



U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

OFFICE OF NUCLEAR REACTOR REGULATION

3.5.1.6 AIRCRAFT HAZARDS

REVIEW RESPONSIBILITIES

Primary - ~~Siting Analysis~~ Plant Systems Branch (~~SAB~~)(SPLB)¹

Secondary - ~~None~~ Civil Engineering and Geosciences Branch (ECGB)²

I. AREAS OF REVIEW

The staff reviews the applicant's assessment of aircraft hazards. The purpose of the review is to assure that the risks due to aircraft hazards are sufficiently low. Probabilistic considerations may be used to demonstrate that aircraft hazards need not be a design basis concern. Otherwise, design basis aircraft identification is made and the applicant's plant design is evaluated to assure that it is protected against the potential effects of aircraft impacts and fires.

The ~~SAB~~SPLB³ reviews the applicant's assessment of aircraft hazards to the plant and determines whether or not they should be incorporated into the plant design basis. If the aircraft hazards are incorporated into the plant design basis, the ~~SAB~~SPLB⁴ identifies and describes the design basis aircraft in terms of aircraft weight, speed, and other appropriate characteristics.

For design certifications, aircraft hazards may be included in the site parameter envelope that must be met by the plant design. For review of such applications, the SPLB reviews the applicant's assessment aircraft hazards and their incorporation into the design basis. For applications referencing a certified design that includes aircraft hazards in its site parameter envelope, SPLB reviews site specific hazards for consistency with that envelope.⁵

DRAFT Rev. 3 - April 1996

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 Interfaces:⁶

The SPLB also performs the following reviews under the SRP sections indicated:⁷ ~~On request by SAB, the following branches with primary review responsibility will review specific aspects of aircraft hazards:~~⁸

- ~~1. The Structural Engineering Branch (SEB), in the area of missile effects (SRP Section 3.5.3), with respect to aircraft impacts;~~⁹
21. The Chemical Engineering Branch (CMEB) SPLB¹⁰, in the area of reviews¹¹ fire protection (SRP Section 9.5.1); with respect to aircraft fires under SRP Section 9.5.1.; and¹²
32. The Auxiliary Systems Branch (ASB) SPLB¹³, in the area of reviews¹⁴ structures, systems, and components (SSC) important to safety (SRP Section 3.5.2); with respect to protection requirements against aircraft crashes under SRP Section 3.5.2.¹⁵
- ~~4. For those areas of review identified above as being part of the primary responsibility of other branches, the acceptance criteria necessary for the review and the methods of their application are contained in the referenced SRP sections of the corresponding primary branches.~~¹⁶

In addition, the SPLB will coordinate other branches' evaluations that interface with specific aspects of aircraft hazards as follows: ~~On request by SAB, the following branches with primary review responsibility will review specific aspects of aircraft hazards:~~¹⁷

- ~~51. The Applied Statistics Branch (ASB/MPA) Probabilistic Safety Assessment Branch (SPSB)~~¹⁸ will provide technical review support with respect to aircraft accident statistics.
12. The Structural Civil Engineering and Geosciences Branch (SEB) (ECGB)¹⁹, will provide technical review support²⁰ in the area of missile effects (SRP Section 3.5.3), with respect to aircraft impacts.²¹ The ECGB also reviews, under SRP Section 2.3.6 (proposed), the adequacy of the site parameter envelope specified in standard design certification applications.²²

For those areas of review identified above the acceptance criteria necessary for the review and the methods of their application are contained in the referenced SRP sections of the corresponding primary branches.²³

II. ACCEPTANCE CRITERIA

~~SAB~~ SPLB²⁴ acceptance criteria are based on meeting the relevant requirements of one of the following sets of regulations:

1. 10 CFR Part 100, §100.10 as it relates to indicating that the site location, in conjunction with other considerations (such as plant design, construction, and operation), should insure a low risk of public exposure. This requirement is met if the probability of aircraft

accidents resulting in radiological consequences greater than 10 CFR Part 100 exposure guidelines is less than about 10^{-7} per year (see SRP Section 2.2.3). The probability is considered to be less than about 10^{-7} per year by inspection if the distances from the plant meet all the requirements listed below:

