 1.70 requires information regarding the restricted area. The SRP did not provide guidance to the reviewer on this subject. Review of the description of the restricted area is now included in this SRP section.
6.	SRP-UPD format item	Added a sentence explaining that the standard design certification applicant may postulate values for site parameters of interest.
7.	SRP-UDP Update item	Added a subsection titled Review Interfaces. Added the standard introduction to the section which identifies interfacing SRP sections for which the primary review branch is responsible.
8.	SRP-UDP format item	Added a review interface with the new SRP Section 2.3.6.
9.	SRP-UDP format item	Added a boiler plate introduction to the section which identifies interfacing SRP sections for which branches other than the primary review branch are responsible.
10.	Editorial revision	This paragraph was moved here from the end of the Acceptance Criteria section and edited to include review of the restricted area.
11.	Editorial addition. Integrated Impact Number 1454	This section was expanded by adding the titles of each section of the CFR cited. It was also expanded to include the section of the regulations containing requirements for the restricted area (Part 20).

SRP Draft Section 2.1.1
Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
12.	Integrated Impact Number 1454	The requirements of the 10 CFR 20 concerning restricted area are cited.
13.	Integrated Impact Number 1454	The regulation defining the restricted area is cited.
14.	Editorial revision	The acceptance criteria are renumbered.
15.	Editorial revision	The paragraph was rewritten to be more specific about the requirement of 10 CFR 100.10 relevant to this SRP.
16.	Editorial addition	The paragraph was added to identify that Part 100.11 also contributes to the basis for the acceptance criteria.
17.	Editorial addition	The paragraph was added to identify that Part 100.3 also contributes to the basis for the acceptance criteria.
18.	Editorial revision	The acceptance criteria are renumbered.
19.	Editorial revision	The paragraph was rewritten to better show the relevance to the acceptance criteria.
20.	Integrated Impact Number 1454	The paragraph was added to show an acceptance criterion for the restricted area which parallels the acceptance criteria for the exclusion area and the transportation routes.
21.	Editorial revision	Since the basis for accepting the information is Part 50.34, rather than Part 100, the sentence is rewritten to be clearer that it is the information which is being accepted, rather than the transportation routes themselves. It is 10 CFR Part 100.3 which places restrictions on the transportation routes. The reference is deleted because it is unnecessary.
22.	Editorial revision	This paragraph was moved to the head of the Acceptance Criteria section and edited. See change number 8.
23.	SRP-UDP format item	Added subsection titled "Technical Rationale" to Acceptance Criteria and put in paragraph form to describe the bases for referencing the CFR. Added standard lead-in sentence for "Technical Rationale."
24.	SRP-UDP format item. Develop technical rationale	Added technical rationale for 10 CFR 20.
25.	SRP-UDP format item. Develop technical rationale	Added technical rationale for 10 CFR 100.
26.	SRP-UDP format item. Develop technical rationale	Added technical rationale for 10 CFR 50.34.
27.	Editorial correction	"Ensure" rather than "insure" is intended.

SRP Draft Section 2.1.1
Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
28.	Editorial revision	Moved two sentences, instructing the reviewer to determine distances to the exclusion area boundary, here from the Areas of Review section since the sentences tell how to do the review.
29.	Integrated Impact Number 1454	Added a paragraph instructing the reviewer on how to address information on the restricted area.
30.	Editorial addition	Added phrase, "The reviewer should," making instructions to reviewer clearer.
31.	Editorial correction	Changed railways to railroads to be consistent with 10 CFR 100.3(a).
32.	Editorial correction	Changed railways to railroads to be consistent with 10 CFR 100.3(a).
33.	Editorial addition	Added phrase, "The reviewer should," making instructions to reviewer clearer.
34.	Editorial addition	Added a procedure instructing the reviewer to use personal judgement in making the determination that there is no obvious way for normal transportation routes to interfere with plant operation.
35.	Editorial addition	Added the clause "for an early site permit, CP, or COL review" to the introduction of the Site Visit subsection. No site visit can be made for a design certification review.
36.	SRP-UDP Guidance, Implementation of 10 CFR 52	Added standard paragraph to address application of Review Procedures in design certification reviews.
37.	SRP-UDP format item	Added wording to show findings are applicable to early site permit, CP, OL, or COL reviews.
38.	Integrated Impact Number 1454	Adding wording to show that reviewer must find that information on the restricted area is adequate.
39.	Editorial addition	Reference to compliance with §100.11(a)(1) and §100.3(a) were added to provide complete identification of the applicable paragraphs of Part 100.
40.	Editorial addition	The review procedures instruct the reviewer to make this finding. It is important enough to include in the findings section.
41.	SRP-UDP format item	Added standard paragraph prescribing additional findings for a design certification review.
42.	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.
43.	SRP-UDP Guidance	Added standard paragraph to indicate applicability of this section to reviews of future applications.

SRP Draft Section 2.1.1
Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
44.	Integrated Impact Number 1454	Added a reference for 10 CFR Part 20.

SRP Draft Section 2.1.1
Attachment B - Cross Reference of Integrated Impacts

Integrated Impact No.	Issue	SRP Subsections Affected
1454	Added guidance to SRP Section 2.1.1 addressing review of the information on the restricted area which is requested in Regulatory Guide 1.70.	<p>Subsection I, Areas of Review, third paragraph.</p> <p>Subsection I, Areas of Review, Review Interfaces, second paragraph.</p> <p>Subsection II, Acceptance Criteria, second paragraph, and subitem 1.</p> <p>Subsection II, Acceptance Criteria, second paragraph, first subparagraph.</p> <p>Subsection II, Acceptance Criteria, third paragraph, first subparagraph.</p> <p>Subsection II, Acceptance Criteria, Technnical Rationale, first paragraph, item 1.</p> <p>Subsection, III Review Procedures, third paragraph.</p> <p>Subsection IV, Evaluation Findings, first paragraph.</p>