U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

OFFICE OF NUCLEAR REACTOR REGULATION

9.1.3 SPENT FUEL POOL COOLING AND CLEANUP SYSTEM

REVIEW RESPONSIBILITIES

Primary - ~~Auxiliary Systems Branch (ASB)~~Plant Systems Branch (SPLB)[1]

Secondary - ~~Chemical Engineering Branch (CMEB)~~Materials and Chemical Engineering Branch (EMCB)[2]

I. AREAS OF REVIEW

All nuclear reactor plants include a spent fuel pool for the wet storage of spent fuel assemblies. The methods used to provide cooling for the removal of decay heat from the stored assemblies vary from plant to plant depending upon the individual design. The safety function to be performed by the system in all cases remains the same; that is, the spent fuel assemblies must be cooled and must remain covered with water during all storage conditions. Other functions performed by the system~~,~~ but not related to safety~~,~~ include water cleanup for the spent fuel pool, refueling canal, refueling water storage tank, and other equipment storage pools~~;~~, means for filling and draining the refueling canal and other storage pools~~;~~, and surface skimming to provide clear water in the storage pool.[3]
The ~~ASB~~SPLB[4] review of the spent fuel pool cooling and cleanup system (SFPCCS)[5] covers the system from inlet to and exit from the storage pool and pits, the seismic Category I water source and piping used for fuel pool makeup, the cleanup system filter-demineralizers,[6] and the regenerative process to the point of discharge to the radwaste system.

1. The capability of the spent fuel pool cooling and cleanup system to provide adequate cooling to the spent fuel during all operating conditions is reviewed on ~~one~~either[7] of two bases.

   a.[8] The first basis requires the cooling portion of the system to be designed to seismic Category I (Regulatory Guide 1.29)[9], Quality Group C (Regulatory Guide 1.26)[10] requirements.

   b.[11] The second basis allows a non-seismic Category I, Quality Group C, spent fuel pool cooling system provided that the following systems are designed to seismic Category I, Quality Group C requirements and are protected against tornadoes: the fuel pool make-up water system and its source; and, the fuel pool building and its ventilation and filtration system. The makeup, ventilation and filtration systems must also withstand a single active failure. In addition, the transient

temperature (T_a) used in evaluating combined load on structures shall be the boiling temperature of water when the cooling system is not designed to seismic Category I requirements.

2. The ~~ASB~~SPLB[12] reviews the capability of the spent fuel pool cooling, makeup, and cleanup systems to provide adequate cooling to the spent fuel during all operating and accident conditions. The review includes the following considerations:

   a. The quantity of fuel to be cooled, including the corresponding requirements for continuous cooling during normal, abnormal, and accident conditions.

   b. The ability of the system to maintain pool water levels.

   c. The ability to provide alternate cooling capability and the associated time required for operation.

   d. Provisions to provide adequate makeup to the pool.

   e. Provisions to preclude loss of function resulting from single active failures or failures of non-safety-related components or systems.

   f. The means provided for the detection and isolation of system components that could develop leaks or failures.

   g. The instrumentation provided for initiating appropriate safety actions.

   h. The ability of the system to maintain uniform pool water temperature conditions.

3. ~~ASB~~The SPLB[13] also performs the following reviews under the Standard Review Plan (SRP)[14] sections indicated:

   a. Review for flood protection is performed under SRP Section 3.4.1.

   b. Review of the protection against internally generated missiles is performed under SRP Section 3.5.1.1.

   c. Review of the structures, systems and components to be protected against externally generated missiles is performed under SRP Section 3.5.2.

   d. Review of high- and moderate-energy pipe breaks is performed under SRP Section 3.6.1.

   e. Review for fire protection is performed under SRP Section 9.5.1.[15]

   f. Review of environmental qualification of mechanical and electrical equipment is performed under SRP Section 3.11.[16]

   g. Review to verify that the limits for radioactivity concentrations are not exceeded is performed under SRP Sections 11.1 and 11.2.[17]

Review Interfaces[18]