- (a) The plant-to-airport distance D is between 8.05 and 16.1 kilometers (5 and 10 statute miles)²⁵, and the projected annual number of operations is less than $193 D^2$ ($500 D^2$)²⁶, or the plant-to-airport distance D is greater than 16.1 kilometers (10 statute miles)²⁷, and the projected annual number of operations is less than $386 D^2$ ($1000 D^2$)²⁸,
- (b) The plant is at least 8.05 kilometers (5 statute miles)²⁹ from the edge of military training routes, including low-level training routes, except for those associated with a usage greater than 1000 flights per year, or where activities (such as practice bombing) may create an unusual stress situation,
- (c) The plant is at least 3.22 kilometers (2 statute miles)³⁰ beyond the nearest edge of a federal airway, holding pattern, or approach pattern.

If the above proximity criteria are not met, or if sufficiently hazardous military activities are identified (see item b above), a detailed review of aircraft hazards must be performed. Aircraft accidents which could lead to radiological consequences in excess of the exposure guidelines of 10 CFR Part 100 with a probability of occurrence greater than about 10^{-7} per year should be considered in the design of the plant. If the results of the review do not support a finding that the risk due to aircraft activities is acceptably low, then the design basis acceptance criteria outlined in Item II.2 below applies.

2. General Design Criterion (GDC) 4 of 10 CFR Part 50 ~~(Ref. 13)~~³¹, Appendix A, requires that ~~structures, systems, and components (SSC)~~³² important to safety be appropriately protected against the effects of missiles that may result from events and conditions outside the nuclear power unit. GDC 3 of 10 CFR Part 50, Appendix A, requires that SSC important to safety be appropriately protected against the effects of fires. The plant meets the relevant requirements of GDC 3 and GDC 4, and is considered appropriately protected against design basis aircraft impacts (Reference: 610) and fires (Reference: 37)³³ if the SSC important to safety are capable of withstanding the effects of the postulated aircraft impacts and fires without loss of safe shutdown capability, and without causing a release of radioactivity which would exceed 10 CFR Part 100 dose guidelines.

The safety-related SSC to be considered with respect to the above acceptance criteria include those described in the Appendix to Regulatory Guide 1.117, "Structures, Systems, and Components of Light-Water-Cooled Reactors to be Protected Against Tornadoes." Other safety-related SSC, which may not be included in Regulatory Guide 1.117, will be considered on a case-by-case basis in accordance with the acceptance criteria of the appropriate branches having primary responsibility for their protection.

Technical Rationale:³⁴

The technical rationale for application of the above acceptance criteria to aircraft hazards is discussed in the following paragraphs.

1. 10 CFR Part 100, §100.10 establishes site requirements in conjunction with other design features regarding insuring a low risk of public exposure. A probability of less than 10^{-7} per year has been established as an NRC staff objective for meeting the requirements of 10 CFR Part 100. An evaluation of the probability of aircraft crashes at a nuclear facility in the vicinity of an airport have been performed (Reference 6). The basis for the distance and usage limits is to ensure a conservative upper bound on aircraft impact probability thereby limiting the overall probability of an exposure exceeding the 10 CFR Part 100 guidelines to less than 10^{-7} per year. Aircraft hazards that have the potential for causing onsite accidents leading to the release of significant quantities of radioactive fission products, thus posing an undue risk of public exposure, must be shown to have a sufficiently low probability of occurrence. Meeting the probability, distance and usage requirements in regard to aircraft hazards and 10 CFR Part 100 exposure guidelines provides a high level of assurance that individuals will not be exposed to excessive radiation doses.
2. GDC 4 establishes requirements regarding the ability of SSC important to safety to be protected from dynamic effects, including the effects of missiles that may result from events and conditions outside the nuclear plant. Aircraft hazards are events outside of the nuclear plant that could have the potential for missile generation. The initiation of an externally generated missile due to aircraft impacts is a dynamic effect and the effect of those missiles on SSC important to safety must be evaluated. Regulatory Guide 1.117 provides acceptable methods for determining those SSC that should be protected. Protecting those SSC important to safety from the effects of externally generated missiles due to aircraft hazards prevents failure of those systems required for safe shutdown and prevents the release of radioactivity with the potential for causing exposures in excess of the 10 CFR Part 100 guidelines.
3. GDC 3 establishes requirements regarding minimizing the probability and effect of fires and explosions on SSC important to safety. Aircraft hazards include the potential through an aircraft impact for fires and explosions that could effect SSC important to safety. Regulatory Guide 1.117 describes a method acceptable to the NRC staff for determining which SSC should be protected. The selection of SSC to be protected is based upon not allowing offsite exposures to exceed an appropriate fraction of the offsite dose guidelines of 10 CFR Part 100. Basing the limits upon an appropriate "fraction" ensures protection for those events that are not as severe as the design-basis event but have a higher probability of occurrence. Protecting those SSC that are important to safety from the effects of aircraft hazards ensures the capability to shutdown the reactor and maintain it in a shutdown condition and the capability to prevent the release of radioactivity with the potential for causing exposures in excess of the 10 CFR Part 100 guidelines.

