



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

14.3.8¹ RADIATION PROTECTION AND EMERGENCY PREPAREDNESS (Tier 1)

REVIEW RESPONSIBILITIES

Primary - Emergency Preparedness and Radiation Protection Branch (PERB)

Secondary - None

I. AREAS OF REVIEW

Each branch reviews the Design Control Document (DCD) submitted by the applicant. PERB has primary review responsibility for Tier 1 information pertaining to the radiation protection and emergency preparedness aspects of the design. Review responsibilities may be consistent with those contained in Appendix B to SRP Section 14.3. Examples of the systems within the scope of the review include radiation monitoring systems, containment atmospheric monitoring systems, and emergency response facilities in Tier 1. PERB has primary review responsibility for any additional material regarding design processes for radiation protection and their related design acceptance criteria. PERB also has primary review responsibilities for selected site parameters involving atmospheric dispersion (X/Qs) for exclusion area boundaries (EABs) and low population zones (LPZs). The reviewer has secondary review responsibility for all other Tier 1 and ITAACs which address the plant radiation protection design or systems relied upon in the design-basis accidents (DBAs) dose assessment. These ITAACs include buildings, ventilation and filtration systems, primary containment, drywell bypass, and the post-accident sampling system.

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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.

Review Interfaces

SRP Section 14.3 provides general guidance on review interfaces. PERB performs related reviews and coordination activities, as requested by other branches, for issues in Tier 1 related to plant systems. In addition, PERB will coordinate other branches' evaluations that interface with the overall review of the systems as follows:

1. The Plant Systems Branch (SPLB) determines the acceptability of Tier 1 information regarding HVAC design, containment isolation, and selected aspects of the containment design in SRP Section 14.3.6.
2. The Civil Engineering and Geosciences Branch (ECGB) determines the acceptability of Tier 1 information regarding the ability of SSCs to withstand various natural phenomena in SRP Sections 14.3.1 and 14.3.2, and regarding piping design in SRP Section 14.3.3.
3. The Reactor Systems Branch (SRXB) determines the acceptability of Tier 1 information regarding design features to prevent and mitigate design basis accidents, such as design features based on timing and mass release, in SRP Section 14.3.4.
4. The Containment Systems and Severe Accident Branch (SCSB) determines the acceptability of Tier 1 information regarding containment systems design, in the applicable sections of the SRP pertaining to Tier 2.

II. ACCEPTANCE CRITERIA

The acceptance criteria for ITAAC are based on meeting 10 CFR 52.97(b)(1), which sets forth the comprehensive requirements for ITAAC. For design certification reviews, the scope of ITAAC is limited to the scope of the certified design as required by 10 CFR 52.47(b). To meet the above regulations, the appropriate Tier 1, ITAAC and site parameters should address the following design issues.

The reviewer should primarily utilize the applicable rules and regulations, GDCs, RGs, USIs and GSIs in its review of Tier 1 to determine the safety significance of SSCs with respect to the radiation protection for occupational workers and the general public provided by these SSCs. Other sources include the SRP and applicable NRC generic correspondence. The reviewer should utilize the guidance in Appendix C to SRP Section 14.3 as an aid for comprehensiveness and consistency in this review.

Radiation Protection

The reviewer shall ensure that Tier 1 identifies and describes, commensurate with their safety significance, those SSCs that provide radiation shielding, confinement or containment of radioactivity, ventilation of airborne contamination, or radiation (or radioactivity concentration) monitoring for normal operations and during accidents. Tier 1 contains ITAAC that insure that the identified SSCs will function as designed.

Emergency Preparedness

The reviewer should ensure that Tier 1 discusses adequate facilities for emergency response. These include a habitable technical support center (TSC) with space, data retrieval capabilities and dedicated communications equipment, and an operational support center (OSC) with adequate communications, consistent with the applicable criteria in Supplement 1 to NUREG-0737.

