U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

14.3.11 CONTAINMENT SYSTEMS - INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA

REVIEW RESPONSIBILITIES

Primary - Organization responsible for the review of containment system

Secondary - None

I. AREAS OF REVIEW

This SRP section addresses inspections, tests, analyses, and acceptance criteria (ITAAC) related to the containment and associated systems. ITAAC information is contained in the final safety analysis report (FSAR) of a combined license (COL) application or Tier 1 information from the design control document of a design certification (DC) application.

The specific areas of review are as follows:

1. Tier 1 information is reviewed for issues regarding containment design including containment isolation provisions, containment leakage testing, hydrogen generation and control, containment heat removal, suppression pool hydrodynamic loads, and sub-compartment analysis.

March 2007

USNRC STANDARD REVIEW PLAN

This Standard Review Plan, NUREG-0800, has been prepared to establish criteria that the U.S. Nuclear Regulatory Commission staff responsible for the review of applications to construct and operate nuclear power plants intends to use in evaluating whether an applicant/licensee meets the NRC's regulations. The Standard Review Plan is not a substitute for the NRC's regulations, and compliance with it is not required. However, an applicant is required to identify differences between the design features, analytical techniques, and procedural measures proposed for its facility and the SRP acceptance criteria and evaluate how the proposed alternatives to the SRP acceptance criteria provide an acceptable method of complying with the NRC regulations.

The standard review plan sections are numbered in accordance with corresponding sections in Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)." Not all sections of Regulatory Guide 1.70 have a corresponding review plan section. The SRP sections applicable to a combined license application for a new light-water reactor (LWR) are based on Regulatory Guide 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)."

These documents are made available to the public as part of the NRC's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Individual sections of NUREG-0800 will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience. Comments may be submitted electronically by email to NRR_SRP@nrc.gov.

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2. For a DC application:

   A. The staff reviews the proposed ITAAC that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a plant that incorporates the design design certification is built and will operate in accordance with the design certification, the Atomic Energy Act, and the NRC regulations.

   B. The staff reviews the justification that compliance with the interface requirements is verifiable through ITAAC. The staff also reviews the method that is to be used for verification of the interface requirements.

3. For a COL application:

   A. The staff reviews the proposed ITAAC that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, the facility has been constructed and will operate in conformity with the combined license, the Atomic Energy Act, and the NRC regulations.

   B. If the application references a standard design certification, the staff verifies that the ITAAC contained in the certified design apply to those portions of the facility design that are approved in the design certification.

4. <u>COL Action Items and Certification Requirements and Restrictions</u>. For a DC application, the review will also address COL action items and requirements and restrictions (e.g., interface requirements and site parameters).

   For a COL application referencing a DC, a COL applicant must address COL action items (referred to as COL license information in certain DCs) included in the referenced DC. Additionally, a COL applicant must address requirements and restrictions (e.g., interface requirements and site parameters) included in the referenced DC.

<u>Review Interfaces</u>

Other SRP sections interface with this section as follows:

1. SRP Section 14.3 provides general guidance on ITAAC information.

2. Acceptability of ITAAC information regarding the ability of SSCs to withstand various natural phenomena is reviewed under SRP Sections 14.3.1 and 14.3.2.

3. Acceptability of ITAAC information for piping design is reviewed under SRP Section 14.3.3.

4. Acceptability of ITAAC information for instrumentation and controls is reviewed under SRP Section 14.3.5.

5 Acceptability of ITAAC information for electrical systems and components is reviewed under SRP Section 14.3.6.

The specific acceptance criteria and review procedures are contained in the referenced SRP sections.

II. ACCEPTANCE CRITERIA

Requirements

Acceptance criteria are based on meeting the relevant requirements of the following Commission regulations:

1. 10 CFR 52.47(b)(1), which requires that a DC application contain the proposed inspections, tests, analyses, and acceptance criteria (ITAAC) that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a plant that incorporates the design certification is built and will operate in accordance with the design certification, the provisions of the Atomic Energy Act, and the NRC's regulations;

2. 10 CFR 52.80(a), which requires that a COL application contain the proposed inspections, tests, and analyses, including those applicable to emergency planning, that the licensee shall perform, and the acceptance criteria that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, the facility has been constructed and will operate in conformity with the combined license, the provisions of the Atomic Energy Act, and the NRC's regulations.

SRP Acceptance Criteria

Specific SRP acceptance criteria acceptable to meet the relevant requirements of the NRC's regulations identified above are as follows for review described in Subsection I of this SRP section. The SRP is not a substitute for the NRC's regulations, and compliance with it is not required. However, an applicant is required to identify differences between the design features, analytical techniques, and procedural measures proposed for its facility and the SRP acceptance criteria and evaluate how the proposed alternatives to the SRP acceptance criteria provide acceptable methods of compliance with the NRC regulations.