III. REVIEW PROCEDURES

The reviewer selects and emphasizes aspects of the areas covered by this SRP section as may be appropriate for a particular case. The judgment on areas to be given attention and emphasis in the review is based on an inspection of the material presented to see whether it is similar to that recently reviewed on other plants and whether items of special safety significance³⁵ are involved.

The staff's review of the aircraft hazard assessment consists of the following steps:

1. **Aviation Uses.** Data describing aviation uses in the airspace near the proposed site, including airports and their approach paths, federal airways, Federal Aviation Administration (FAA) restricted areas, and military uses is obtained from Section 2.2.1-2.2.2 of the SAR. For many cases, no detailed analysis need be made as the probability can be judged adequately low based on a comparison with analyses previously performed (References: 59, 711, 812, 913 and 1015)³⁶. In general, civilian and military maps should be examined to verify that all aviation facilities of interest have been considered. In the process, the reviewer should develop an independent assessment of the aircraft hazards. Communications with agencies responsible for aircraft operations and the evaluation of aircraft operational data may be utilized.
2. **Airways.** For situations where federal airways or aviation corridors pass through the vicinity of the site, the probability per year of an aircraft crashing into the plant (P_{FA}) should be estimated. This probability will depend on a number of factors such as the altitude and frequency of the flights, the width of the corridor, and the corresponding distribution of past accidents.

One way of calculating P_{FA} is by using the following expression:

$$P_{FA} = C \times N \times A/w$$

where:

C = inflight crash rate per kilometer (crash rate per mile)³⁷ for aircraft using airway,

w = width of airway (plus twice the distance from the airway edge to the site when the site is outside the airway) in kilometers (miles)³⁸,

N = number of flights per year along the airway, and

A = effective area of plant in square kilometers (square miles)³⁹.

This gives a conservative upper bound on aircraft impact probability if care is taken in using values for the individual factors that are meaningful and conservative. For commercial aircraft a value of $C = 6 \times 10^{-10}$ per aircraft kilometer ($C = 4 \times 10^{-10}$ (Ref. 11) per aircraft mile)⁴⁰ (Reference 14)⁴¹ has been used. For heavily traveled corridors (greater than 100 flights per day), a more detailed analysis may be required to obtain a proper value for this factor.

3. Civilian and Military Airports and Heli-Ports (References⁴²: 5, 26, and 48, and 14⁴³). The probability of an aircraft crashing into the site should be estimated for cases where one or more of the conditions in Item II.1 of the Acceptance Criteria are not met.

The probability per year of an aircraft crashing into the site for these cases (P_A) may be calculated by using the following expression:

$$P_A = \sum_{i=1}^L \sum_{j=1}^M C_j N_{ij} A_j$$

where:

M = number of different types of aircraft using the airport,

L = number of flight trajectories affecting the site,

C_j = probability per square kilometer (square mile)⁴⁴ of a crash per aircraft movement, for the j th aircraft,

N_{ij} = number (per year) of movements by the j th aircraft along the i th flight path, and

A_j = effective plant area (in square kilometers (square miles)⁴⁵) for the j th aircraft.

The manner of interpreting the individual factors in the above equation may vary on a case-by-case basis because of the specific conditions of each case or because of changes in aircraft accident statistics.