~~4~~A.[19] A secondary review is performed by ~~CMEB~~the EMCB[20] and the results used by the ~~ASB~~SPLB[21] to complete the overall evaluation. ~~CMEB~~The EMCB[22] provides ~~an~~ safety evaluation report (SER)[23] input to ~~ASB~~the SPLB[24] on a routine basis that includes an evaluation of the capability and capacity of the spent fuel pool cleanup system to remove corrosion products, radioactive materials and impurities from the pool water. Also upon request the ~~CMEB~~EMCB[25] will provide ~~ASB~~the SPLB[26] with an evaluation of the spent fuel pool and the spent fuel pool cooling system materials — fluid compatibility and potential for metal corrosion degradation. ~~ASB~~The SPLB[27] will request such input if the materials used in the design differs significantly from previously approved designs.

The EMCB, upon request, verifies the compatibility of the materials of construction with service conditions.[28]

B.[29] Coordinated reviews are performed by other branches and the results used by ~~ASB~~the SPLB[30] in the overall evaluation of the SFPCCS. The coordinated reviews are as follows:

1.[31] The ~~Structural Engineering Branch (SEB)~~Mechanical Engineering Branch (EMEB)[32] determines the acceptability of the design analyses, procedures, and criteria used to establish the ability of seismic Category I structures housing the system and supporting systems to withstand the effects of natural phenomena such as the safe shutdown earthquake (SSE), the probable maximum flood (PMF), and tornado missiles as part of its primary review responsibility for SRP Sections 3.3.1, 3.3.2, 3.5.3, 3.7.1 through 3.7.4, 3.8.4, and 3.8.5.

2.[33] The Mechanical Engineering Branch ~~(MEB)~~(EMEB)[34] determines that the components piping and structures are designed in accordance with applicable codes and standards as part of its primary review responsibility for SRP Sections 3.9.1 through 3.9.3. The ~~(MEB)~~EMEB,[35] also, determines the acceptability of the seismic and quality group classifications for system components as part of its primary review responsibility for SRP Sections 3.2.1 and 3.2.2. The ~~(MEB)~~EMEB[36] also reviews the adequacy of the inservice testing program of pumps and valves as part of its primary review responsibility for SRP Section 3.9.6.

3. The ~~Materials Engineering Branch (MTEB)~~ECGB verifies that inservice inspection requirements are met for system components as part of its primary review responsibility for SRP Section 6.6~~, and, upon request, verifies the compatibility of the materials of construction with services conditions~~.[37]

4.[38] The review for~~ Fire Protection,~~[39] Technical Specifications~~, and Quality Assurance are~~ is[40] coordinated and performed by the ~~Chemical Engineering Branch, Licensing Guidance Branch, and Quality Assurance Branch~~Technical Specifications Branch (TSB)[41] as part of ~~their~~its primary review responsibility for SRP Section~~s 9.5.1,~~[42] 16.0~~ and 17.0, respectively~~.

5. The review for Quality Assurance is coordinated and performed by the Quality Assurance and Maintenance Branch (HQMB) as part of its primary review responsibility for SRP Sections 17.1, 17.2, or 17.3.[43]

6.[44] The ~~EQB~~EMEB[45] reviews the seismic qualifications of Category I instrumentation and electrical equipment ~~and the environmental qualification of mechanical and electrical equipment as part of its primary review responsibility for SRP Sections 3.10 and 3.11, respectively.~~as part of its primary review responsibility for SRP Section 3.10.[46]

7.[47] The Instrumentation and Control ~~Systems Branch (ICSB)~~Branch (HICB)[48]~~and the Power Systems Branch (PSB)~~[49] will verify the adequacy of the design, installation, inspection and testing ~~all electrical systems (sensing, control and power) required for proper operation of the SFPCCS~~of the SFPCCS instrumentation and controls important to safety as part of ~~their~~its primary review responsibility for SRP Section 7.1 and Appendix 7-A~~ for ICSB and SRP Section 8.3.1 for PSB~~.

8.[50] The Electrical Engineering Branch (EELB) will verify the adequacy of the design, installation, inspection and testing of onsite ac power systems required for proper operation of the SFPCCS as part of its primary review responsibility for SRP Section 8.3.1.