1. The reviewer should primarily utilize the SRP sections related to containment systems in its review of Tier 1 to determine the safety significance of SSCs. Other sources include applicable rules and regulations, GDCs, RGs, USIs and GSIs, NRC generic correspondence, PRA, insights from the standard design's safety and severe accident analyses, and operating experience. The reviewer should also use the review checklists provided in Appendix C to SRP Section 14.3 as an aid for establishing consistency and comprehensiveness in the review of the systems.

2. Tier 1 should be reviewed to verify that key parameters and insights from containment safety analyses, such as loss of coolant accident, main steamline break, main feedline break, subcompartment analyses, and suppression pool bypass are adequately addressed. Applicants should provide cross references in DCD Tier 2 Section 14.3 to show how the important input parameters used in the transient and accident analyses for the design are verified by the ITAAC. The reviewer should ensure that appropriate treatment of severe accident design features and containment design features are included in Tier 1. The supporting information regarding the detailed design and

analyses should remain in Tier 2. For many of the design features, it may be impractical to test their functionality because of the absence of simulated severe accident conditions. Consequently, the existence of the feature on a figure, subject to a basic configuration walkdown, may be considered sufficient Tier 1 treatment. Applicants should provide cross references in the appropriate sections of Tier 2 to show how the important parameters from PRA, including shutdown risk, and severe accident analyses are verified by the ITAAC. For both PRA and severe accident analyses, although large uncertainties and unknowns may be associated with the event phenomena, design features important for severe accident prevention and mitigation resulting from these analyses should be selected for treatment in Tier 1.

3. If applicable, the reviewer should utilize regulatory guidance from the Commission for selected policy and technical issues related to the particular design. Examples of these are contained in SECY-93-087, "Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor (ALWR) Designs." The SRM related to this is dated July 21, 1993.

4. Containment isolation may be addressed by a combination of the system ITAACs or in a single system ITAAC. The containment isolation valves (CIVs) should be specified in Tier 1, and are most clearly shown on the system figures. The verification of the design qualification of the motor operated CIVs may be verified by the basic configuration check in each system ITAAC. In addition, in-situ tests should be required for containment isolation motor operated valves (MOV) and check valves in each system ITAAC. The ITAAC should verify that the CIVs close on receipt of an isolation signal. Actual closure of the containment isolation valves may be checked using the manual isolation switches in the main control room (MCR). Other ITAAC may verify that a containment isolation signal is generated for each of the process variables that will cause a containment isolation; the intent is to preclude multiple cycling of the containment isolation valves during the testing.

5. Tier 1 should address and verify at least the minimum inventory of alarms, displays, and controls in Design Control Document (DCD) Tier 2 Chapter 18. These are derived from Generic Technical Guidelines (e.g., Emergency Procedure Guidelines, Emergency Response Guidelines), the guidance of RG 1.97, and severe accident and PRA insights. They may be specified in the MCR and the Remote Shutdown System (RSS) ITAAC, or addressed in the appropriate ITAAC, and are verified to exist. Other controls, displays, and alarms should be identified in the system ITAAC based on their safety significance. Locations for these should be shown on system figures if important to system design and function.

Technical Rationale

The technical rationale for application of these acceptance criteria to the areas of review addressed by this SRP section is discussed in the following paragraphs:

1. Application of 10 CFR 52.47(b)(1), as it relates to ITAAC (for design certification) provides reasonable assurance that the SSCs in this area of review will operate in accordance with the design certification, the provisions of the Atomic Energy Act, and the NRC's regulations.

2. Application of 10 CFR 52.80(a), as it relates to ITAAC (for combined licenses) provides reasonable assurance that the SSCs in this area of review have been constructed and will be operated in conformity with the combined license, the provisions of the Atomic Energy Act, and the NRC's regulations.

III. REVIEW PROCEDURES

The reviewer will select material from the procedures described below, as may be appropriate for a particular case.

These review procedures are based on the identified SRP acceptance criteria. For deviations from these acceptance criteria, the staff should review the applicant's evaluation of how the proposed alternatives provide an acceptable method of complying with the relevant NRC requirements identified in Subsection II.

1. Follow the general procedures for review of Tier 1 contained in the Review Procedures section of SRP Section 14.3. Ensure that the DCD is consistent with Appendix A to SRP Section 14.3.