Values for C_j currently being used are taken from the data summarized in the following table:

Distance From End of Runway <u>km (miles)</u>	<u>Probability (x 10⁸) of a Fatal Crash per Square Kilometer (Square Mile) per Aircraft Movement⁴⁶</u>			
	<u>U.S. Air Carrier¹</u>	<u>General Aviation²</u>	<u>USN/USM¹</u>	<u>USAF¹</u>
0-1.6 (0-1)	6.45 (16.7)	32.4 (84.0)	3.20 (8.3)	2.20 (5.7)
1.6-3.2 (1-2)	1.54 (4.0)	5.8 (15.0)	0.42 (1.1)	0.89 (2.3)
3.2-4.8 (2-3)	0.371 (0.96)	2.39 (6.2)	0.127 (0.33)	0.42 (1.1)
4.8-6.4 (3-4)	0.262 (0.68)	1.47 (3.8)	0.120 (0.31)	0.162 (0.42)
6.4-8.0 (4-5)	0.104 (0.27)	0.46 (1.2)	0.077 (0.20)	0.154 (0.40)
8.0-9.6 (5-6)	0 0	NA ³	NA	NA
9.6-11.3 (6-7)	0 0	NA	NA	NA
11.3-12.9 (7-8)	0 0	NA	NA	NA
12.9-14.5 (8-9)	0.054 (0.14)	NA	NA	NA
14.5-16.1 (9-10)	0.046 (0.12)	NA	NA	NA

¹ Reference 26.

² Reference 48.

³ NA indicates that data was not available for this distance.

4. Designated Airspaces. For designated airspaces involving military or civilian usage, a detailed quantitative modeling of all operations should be verified. The results of the model should be the total probability (C) of an aircraft crash per unit area and time in the vicinity of the proposed site.

The probability per year of a potentially damaging crash at the site due to operations at the facility under consideration (P_M) is then given for this case by the following expression:

$$P_M = C \times A$$

where:

C = total probability of an aircraft crash per square kilometer (square mile)⁴⁷ per year in the vicinity of the site due to the airports being considered, and

A = effective area of one unit of the plant in square kilometers (square miles)⁴⁸.

Where estimated risks due to military aircraft activity are found to be unacceptably high, suitable airspace or airway relocation should be implemented. Past experience has been that military authorities have been responsive to modification of military operations and relocation of training routes in close proximity to nuclear power plant sites. ~~(Ref. 12)~~⁴⁹

5. Holding Patterns. Holding patterns are race track shaped courses at specified altitudes, associated with one or more radio-navigational facilities, where aircraft can "circle" while awaiting clearance to execute an approach to a landing at an airport or to continue along an airway. Holding patterns which are sufficiently distant from the plant need not be considered (See subsection II above). Otherwise, traffic in the holding pattern should be converted into equivalent aircraft passages taking into account the characteristics, including orientation with respect to the plant, of the holding pattern. The information in Item III.2 above should be used in this evaluation.
6. The total aircraft hazard probability at the site equals the sum of the individual probabilities obtained in the preceding steps.
7. The effective plant areas used in the calculations should include the following:
- a. A shadow area of the plant elevation upon the horizontal plane based on the assumed crash angle for the different kinds of aircraft and failure modes.

- b. A skid area around the plant as determined by the characteristics of the aircraft under consideration. Artificial berms or any other manmade and natural barriers should be taken into account in calculating this area.
- c. The areas of those safety-related SSC which are susceptible to impact or fire damage as a result of aircraft crashes.

Requirements and procedures governing issuance of early site permits for approval of proposed sites for nuclear power facilities are specified in 10 CFR Part 52. Applications for such a permit should include a description of the aircraft hazards for the site. For review of this type of application, such reviews should follow the procedures outlined above.⁵⁰

Aircraft hazards are considered to be site specific. However, for design certification applications the site parameter envelope may include site proximity criteria for aircraft hazards. Where so specified, this site proximity criteria is verified to be consistent with the acceptance criteria contained in subsection II.1. For applicants referencing a certified design, the reviewer verifies that the site proximity criteria provided in the site parameter envelope have been met. If the site proximity acceptance criteria are not met for a site, or if sufficiently hazardous military activities are identified, the applicant's detailed design and assessment of the aircraft hazards are reviewed in accordance with the above review procedures to confirm that the applicant has adequately addressed the siting in proximity to potentially hazardous aviation and/or military activities.⁵¹

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.⁵²

IV. EVALUATION FINDINGS

The reviewer drafts an introductory paragraph for the evaluation findings describing the procedure used in evaluating the aircraft hazards with respect to the safety-related SSC. The reviewer verifies that the site location is acceptable and meets the requirements of 10 CFR Part 100, §100.10.