9. For new plant applicants, the spent fuel pool cooling system may be included in the systematic assessment of shutdown risks as an alternate feature that can maintain core cooling in the event of a loss of normal decay heat removal during shutdown conditions. The Probabilistic Safety Assessment Branch (SPSB)

coordinates and performs the shutdown risk assessment reviews as part of its primary review responsibility for SRP Section 19.1 (Proposed).[51]

~~The Effluent Treatment Systems Branch (ETSB) will verify that the limits for radioactivity concentrations are not exceeded as part of its primary review responsibility for SRP Sections 11.1 and 11.2.~~[52]

C.[53] For those areas of review identified above as being the primary responsibility of other branches, the acceptance criteria and methods of ~~review~~ application are contained in the referenced SRP sections ~~corresponding to those branches~~.[54]

II. ACCEPTANCE CRITERIA

Acceptability of the design of the spent fuel pool cooling and cleanup system, as described in the applicant's safety analysis report (SAR), including related sections of Chapters 2 and 3 of the SAR is based on specific general design criteria and regulatory guides, and on independent calculations and staff judgments with respect to system functions and component selection.

1. The design of the spent fuel pool cooling and cleanup system and its makeup system is acceptable if the integrated design is in accordance with the following criteria:

   a. General Design Criterion 2 (GDC 2),[55] as related to structures housing the system and the system itself being capable of withstanding the effects of natural phenomena such as earthquakes, tornadoes, and hurricanes. Acceptance for meeting this criterion is based on conformance to positions C.1, C.2, C.6, and C.8 of Regulatory Guide 1.13 and position C.1 of Regulatory Guide 1.29 for safety-related portions,[56] and position C.2 of Regulatory Guide 1.29 for nonsafety-related portions of the system.

   [57]This criterion does not apply to the cleanup portion of the system and need not apply to the cooling system if the fuel pool makeup water system and its source meet this criterion,[58] and the fuel pool building and its ventilation and filtration system meet this criterion, and the ventilation and filtration system meets the guidelines of Regulatory Guide 1.52.

   [59]The cooling and makeup system should ~~also~~[60] be designed to Quality Group C requirements in accordance with Regulatory Guide 1.26. However, when the cooling system is not designated Category I it need not meet the requirements of ASME Section XI for inservice inspection of nuclear plant components.

   b. General Design Criterion 4 (GDC 4),[61] with respect to structures housing the systems and the system being capable of withstanding the effects of external missiles. Acceptance is based on meeting position C.2 of Regulatory Guide 1.13.

   [62]This criterion does not apply to the cleanup system and need not apply to the cooling water system if the makeup system, ~~and~~ its source, ~~and~~ the building, and its ventilation and filtration system are tornado protected, and the ventilation and filtration system meets the guidelines of Regulatory Guide 1.52.[63]

c. General Design Criterion 5 (GDC 5),[64] as related to shared systems and components important to safety being capable of performing required safety functions.

d. General Design Criterion 44 (GDC 44),[65] ~~to include~~as related to[66]:

(1) The capability to transfer heat loads from safety-related structures, systems, and components to a heat sink under both normal operating and accident conditions.

(2) Suitable redundancy of components so that safety functions can be performed assuming a single active failure of a component coincident with the loss of all offsite power.

(3) The capability to isolate components, systems, or piping, if required, so that the system safety function will not be compromised.

~~(4) In meeting this criterion,[67] acceptance is based on the recommendations of Branch Technical Position ASB 9-2 SPLB 9-2, "Residual Decay Energy for Light-Water Reactors for Long-Term Cooling" (located in SRP Section 9.2.5)[68] for calculating the heat loads and the assumptions set forth in item 1.h of subsection III of this SRP section. The temperature limitations of the pool water identified in item 1.d of subsection III of this SRP section is also used as a basis for meeting this criterion.~~

e. General Design Criterion 45 (GDC 45),[69] as related to the design provisions to permit periodic inspection of safety-related components and equipment.

f. General Design Criterion 46 (GDC 46),[70] as related to the design provisions to permit operational functional testing of safety-related systems or components to ~~assure~~ensure[71] structural integrity and system leak tightness, operability, and adequate performance of active system components, and the capability of the integrated system to perform required functions during normal, shutdown, and accident situations.

g. General Design Criterion 61 (GDC 61),[72] as related to the system design for fuel storage and handling of radioactive materials, including the following elements:

(1) The capability for periodic testing of components important to safety.