The review of Emergency Planning should be accomplished as part of the combined license application or application for an early site permit. The Energy Policy Act of 1992 amended the Atomic Energy Act to require that the applicant for a combined license submit ITAAC for emergency planning, and this requirement was incorporated into §52.97(b). The staff provided its preliminary views on acceptable ITAAC to the Commission in SECY-95-090, "Emergency Planning Under 10 CFR Part 52," April 11, 1995. The staff developed significant portions of this ITAAC using the information in NUREG-0654, Supplements 1 and 2.

Design Processes and Design Acceptance Criteria (DAC)

An applicant for design certification may not provide sufficient detail in selected aspects of the design, including sufficient information to stipulate the source terms needed to verify the design of the shielding, ventilation, and airborne radioactivity monitoring systems. The applicant may choose to provide design processes and design acceptance criteria (DAC) for this material, as discussed in Appendix A to SRP Section 14.3. The rationale for determining which areas of the design should utilize design processes and acceptance criteria should be documented by the applicant in DCD Tier 2 Section 14.3. Essentially, the applicant should extract the most important design processes and acceptance criteria from Chapter 12 of Tier 2 and put them into Tier 1. This may be done in a separate section of Tier 1, or provided in the applicable systems of Tier 1. A COL applicant or licensee must meet these criteria in the design of the plant, and the staff can audit the facility's design documentation to ensure that the criteria are met. The following discussion is specific to the review of design processes and acceptance criteria in this area:

Applicants may not provide the complete design information in this design area before design certification because the radiation shielding design and the calculated concentrations of airborne radioactive material were dependent upon as-built and as-procured information of plant systems and components. Therefore, applicants may not be able to describe the standard design's radiation source terms (i.e., the quantity and concentration of radioactive materials contained in, or leaking from plant systems) in sufficient detail to allow the staff to verify the adequacy of the shielding design, ventilation system designs, or the design and placement of the airborne radioactivity monitors. Instead, applicants may provide the processes and acceptance criteria by which the details of the design in this area would be developed, designed, and evaluated. This scope of the material in Tier 1 should be stated in the design description. Examples of its application could be to the radiological shielding and ventilation design of the reactor building, turbine building, control building, service building, and radwaste building. The implementation of the process and the design is the responsibility of the COL applicant or licensee.

The acceptance criteria in the DAC may be taken from the acceptance criteria in the applicable sections of Chapter 12 of the SRP. The analysis methods and source term assumptions specified in the DAC should be consistent with approved methods and assumptions listed in the SRP. The SRP is the basis for the staff's safety review of the standard design. Therefore, demonstrating that the final design meets these DAC with the methods and assumptions specified in Tier 1 ensures that the as-built design meets the applicable acceptance criteria of the SRP and the associated regulations and staff technical positions.

The DAC in Tier 1 should address the verification of the plant radiation shielding design and the plant airborne concentrations of radioactive materials (e.g., the ventilation system and airborne monitoring system designs). The DAC should require the COL applicant to calculate radiation levels and airborne radioactivity levels within the plant rooms and areas to verify the adequacy of these design features during plant construction (concurrently with the verification of the ITAAC). The plant rooms and areas to which the DAC apply may be given in figures in Tier 1. Detailed supporting information for the DAC should be contained in appropriate sections of DCD Tier 2 Chapter 12.

The criteria in Tier 1 should ensure that the radiation shielding design (either that provided for by the plant structures, or design permanent or temporary shielding) is adequate to ensure that the maximum radiation levels in plant areas are commensurate with the area's access requirements so radiation exposures to plant personnel can be maintained as low as reasonably achievable (ALARA) during normal plant operations and maintenance. Tier 1 should ensure that adequate shielding is provided for those areas of the plant that may require occupancy to permit an operator to aid in the mitigation of or the recovery from an accident. Tier 1 should ensure that the contribution to the radiation dose from gamma shine (particularly from the turbine building) to a member of the public (off site) will be a small fraction of the EPA dose limit in 40 CFR Part 190.