The basis for the above findings may be strictly in terms of the probabilities associated with potential aircraft crashes onsite. If the aircraft crash statistics applicable to the onsite facilities are such that SRP Section 2.2.3 criteria are met without explicit consideration of plant design features, then conclusions of the following type should be included in the staff's safety evaluation report:

The staff concludes that the operation of the _____ plant in the vicinity of _____ does not present an undue risk to the health and safety of the public and meets the relevant requirements of 10 CFR Part 100, §100.10. This conclusion is based on the staff's independent verification of the applicant's assessment of aircraft hazards at the site that

resulted in a probability less than about 10^{-7} per year for an accident having radiological consequences worse than the exposure guidelines of 10 CFR Part 100.

In addition, plant sites reviewed in the past which had equivalent aircraft traffic in equal or closer proximity were, after careful examination, found to present no undue risk to the safe operation of those plants. Based upon this experience, in the staff's judgment, no undue risk is present from aircraft hazard at the plant site now under consideration.

In the event that the staff evaluation of the aircraft hazards does not support the above basis, i.e., if SRP Section 2.2.3 criteria are not met, then the basis for acceptance is derived from applying GDC 3 and GDC 4 criteria. If the protection against aircraft impacts and fires is such that the plant safety-related SSC meet GDC 3 and GDC 4 criteria, then 10 CFR Part 100 requirements are considered to be met and conclusion of the following type may be included in the staff's safety evaluation report:

The staff concludes that the operation of the _____ plant in the vicinity of _____ does not present an undue risk to the health and safety of the public due to aircraft hazards and meets the relevant requirements of General Design Criteria 3 and 4. This conclusion is based on the staff having independently verified the applicant's assessment of aircraft hazards, including aircraft fires and impacts, at the site and that if the appropriate safety-related structures, systems, and components are designed to withstand the aircraft selected as the design basis aircraft, the probability of an aircraft strike causing radiological consequences in excess of the exposure guidelines of 10 CFR Part 100 is less than about 10^{-7} per year.

For an application referencing a certified plant design that includes aircraft hazards in the site parameter envelope, the reviewer's findings should include a concluding statement similar to the following:

The aircraft hazards associated with actual site proximity data for the proposed site are consistent with those for the proximity data identified in the site parameter envelope specified in the certified plant design documents.⁵³

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.⁵⁴

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 52.⁵⁵ Except in those cases in which the applicant proposes an acceptable alternative method for complying with

specified portions of the Commission's regulations, and 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.⁵⁶

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

VI. REFERENCES

- 131⁵⁷. 10 CFR Part 50, "~~Domestic Licensing of Production and Utilization Facilities.~~" Appendix A, General Design Criterion 3, "Fire Protection," and General Design Criterion 4, "Environmental and Dynamic Effects Design Bases."⁵⁸
2. 10 CFR Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants."⁵⁹
13. 10 CFR Part 100, "~~Reactor Site Criteria.~~" §100.10, "Factors to be Considered when Evaluating Sites," and §100.11, "Determination of Exclusion Area, Low Population Zone, and Population Center Distance."⁶⁰
4. Regulatory Guide 1.117, "Tornado Design Classification."⁶¹
145. NUREG-0533, "Aircraft Impact Risk Assessment Data Base for Assessment of Fixed Wing Air Carrier Impact Risk in the Vicinity of Airports."
26. D. G. Eisenhut, "Reactor Siting in the Vicinity of Airfields." Paper presented at the American Nuclear Society Annual Meeting, June 1973.
37. I. I. Pinkel, "Appraisal of Fire Effects from Aircraft Crash at Zion Power Reactor Facility," July 17, 1972 (Docket No. 50-295).⁶²
48. D. G. Eisenhut, "Testimony on Zion/Waukegan Airport Interaction" (Docket No. 50-295).⁶³
59. USAEC Regulatory Staff, "Safety Evaluation Report," Appendix A, "Probability of an Aircraft Crash at the Shoreham Site" (Docket No. 50-322).⁶⁴
610. "Addendum to the Safety Evaluation by the Division of Reactor Licensing, USAEC, in the Matter of Metropolitan Edison Company (Three Mile Island Nuclear Station Unit 1, Dauphin County, Pennsylvania)," April 26, 1968 (Docket No. 50- 289).⁶⁵
711. Letter to Honorable J. R. Schlesinger from S. H. Bush, Chairman, Advisory Committee on Reactor Safeguards, "Report on Rome Point Nuclear Generating Station," November 18, 1971 (Project No. 455).