(2) Provisions for containment.

(3) Provisions for decay heat removal.

(4) The capability to prevent reduction in fuel storage coolant inventory under accident conditions~~ in accordance with the guidelines of position C.6 of Regulatory Guide 1.13~~.

(5) The capability and capacity to remove corrosion products, radioactive materials and impurities from the pool water and reducing occupational exposures to radiation.

h. General Design Criterion 63 (GDC 63),[73] as it relates to monitoring systems provided to detect conditions that could result in the loss of decay heat removal, to detect excessive radiation levels, and to initiate appropriate safety actions.

i. 10 CFR ~~Part 20, paragraph 20.1(c)~~ 20.1101(b)[74] as it relates to radiation doses being kept as low as is reasonably achievable (ALARA). In meeting this regulation,[75] Regulatory Guide 8.8, positions C.2.f(2) and C.2.f(3) will be used as a basis for acceptance.

Technical Rationale

The technical rationale for application of these acceptance criteria to reviewing spent fuel pool cooling and cleanup system is discussed in the following paragraphs:[76]

A. Compliance with GDC 2 requires that structures, systems, and components important to safety be designed to withstand the effects of expected natural phenomena combined with the appropriate effects of normal and accident conditions without loss of capability to perform their safety functions.

This SRP section describes staff positions related to the design of the spent fuel pool cooling and cleanup system and cites Regulatory Guide 1.13 to describe the design basis, Regulatory Guide 1.26 to describe quality group classifications, and Regulatory Guide 1.29 to describe seismic design classifications. These positions describe the design bases needed to resist expected natural phenomena combined with the appropriate effects of normal and accident conditions.

Meeting the requirements of GDC 2 provides assurance that components of the spent fuel pool cooling and cleanup system will be designed to withstand the effects of expected natural phenomena and will be capable of performing their intended safety functions.[77]

B. Compliance with GDC 4 requires that structures, systems, and components important to safety be designed to accommodate the effects of, and be compatible with, environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents and dynamic effects resulting from pipe whip, missiles, and discharging fluids.

This SRP section describes staff positions related to the design of the spent fuel pool cooling and cleanup system and cites Regulatory Guide 1.13 to describe the design basis, including that for protecting the spent fuel storage facility against missiles and heavy loads.

Meeting the requirements of GDC 4 provides assurance that components of the spent fuel pool cooling and cleanup system will be designed to accommodate expected

environmental conditions and will be capable of performing their intended safety functions.[78]

C. Compliance with GDC 5 requires that structures, systems, and components important to safety not be shared among nuclear power units unless it can be shown that such sharing will not impair their ability to perform their safety functions.

This SRP section describes staff positions related to the design of the spent fuel pool cooling and cleanup system to ensure that no single failure will prevent the system from cooling the spent fuel, which is its safety function.

Meeting the requirements of GDC 5 provides assurance that components of the spent fuel pool cooling and cleanup system will be designed to accommodate shared systems, structures and components such that no single failure will prevent the system from performing its safety function.[79]

D. Compliance with GDC 44 requires that a system be provided to transfer heat from structures, systems, and components important to safety. The system must function under normal and accident conditions, assuming a single failure.

This SRP section describes staff positions related to the design of the spent fuel pool cooling and cleanup system, including assumptions concerning heat loads, redundancy of components, capability to isolate components, and temperature limits.

Meeting the requirements of GDC 44 provides assurance that components of the spent fuel pool cooling and cleanup system will be designed to transfer heat from the system under normal and accident conditions, assuming a single failure.[80]

E. Compliance with GDC 45 requires that the cooling water system be designed to permit appropriate periodic inspection of important components such as heat exchangers and piping, thereby ensuring the integrity and capability of the system.

