U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

OFFICE OF NUCLEAR REACTOR REGULATION

3.5.1.2 INTERNALLY GENERATED MISSILES (INSIDE CONTAINMENT)

REVIEW RESPONSIBILITIES

Primary - Auxiliary Systems Branch (ASB)

Secondary - None

I. AREAS OF REVIEW

The ASB review of the structures, systems, and components (SSC) to be protected from internally generated missiles (inside containment) to assure conformance with the requirements of General Design Criterion 4 includes all SSC within the containment and the containment itself. The review includes internally generated missiles associated with component overspeed failures, missiles that could originate from high energy fluid system failures, and missiles due to gravitational effects.

The ASB with the requested assistance of the Containment Systems Branch (CSB) and the Reactor Systems Branch (RSB) reviews the functional operations and performance requirements for structures, systems, and components inside containment and identifies which of the operations are necessary for the safe shutdown of the reactor facility in the event of an accident or other circumstances that might result in an internally generated missile, or for the mitigation of the effects of loss-of-coolant or other accidents. Safety-related SSC are reviewed with respect to their capability to perform functions required for attaining and maintaining a safe shutdown condition during such accident conditions.

The review of internally generated missile protection includes the following:

1. Structures, systems or portion of systems, and components requiring protection from internally generated missiles and the methods of protection provided against such missiles.

2. Credible primary missiles including, valve hardware, retaining bolts, relief valves parts, instrument wells and reactor vessel seal rings (PWR).

3. Credible secondary missiles generated as a result of impact with primary missiles.

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

The review performed by the Structural Engineering Branch (SEB) is coordinated by the ASB and the results used to complete the overall ASB evaluation of the protection against internally generated missiles. The SEB determines the acceptability of the analytical procedures and criteria used for structures or barriers that protect the containment structure and liner, essential systems, and safety-related components from internally generated missiles as part of its primary review responsibility for SRP Section 3.5.3. The acceptance criteria and their methods of application are contained in that SRP section.

II. ACCEPTANCE CRITERIA

Acceptability of the design information on protection of structures and essential systems and components from internally generated missiles, as presented in the applicant's safety analysis report (SAR), is based on General Design Criterion 4. An additional basis for determining acceptability is the degree of similarity of the design to that of previously approved plants.

The design of structures, systems, and components is acceptable if the integrated design affords missile protection in accordance with General Design Criterion 4, as it relates to structures housing essential systems and to the systems being capable of withstanding the effects of internally generated missiles. A statement in the SAR that essential structures, systems, and components will be afforded protection by locating the systems or components in individual missile-proof structures, physically separating redundant systems or components of the system, or providing special localized protective shields or barriers, is an acceptable method for meeting this criterion at the construction permit stage for providing protection from internally generated missiles (inside containment).

III. REVIEW PROCEDURES

The review procedures below are used during the construction permit (CP) review to determine that the design criteria and bases and the preliminary design as set forth in the preliminary safety analysis report meet the acceptance criteria given in Subsection II. For the review of operating license (OL) applications, the review procedures and acceptance criteria are used to verify that the initial design criteria and bases have been appropriately implemented in the final design as set forth in the final safety analysis report. The reviewer selects and emphasizes areas within the scope of this SRP section as may be appropriate in a particular case.

The first objective in the review of the structures, systems, and components, with regard to protection requirements for internally generated missiles, is to determine whether the equipment is needed to perform a safety function. Some structures and systems are designed as safety related in their entirety, others have portions that are safety related, and others are classified as not needed for safety. In order to determine the safety category of the SSC, the RSB and CSB upon request from the ASB, will evaluate the SSC with regard to their function in achieving safe reactor shutdown conditions or in preventing accidents or mitigating the consequences of accidents, and will provide an input to the ASB. The primary reviewer obtains such input as required to assure that this review procedure is complete. Structures, systems, or components that perform a safety function, or by virtue of their failure could have an adverse effect on a safety function should be protected from the effects of internally generated missiles.

A review is conducted of the information provided in the SAR pertaining to SSC design bases and criteria, the listing of credible primary missiles, secondary missiles, damage or failures to safety-related SSC as a result of missile impingement and missile protection provided. The reviewer may use failure mode and effect analyses and the results of other portions of the facility review in evaluating specific SSC and the origin of possible missiles, and in determining which structures, systems, and components require protection from internally generated missiles and whether the degree of protection provided is adequate.

IV. EVALUATION FINDINGS

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

> The review of possible effects of internally generated missiles (inside containment) included structures, systems, and components whose failure could prevent safe shutdown of the plant or result in significant uncontrolled release of radioactivity. Based on the review of the applicant's design bases and criteria for essential structures, systems, and components necessary to maintain a safe plant shutdown, the staff concludes that the structures, systems, and components to be protected from internally generated missiles (inside containment) meet the requirements of General Design Criterion 4 with respect to protection of safety-related SSC from internal missiles inside containment since the applicant:
>
> 1. Has used methods for identification of potential sources of internal missiles and for demonstrating the adequacy of the protection provided which have been reviewed by the staff in this or in previous applications and found acceptable; and
>
> 2. Has shown that essential SSC functions will be protected from internally generated missiles (inside containment) by locating the systems or components in individual missile-proof structures or providing special localized protective shields or barriers.

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.

VI. REFERENCES

1. 10 CFR Part 50, Appendix A, General Design Criterion 4, "Environmental and Missile Design Bases."