812. Letter to Mr. Joseph L. Williams, Portland General Electric Company, from R. C. DeYoung (in reference to Mr. Williams' letter of May 7, 1973), November 23, 1973 (Project No. 485).⁶⁶
913. "Aircraft Considerations-Preapplication Site Review by the Directorate of Licensing, USAEC, in the Matter of Portland General Electric Company, Boardman Nuclear Plant, Boardman, Oregon," October 12, 1973 (Project No. 485).⁶⁷
114. H. E. P. Krug, "Testimony on Aircraft Operations in Response to a Question from the Board" (Docket Nos. 50-275 and 50-323).⁶⁸
105. Letter to Mr. J. H. Campbell, Consumers Power Company, from Col. James M. Campbell, Dep. Chief, Strategic Division, Directorate of Operations, U.S. Air Force, May 19, 1971 (Docket No. 50-155).⁷⁰
- ~~12. Letter to Mr. J. H. Campbell, Consumers Power Company, from Col. James M. Campbell, Dep. Chief, Strategic Division, Directorate of Operations, U.S. Air Force, May 19, 1971 (Docket No. 50-155).⁷¹~~

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SRP Draft Section 3.5.1.6
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 names and abbreviations.	Editorial change made to reflect current PRB names and responsibilities for this SRP section.
2.	Current PRB names and abbreviations.	Editorial change made to reflect current secondary review responsibilities.
3.	Current PRB names and abbreviations.	Editorial change made to reflect current PRB names and responsibilities for this SRP section.
4.	Current PRB names and abbreviations.	Editorial change made to reflect current PRB names and responsibilities for this SRP section.
5.	Integrated Impact No. 284	Added reference to site parameter envelope in design certification reviews and in review of those applications referencing a certified design.
6.	SRP-UDP format item.	Revised review interface section of Areas of Review to be consistent with SRP-UDP required format that uses a number/paragraph format to distinguish individual reviews and supporting reviews performed by other PRBs.
7.	Editorial.	Added introductory sentences for the review interface section that are consistent with the format used in the SRP-UDP. In addition the review interfaces were split into two groups; those that are performed by SPLB and those that are coordinated by SPLB.
8.	Editorial.	Deleted last sentence of the introductory paragraph to make it consistent with the SRP-UDP format for review interfaces. This sentence has been replaced by the introductory sentence for the second section of the review interfaces.
9.	Editorial.	Moved the review interface regarding SRP section 3.5.3 to the second section of the review interfaces.
10.	Current PRB names and abbreviations.	Editorial change made to reflect current PRB names and responsibilities for the review interface covering SRP section 9.5.1.
11.	Editorial.	The SPLB is now responsible for the reviews of fire protection under SRP section 9.5.1 so the sentence was revised by deleting "in the areas of" and adding "reviews" to reflect the proper responsibility for the review.
12.	Editorial.	Deleted the parenthetical reference for SRP Section 9.5.1 and added the phrase "under SRP Section 9.5.1" to the end of the sentence. Also deleted ", and" and added a period to correct the punctuation.