This SRP section describes staff positions related to the design of the spent fuel pool cooling and cleanup system, including inspection of the system and its components.

Meeting the requirements of GDC 45 provides assurance that components of the spent fuel pool cooling and cleanup system can and will be inspected, thereby ensuring that the system is capable of performing its intended safety function.[81]

F. Compliance with GDC 46 requires that the cooling water system be designed to permit appropriate periodic pressure and functional testing to ensure the leaktight integrity of its components, the operability of its components, and the operability of the system as a whole at conditions that are as close to the design basis as practical.

This SRP section describes staff positions related to the design of the spent fuel pool cooling and cleanup system, including testing of the system and its components.

Meeting the requirements of GDC 46 provides assurance that components of the spent fuel pool cooling and cleanup system can and will be tested, thereby ensuring that the system is capable of performing its intended safety function.[82]

G. Compliance with GDC 61 requires that the fuel storage system be designed to ensure adequate safety under normal and postulated accident conditions. The system shall be designed with the capability to permit appropriate periodic inspection and testing of components important to safety, suitable shielding for radiation protection, containment capability, confinement capability, and residual heat removal capability.

This SRP section describes staff positions related to the design of the spent fuel pool cooling and cleanup system, including provisions for inspection and testing, shielding, containment and confinement, and residual heat removal.

Meeting the requirements of GDC 61 provides assurance that components of the spent fuel pool cooling and cleanup system will be inspected, tested, shielded, and provided with containment, confinement, and residual heat removal capability to ensure that the system is capable of performing its intended safety function.[83]

H. Compliance with GDC 63 requires that appropriate systems be provided in the fuel storage area to detect conditions that may result in the loss of residual heat removal capability or excessive radiation levels, and initiate appropriate safety actions.

This SRP section describes staff positions related to the design of the spent fuel pool cooling and cleanup system, including provisions for monitoring and detection systems.

Meeting the requirements of GDC 63 provides assurance that components of the spent fuel pool cooling and cleanup system will be provided with monitoring and detection capabilities to ensure that the system is capable of performing its intended safety function.[84]

I. Compliance with 10 CFR 20.1101(b) requires that the licensee use, to the extent practicable, procedures and engineering controls based on sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as is reasonably achievable.

This SRP section describes staff positions related to the design of the spent fuel pool cooling and cleanup system, including positions to achieve radiation doses in conformance with the ALARA principle. Positions in Regulatory Guide 8.8 regarding methods for preventing the generation and spread of contamination are provided.

Meeting the requirements of 10 CFR 20.1101(b) provides assurance that components of the spent fuel pool cooling and cleanup system will result in radiation doses that comply with the ALARA standard.[85]

III. REVIEW PROCEDURES

The procedures set forth below are used during the construction permit (CP) application 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 of this SRP section. For the review of operating license (OL) applications, the review procedures ~~and~~ are used to determine that the acceptance criteria and bases have been appropriately implemented in the final design as set forth in the final safety analysis report. The review procedures for OL applications include a determination that the content and intent of the technical specifications

prepared by the applicant are in agreement with the requirements for system testing, minimum performance, and surveillance developed as a result of the staff's review.

Upon request from the primary reviewer, the coordinating review branches will provide input for the areas of review stated in subsection I of this SRP section. The secondary review branch, ~~CMEB~~EMCB,[86] will provide an input on a routine basis for those areas of review indicated in this SRP section. The primary reviewer (~~ASB~~SPLB[87]) obtains and uses such input as required to ~~assure~~ensure[88] that this review procedure is complete.

The review procedures given below are for a typical system. Any variance of the review, to take account of a proposed unique design, will be such as to ~~assure~~ensure[89] that the system meets the criteria of subsection II of this SRP section. In the review, the spent fuel pool cooling and cleanup system and its makeup system are evaluated with respect to their capability to perform the necessary safety functions during all conditions, including normal operation, refueling, abnormal storage conditions, and accident conditions.