The criteria in Tier 1 should ensure that the plant provides adequate containment and ventilation flow rates to control the concentrations of airborne radioactivity to levels commensurate with the access requirements of areas in the plant. Tier 1 should ensure that once the concentrations of airborne radioactivity are determined, the required airborne monitors are provided in the appropriate locations in the plant.

Radiological Dose Consequences

The reviewer should review the ITAAC for which PERB has secondary review responsibility, focusing on verifying design features and assumptions upon which the radiological dose consequence assessment of design basis accidents (DBAs). The following discussion provides examples of some of the important design features and assumptions that should be addressed in Tier 1. The maximum MSIV closure time and maximum MSIV leakage rates may be verified by the ITAAC for the nuclear boiler system (BWR's only). The maximum primary containment leakage rate may be verified by the ITAAC for the primary containment system. The minimum radioiodine removal efficiency of the charcoal adsorbers in the standby gas treatment system (SGTS) filter trains and the maximum time for the SGTS to draw a specified negative pressure in the secondary containment may be verified by the ITAAC for the SGTS. The minimum radioiodine removal efficiency of the charcoal adsorbers in the control room and TSC ventilation

system filter trains may be verified by the ITAAC for the HVAC systems. Capability of the main steam system to maintain structural integrity in an safe-shutdown earthquake (SSE) may be verified by the ITAAC for the turbine main steam system. Capability of the off-gas system to withstand an internal hydrogen explosion may be verified by the ITAAC for the off-gas system. The applicant should provide a radiological analysis table in DCD Tier 2 Section 14.3 that should be used to ensure that the most important, though not necessarily all, of the key parameters in the accident dose analyses are addressed in Tier 1.

Site Parameters

PERB is responsible for ensuring that the meteorological dispersion values assumed in various accident analyses are identified as bounding parameters for a site in Tier 1 section for site parameters. These parameters should be specified for the EAB and LPZ at appropriate time intervals for the standard design. The reviewer should ensure that the site parameters in Chapter 2 of DCD Tier 2 are consistent with Tier 1. The parameters are used to evaluate the suitability of a site for the design, and must be demonstrated as part of an early site permit or as part of an application for a combined license.

III. REVIEW PROCEDURES

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. Review responsibilities may be consistent with those in Appendix B 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 SSCs that provide a significant radiation protection function 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 radiation protection 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. Reviewers should ensure that site parameters for radiological dispersal (X/Q) are specified in Tier 1, with appropriate time intervals, and are the bounding parameters

from plant accident analyses. Ensure that site parameter values in Chapter 2 of Tier 2 are consistent with Tier 1.

IV. EVALUATION FINDINGS

Each review branch verifies that sufficient information has been provided to satisfy the requirements of this SRP section, and concludes that Tier 1 is acceptable. A finding similar to that discussed in the Evaluation Findings section of SRP Section 14.3 should be included in a separate section of the SER.

If the applicant has provided DAC for the radiation protection aspects of the standard design, then the reviewer should provide a separate evaluation similar to the above for that material.

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 design certification and combined license applications submitted by applicants pursuant to 10 CFR 52. 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.

VI. REFERENCES

1. 10 CFR Part 52, §52.47 "Contents of Applications."
2. 10 CFR Part 52, §52.97 "Issuance of Combined Licenses."
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. NUREG-0654, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," February 1980, (Rev. 1) November 1980, and Supplements 1 and 2.
6. SECY-95-090, "Emergency Planning Under 10 CFR Part 52," April 11, 1995.

SRP Draft Section 14.3.81
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 1541	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 14.3.8 provides guidance specific to the review of radiation protection and emergency preparedness information and related inspections, tests, analyses, and acceptance criteria (ITAAC) provided in applications submitted in accordance with the requirements of 10 CFR 52.

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SRP Draft Section 14.3.81
Attachment B - Cross Reference of Integrated Impacts

Integrated Impact No.	Issue	SRP Subsections Affected
1541	Develop Acceptance Criteria and Review Procedures for review of Certified Design Material (CDM) including associated inspections, tests, analyses and acceptance criteria (ITAAC) for radiation protection and emergency preparedness.	All.