SRP Draft Section 3.5.1.6
Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
13.	Current PRB names and abbreviations.	Editorial change made to reflect current PRB names and responsibilities for the review interface covering SRP section 3.5.2.
14.	Editorial.	The SPLB is now responsible for the reviews of SSC to be protected from externally generated missiles under SRP section 3.5.2 so the sentence was revised by deleting "in the areas of" and adding "reviews" to reflect the proper responsibility for the review.
15.	Editorial.	Deleted the parenthetical reference for SRP Section 3.5.2 and added the phrase "under SRP Section 3.5.2" to the end of the sentence.
16.	Editorial.	Moved the old step number I.4 to end of the review interfaces to be consistent with the SRP-UDP standard format.
17.	Editorial.	Deleted last sentence of the introductory paragraph to make it consistent with the SRP-UDP format for review interfaces. This sentence has been replaced by the introductory sentence for the second section of the review interfaces.
18.	Current PRB names and abbreviations.	Editorial change made to reflect current PRB names and responsibilities for SRP sections. The Applied Statistics Branch has not been in existence for some time. Therefore, in accordance with NRC Technical Monitor direction, the responsibility for this review was designated as belonging to the Probabilistic Safety Assessment Branch (SPSB).
19.	Current PRB names and abbreviations.	Editorial change made to reflect current PRB names and responsibilities for the review interface covering SRP section 3.5.3.
20.	Editorial.	Added the phrase "will provide technical review support" to complete this sentence. The sentence as stated previously was not a complete sentence.
21.	Editorial.	Deleted the comma and added a period to correct the punctuation.
22.	Integrated Impact 284	Included a review interface to new SRP section 2.3.6 for review of DC site parameter envelope.
23.	Editorial.	Moved the old step number I.4 to end of the review interfaces to be consistent with the SRP-UDP standard format.
24.	Current PRB names and abbreviations.	Editorial change made to reflect current PRB names and responsibilities for this SRP section.

SRP Draft Section 3.5.1.6
Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
25.	SRP-UDP format item, Metrication policy implementation.	The existing distances of 5 and 10 statute miles for required plant distances were converted to 8.05 and 16.1 kilometers respectively using the guidance of Federal Standard 376B.
26.	SRP-UDP format item, Metrication policy implementation.	The existing factor of 500 D ² was converted to 193 D ² that is an equivalent number of projected annual operations for the metric system of units. The new factor was rounded to respect the maximum limit in accordance with federal standard 376B and for that reason is not consistent with the factor presented in section 2.2.1 of the ABB-CE FSER.
27.	SRP-UDP format item, Metrication policy implementation.	The existing distances of 10 statute miles for required plant distances was converted to 16.1 kilometers using the guidance of Federal Standard 376B.
28.	SRP-UDP format item, Metrication policy implementation.	The existing factor of 1000 D ² was converted to 386 D ² that is an equivalent number of projected annual operations for the metric system of units. The new factor was rounded to respect the maximum limit in accordance with federal standard 376B and for that reason is not consistent with the factor presented in section 2.2.1 of the ABB-CE FSER.
29.	SRP-UDP format item, Metrication policy implementation.	The existing distances of 5 statute miles for required plant distances was converted to 8.05 kilometers using the guidance of Federal Standard 376B.
30.	SRP-UDP format item, Metrication policy implementation.	The existing distances of 2 statute miles for required plant distances was converted to 3.22 kilometers using the guidance of Federal Standard 376B.
31.	Editorial.	In accordance with the SRP-UDP format, a parenthetical reference for citation of the GDC 4 in the Acceptance Criteria subsection is unnecessary and has been deleted.
32.	Editorial.	The definition of the acronym SSC for structures, systems and components has already been previously established. Therefore, the phrase "structures, systems and components" was deleted.
33.	Editorial.	Deleted the use of the abbreviation Ref. and replaced it with Reference to be consistent with the SRP-UDP format. Renumbered the references to correspond with changes to the REFERENCES subsection.
34.	SRP-UDP format item, adding technical rationale.	Technical rationale was developed and added for the Acceptance Criteria covering 10 CFR Part 100 § 100.10, GDC 4, GDC 3 and Regulatory Guide 1.117. The SRP-UDP requires that technical rationale be developed for the Acceptance Criteria.
35.	Editorial	Grammatical correction.