1. The safety function of the system for refueling and normal operations is identified by reviewing the information provided in the SAR pertaining to the design bases and criteria and the safety evaluation section. The SAR section on the system functional performance requirements is also reviewed to determine that it describes the minimum system heat transfer and system flow requirements for normal plant operation, component operational degradation requirements (i.e., pump leakage, etc.) and describes the procedures that will be followed to detect and correct these conditions should degradation become excessive. The reviewer, using failure modes and effects analyses, determines that the system is capable of sustaining the loss of any active component and evaluates, on the basis of previously approved systems or independent calculations, that the minimum system requirements (cooling load and flow) are met for these failure conditions. The system piping and instrumentation diagrams (P&IDs), layout drawings, and component descriptions are then reviewed for the following points:

   a. Essential portions of the system are correctly identified and are isolable from the nonessential portions of the system. The P&IDs are reviewed to verify that they clearly indicate the physical division between each portion and indicate required classification changes. System drawings are also reviewed to see that they show the means for accomplishing isolation and the system description is reviewed to identify minimum performance requirements for the isolation valves. For the typical system, the drawings and description are reviewed to verify that adequate isolation valves separate non-essential portions and components from the essential portions.

   b. Heat exchangers, pumps, valves and piping for the cooling portion of the system are constructed to Quality Group C and designed to seismic Category I requirements in accordance with the guidance provided in Regulatory Guides 1.26 and 1.29. As an acceptable alternative, the cooling loop may be constructed to non-seismic Category I requirements provided the spent fuel pool water makeup system, and the building ventilation and filtration system are designed to Quality Group C and seismic Category I requirements, are protected from the effects of tornadoes and meet the single failure requirements. Where this alternative is selected, the ventilation system provides the capability to vent steam/moisture to the atmosphere to protect safety-related components from the

effects of boiling in the SFP. If necessary to limit the offsite dose consequences of spent fuel pool boiling t~~The~~ **The ventilation and filtration system must also meet the guidelines of Regulatory Guide 1.52125**. The review for seismic design is performed by ~~SEB~~the ECGB[90] and the review for seismic and quality group classification is performed by ~~MEB is~~ the EMEB, as[91] indicated in subsection I of this SRP section.

c. The stated quantity of fuel to be cooled by the spent fuel cooling system is consistent with the quantity of fuel stored, as stated in Section 9.1.2 of the SAR.

d. The minimum heat removal capacity with the cooling system in operation is greater than 0.3% of the reactor rated thermal power with the pool at the design temperature of the structure and the heat sink at its maximum design temperature. The cooling system retains at least half of its full heat removal capacity assuming a single active failure. This capacity provides reasonable assurance that the pool temperature will remain within design bounds for the structure during full core discharges to the spent fuel pool when the normal cooling system is in operation, and ensures that significant heat removal capacity will remain available when an active component is unavailable due to a single failure or maintenance. The forced cooling capacity remaining following a single failure is adequate due to the low probability that the single failure would occur during the short period of time necessary for the heat load to decay to half its value at the completion of the offload and the availability of makeup water sources to compensate for evaporation and leakage. ~~For the maximum normal heat load with normal cooling systems in operation, and assuming a single active failure, the temperature of the pool should be kept at or below 140°F 60 °C (140 °F)[92] and the liquid level in the pool should be maintained. For the abnormal maximum heat load (full core unload) the temperature of the pool water should be kept below boiling and the liquid level maintained with normal systems in operation. A single active failure need not be considered for the abnormal case. The associated parameters for the decay heat load of the fuel assemblies, the temperature of the pool water, and the heatup time or rate of pool temperature rise for the stated storage conditions are reviewed on the basis of independent analyses or comparative analyses of pool conditions that have been previously found acceptable.~~

e. The spent fuel pool and cooling systems have been designed so that in the event of failure of inlets, outlets, piping, or drains, the pool level will not be inadvertently drained below a point approximately ~~10 feet~~3 meters (10 feet)[93] above the top of the active fuel. Pipes or external lines extending into the pool that are equipped with siphon breakers, check valves, or other devices to prevent drainage are acceptable as a means of implementing this requirement.

