



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

3.5.1.5 SITE PROXIMITY MISSILES (EXCEPT AIRCRAFT)

REVIEW RESPONSIBILITIES

Primary - Siting Analysis Branch (SAB)

Secondary - NONE

I. AREAS OF REVIEW

The staff reviews the nature and extent of offsite activities identified in SRP Section 2.2.1-2.2.2 to determine whether any missiles resulting from such activities, other than aircraft (aircraft hazards are reviewed separately in SRP Section 3.5.1.6), have the potential for adversely affecting structures, systems, and components (SSC) essential to safety. In the event that an offsite activity has the potential for missile production (e.g., explosion) and is found to be a design basis event according to SRP Section 2.2.3, the staff reviews the plant design to determine whether the plant is adequately protected against the effects of the postulated missiles. The SSC that should be protected against missiles are identified in accordance with SRP Section 3.5.2 as part of the primary review responsibility of the Auxiliary Systems Branch (ASB). The Siting Analysis Branch (SAB) identifies and characterizes any offsite missiles that are required to be accommodated within the plant design basis in order to protect adequately the safety-related SSC. The Structural Engineering Branch (SEB) on request by SAB reviews the missile impact effects on the safety-related SSC. The acceptance criteria necessary for the review and the methods of application for the above reviews are contained in the referenced SRP section.

II. ACCEPTANCE CRITERIA

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

1. 10 CFR Part 100, §100.10 indicates 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 site proximity missiles impacting the plant and causing radiological

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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.

consequences greater than 10 CFR Part 100 exposure guidelines is less than about 10^{-7} per year (see SRP Section 2.2.3). If the results of the review do not indicate that the above criterion is met, then the acceptance criterion described in 2 below applies.

2. General Design Criterion (GDC) 4 of 10 CFR Part 50, Appendix A, requires that structures, systems, and components (SSC) important to safety be appropriately protected against the effects of missiles that may result from events and conditions outside the nuclear power unit. The plant complies with GDC 4 and is considered adequately protected against site proximity missiles if the following criterion is met: The SSC important to safety are capable of withstanding the effects of the postulated missiles without loss of safe shutdown capability and without causing a release of radioactivity which would exceed 10 CFR Part 100 dose criteria.

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 significance are involved.

1. The identification and description of accidents which could possibly generate missiles is obtained from the review performed in accordance with SRP Section 2.2.1-2.2.2 and SRP Section 2.2.3.
2. The SSC identified by ASB in reference to SRP Section 3.5.2 are reviewed with respect to missile vulnerability. Using conservative assumptions, and experience gained from past reviews on similar SSC missile interactions, a determination is made of those portions of the plant which clearly have the potential for unacceptable missile damage. If all SSC appear to be adequately protected against the effects of the postulated missiles, then the review is terminated and evaluation findings are written in terms of design basis considerations (See subsection II.2 of this SRP section).
3. The total probability of the missiles striking a vulnerable critical area of the plant is estimated. The total probability per year (P_T) may be estimated by using the following expression:

$$P_T = P_E \times P_{MR} \times P_{SC} \times P_p \times N$$

where:

P_E = probability per year of design basis event obtained from the review performed under SRP Section 2.2.3;

P_{MR} = probability of missiles reaching the plant,

P_{SC} = probability of missiles striking a vulnerable critical area of the plant,

P_p = probability of missiles exceeding the energies required to penetrate to vital areas (e.g., based on wall thickness provided for tornado

missiles), or producing secondary missiles which could damage vital equipment, and

N = number of missiles generated by the design basis event.

P_p may be assumed to be equal to 1 as a first step in the analysis.

If P_T thus calculated is greater than 10^{-7} per year, then missile effects on SSC should be estimated by SEB on request by SAB. The request should be accompanied by a specified missile description, including missile size, shape, weight, energy, material properties, and trajectory.

IV. EVALUATION FINDINGS

Based upon the nature of activities around the site and the review performed, the staff provides an evaluation in one of the following forms, to be included in the staff's safety evaluation report.

1. The staff concludes that the site location, in conjunction with other considerations (such as plant design, construction, and operation) is acceptable and meets the requirements of 10 CFR Part 100, §100.10. This conclusion is based on the information provided by the applicant and reviewed by the staff which demonstrates that the probability of site proximity missiles adversely affecting safety-related structures, systems and components is acceptably low (within the criteria given in SRP Section 2.2.3), and that the site location has been determined to insure a low risk of public exposure due to the hazard of site proximity missiles.
2. The staff concludes that the protection for structures, systems, and components important to safety is acceptable and meets the requirements of General Design Criteria 4 of Appendix A to 10 CFR Part 50. This conclusion is based on the information provided by the applicant and reviewed by the staff which identified potential missiles that could adversely affect safety-related structures, systems, and components and which demonstrates that these structures, systems, and components have adequate barriers protecting them from the effects of missiles such that radiation exposures in excess of those given in 10 CFR Part 100 will not be exceeded.
3. Information provided by the applicant and reviewed by the staff has led us to identify potential missiles which could adversely affect safety-related structures, systems, and components. However, some of these structures, systems, and components have adequate barriers protecting them from the effects of such missiles in accordance with the requirements of GDC 4 of Appendix A to 10 CFR Part 50, such that radiation exposures in excess of those given in 10 CFR Part 100 will not be exceeded. The remaining safety-related structures, systems, and components, although vulnerable to the potential effects of identified missiles, have a sufficiently low probability (within the criteria given in SRP Section 2.2.3) of unacceptable damage (on the basis of considerations such as low strike probability, or adequate separation and redundancy) such that the risk of public exposure is low and in conformance with 10 CFR Part 100, §100.10.

V. IMPLEMENTATION

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

Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

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

VI. REFERENCES

1. Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants."
2. Regulatory Guide 1.76, "Design Bases Tornado for Nuclear Power Plants."
3. Regulatory Guide 1.91, "Evaluation of Explosions Postulated to Occur on Transportation Routes Near Nuclear Power Plant Sites."
4. Standard Review Plan Section 2.2.3, "Evaluation of Potential Accidents."