2. Ensure that all Tier 1 information is consistent with Tier 2 information. Figures and diagrams should be reviewed to ensure that they accurately depict the functional arrangement and requirements of the systems. Reviewers should use the Review Checklists in Appendix C to SRP Section 14.3 as an aid in establishing consistent and comprehensive treatment of issues.

3. Ensure that the containment systems are clearly described in Tier 1, including the key performance characteristics and safety functions of SSCs based on their safety significance.

4. The reviewer should ensure that appropriate guidance is provided to other branches such that containment systems issues in Tier 1 are treated in a consistent manner among branches.

5. Ensure that design features from the resolutions of selected policy and technical issues are adequately addressed in Tier 1 based on safety significance. Ensure that the appropriate Commission guidance, requirements, bases, and resolutions for these items are documented clearly in the SER.

6. For review of a DC application, the reviewer should follow the above procedures to verify that the design, including requirements and restrictions (e.g., interface requirements and site parameters), set forth in the final safety analysis report (FSAR) meets the acceptance criteria. DCs have referred to the FSAR as the design control document (DCD). The reviewer should also consider the appropriateness of identified COL action items. The reviewer may identify additional COL action items; however, to ensure these COL action items are addressed during a COL application, they should be added to the DC FSAR.

   For review of a COL application, the scope of the review is dependent on whether the COL applicant references a DC, an early site permit (ESP) or other NRC approvals (e.g., manufacturing license, site suitability report or topical report).

7. Implementation of ITAAC will be inspected in accordance with NRC Inspection Manual Chapter IMC-2503, “Construction Inspection Program - ITAAC Inspections.”

IV. EVALUATION FINDINGS

The reviewer verifies that the applicant has provided sufficient information and that the review and calculations (if applicable) support conclusions of the following type to be included in the staff's safety evaluation report. The reviewer also states the bases for those conclusions.

The reviewer verifies that sufficient information has been provided to satisfy the requirements of SRP Section 14.3 and this SRP section, and concludes that the ITAAC is acceptable. A finding similar to that in the Evaluation Findings section of SRP Section 14.3 should be provided in a separate section of the SER.

For DC and COL reviews, the findings will also summarize the staff’s evaluation of requirements and restrictions (e.g., interface requirements and site parameters) and COL action items relevant to this SRP section.

In addition, to the extent that the review is not discussed in other SER sections, the findings will summarize the staff's evaluation of the ITAAC, including design acceptance criteria, as applicable.

V. IMPLEMENTATION

The staff will use this SRP section in performing safety evaluations of DC applications and license applications submitted by applicants pursuant to 10 CFR Part 50 or 10 CFR Part 52. Except when the applicant proposes an acceptable alternative method for complying with specified portions of the Commission’s regulations, the staff will use the method described herein to evaluate 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, unless superseded by a later revision.

VI. REFERENCES

1. 10 CFR 52.47, "Contents of Applications."

2. 10 CFR 52.80(a), "Contents of Applications."

3. NUREG-1503, "Final Safety Evaluation Report Related to the Certification of the Advanced Boiling Water Reactor," Volumes 1 and 2, July 1994.

4. NUREG-1462, "Final Safety Evaluation Report Related to the Certification of the System 80+ Design," Volumes 1 and 2, August 1994.

5. SECY-93-087, "Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor Designs," April 4, 1993 (ML003708021). The SRM related to this is dated July 21, 1993.

6. NRC Inspection Manual Chapter IMC-2503, “Construction Inspection Program - ITAAC Inspections,” issued April 25, 2006.

7. Regulatory Guide 1.97, Rev. 4, “Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants,” June 2006.

PAPERWORK REDUCTION ACT STATEMENT

The information collections contained in the Standard Review Plan are covered by the requirements of 10 CFR Part 50 and 10 CFR Part 52, and were approved by the Office of Management and Budget, approval number 3150-0011 and 3150-0151.

PUBLIC PROTECTION NOTIFICATION

The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.

SRP Draft Section 14.3.11
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.	Integrated Impact 1550	The scope and content of this proposed SRP section is derived from the requirements of 10 CFR Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants," as well as the guidance in staff SECY papers related to design certification and combined license reviews, and the staff positions established in the Final Safety Evaluation Reports (FSERs) for the evolutionary reactor designs.SRP Section 14.3.11 provides guidance specific to the review of containment systems information and related inspections, tests, analyses, and acceptance criteria (ITAAC) provided in applications submitted in accordance with the requirements of 10 CFR 52.

Integrated Impact No.	Issue	SRP Subsections Affected
1550	Develop Acceptance Criteria and Review Procedures for review of Certified Design Material (CDM) including associated inspections, tests, analyses and acceptance criteria (ITAAC) for containment systems.	All