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Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
36.	Editorial.	Deleted the use of the abbreviation Refs. and replaced it with References to be consistent with the SRP-UDP format. Renumbered the references to correspond with changes to the REFERENCES subsection.
37.	SRP-UDP format item, Metrication policy implementation.	Editorial change to express crash rate per mile in metric units of crash rate per kilometer.
38.	SRP-UDP format item, Metrication policy implementation.	Editorial change to express miles in metric units of kilometers.
39.	SRP-UDP format item, Metrication policy implementation.	Editorial change to express square miles in metric units of square kilometers.
40.	SRP-UDP format item, Metrication policy implementation.	The existing value for crash rate of 4×10^{-10} per aircraft mile was converted to 6×10^{-10} per aircraft kilometer using the guidance of Federal Standard 376B.
41.	Editorial.	To avoid confusion in the presentation of the text the reference was moved to a position after the english units.
42.	Editorial.	Deleted the use of the abbreviation Refs. and replaced it with References to be consistent with the SRP-UDP format.
43.	Editorial.	Renumbered the references to correspond with changes to the REFERENCES subsection.
44.	SRP-UDP format item, Metrication policy implementation.	Editorial change to express the probability per square mile in metric units of square kilometers.
45.	SRP-UDP format item, Metrication policy implementation.	Editorial change to express square miles in metric units of square kilometers.
46.	SRP-UDP format item, Metrication policy implementation.	The tabulated probabilities of a fatal crash per square mile per aircraft movement were converted to probabilities of a fatal crash per square kilometer per aircraft movement. The tabulated distances from the end of the runway were also converted to kilometers. In addition, minor formatting changes to the table were required to properly accommodate the dual sets of data.
47.	SRP-UDP format item, Metrication policy implementation.	Editorial change to express the probability per square mile in metric units of square kilometers.
48.	SRP-UDP format item, Metrication policy implementation.	Editorial change to express square miles in metric units of square kilometers.
49.	Reference Verification.	This citation of reference 12 was changed to reference 10 because reference 12 was a duplicate reference that was deleted. However, reference 10 has already been previously cited so the entire reference citation was deleted.

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Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
50.	Integrated Impact No. 284	Added a paragraph to define early site permit review.
51.	10 CFR 52 applicability issue Integrated Impact #284.	A discussion was added addressing the applicability of the review procedures to the design certification and combined license process. The review of aircraft hazards under the 10 CFR 52 licensing process, except for the input to the site parameter envelope, is primarily a site specific review and is the responsibility of the applicant referencing a certified design. This approach for the review procedures is consistent with the reviews documented in the ABWR FSER and the ABB-CE FSER.
52.	SRP-UDP Guidance, Implementation of 10 CFR 52	Added standard paragraph to address application of Review Procedures in design certification reviews.
53.	Integrated Impact No. 284	Added requirement for a statement regarding the site parameter envelope to EVALUATION FINDINGS.
54.	10 CFR 52 implementation	Added standard evaluation findings statement to address implementation of 10 CFR 52.
55.	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.
56.	SRP-UDP Guidance	Added standard paragraph to indicate applicability of this section to reviews of future applications.
57.	SRP-UDP Format Item, Reference Verification.	The references had to be re-ordered and re-numbered in accordance with SRP-UDP guidance.
58.	SRP-UDP format item	Revised to list specific portions of 10 CFR Part 50 which are cited/discussed in this SRP section in a manner consistent with SRP-UDP format for CFR/GDC references.
59.	Integrated Impact No. 284	Added reference to 10 CFR Part 52.
60.	SRP-UDP format item	Revised to list specific sections of 10 CFR Part 100 which are cited/discussed in this SRP section in a manner consistent with SRP-UDP format for CFR references.
61.	Reference Verification.	Added a reference for Regulatory Guide 1.117 "Tornado Design Classification," which is cited in the Acceptance Criteria.
62.	Reference Verification.	A copy of this reference could not be obtained and was not verified.
63.	Reference Verification.	A copy of this reference could not be obtained and was not verified.
64.	Reference Verification.	A copy of this reference could not be obtained and was not verified.

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Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
65.	Reference Verification.	A copy of this reference could not be obtained and was not verified.
66.	Reference Verification.	Added a period after the C. in R. C. DeYoung to correct a punctuation error.
67.	Reference Verification.	A copy of this reference could not be obtained and was not verified.
68.	Reference Verification.	A copy of this reference could not be obtained and was not verified.
69.	Reference Verification.	A copy of this reference could not be obtained and was not verified.
70.	Reference Verification.	A copy of this reference could not be obtained and was not verified.
71.	Reference Verification.	Reference number 12 is a duplicate of reference number 10. Therefore, reference number 12 was deleted.

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Attachment B - Cross Reference of Integrated Impacts

Integrated Impact No.	Issue	SRP Subsections Affected
284	Incorporate review procedures and evaluation findings to include the guidance for review of site specific parameters to reflect the site parameter related requirements for applications referencing a certified plant design.	Subsections I, III, IV, and VI