f. A seismic Category I makeup system and an appropriate backup method to add coolant to the spent fuel pool are provided. If the cooling system is designed to Seismic Category I, Quality Group C standards, t~~T~~he backup system need not be a permanently installed system, nor Category I, but must take water from a Category I source. Otherwise, the backup system must also be permanently installed and seismic Category I. The minimum makeup capacity for each system exceeds the larger of the pool leakage rate assuming spent fuel pool

liner perforation resulting from a dropped fuel assembly or the evaporation rate necessary to remove 0.3% of the reactor rated thermal power. The design permits initiation of makeup water flow through either system from locations remote from the operating floor surrounding the pool surface. Engineering judgment and comparison with plants of similar design are used to determine that ~~the makeup capacities and~~ the time required to align systems and connect makeup systems not permanently installed ~~make associated hookups~~ are consistent with heatup times or expected leakage from structural damage.

g. Design provisions have been made that permit appropriate inservice inspection and functional testing of system components important to safety. It will be acceptable if the SAR provides a statement that the spent fuel pool cooling, makeup, and cleanup system is included in the inservice inspection program per SRP Section 6.6 and the inservice testing program of SRP Section ~~3.6.6~~3.9.6.[94] These SRP sections are reviewed by the ~~MTEB and MEB~~EMCB and EMEB,[95] respectively.

h. The reviewers verify that the system design provides adequate SFP cooling capacity for normal operation by reviewing a bounding evaluation of potential refueling conditions or reviewing a method of performing outage-specific evaluations described in the safety analysis report. The largest heat load placed on the SFCCS heat exchangers is imposed by refueling offloads, which are deliberate, planned evolutions. Emergency offloads are not credible because fuel transfer requires plant cooldown, reactor disassembly and refueling cavity flooding, which are processes that depend on continued decay heat removal through the the reactor coolant system and shutdown cooling system. As a result, if necessary for adequate cooling of the fuel, factors that increase heat load (e.g., power increases, decay time reductions, or storage capacity increases) may be offset by operational factors that reduce heat load (e.g., longer decay times or transfer of fewer fuel assemblies to the SFP) or that increase heat removal capability (e.g., scheduling offloads for periods of reduced ultimate heat sink temperature or optimizing cooling system performance).

Considering the preceding measures to manage the heat load relative to cooling capability, the following criteria are evaluated:

(a) decay heat load calculations are performed using a conservative model that evaluates multiple fission product groups and considers offload size, decay time, power history, and inventory of previously discharged assemblies.

(b) heat removal capability is calculated for a bulk SFP temperature of 60°C (140°F) considering ultimate heat sink temperature, cooling system flow rates, and heat exchanger performance (i.e., fouling and tube plugging margin).

(c) appropriate administrative controls are described in the safety analysis report to ensure that the full heat removal capability at a SFP temperature of 60°C (140°F) will exceed the calculated decay heat load at the completion of the refueling offload.

~~The calculation for the maximum amount of thermal energy to be removed by the spent fuel cooling system will be made in accordance with Branch Technical Position ASB 9-2, "Residual Decay Energy for Light-Water Reactors for Long-Term Cooling" (located in SRP Section 9.2.5)SPLB 9-2[96] under the following assumed conditions.~~

~~i.(1)[97] The uncertainty factor K is set equal to 0.1 for long-term cooling (greater than 107 seconds).~~

~~ii.(2) The normal maximum spent fuel heat load is set at one refueling load at equilibrium conditions after 150 hours decay and one refueling load to equilibrium conditions after one year decay. (Maximum pool temperature 140°F60 °C (140 °F)[98])~~

~~iii.(3) The spent fuel pool cooling system should have the capacity to remove the decay heat from one full core at equilibrium conditions after 150 hours decay and one refueling load at equilibrium conditions after 36 days decay, without spent fuel pool bulk water boiling. Cooling system single failure need not be considered concurrent for this condition.~~

~~iv.(4) For pools with greater than 1-1/3 core capacity, one additional refueling batch at equilibrium conditions after 400 days decay should be included in the cooling requirements.~~

2. The reviewer verifies that the system has been designed so that system functions will be maintained, as required, in the event of adverse natural phenomena such as earthquakes, tornadoes, hurricanes, and floods. The reviewer evaluates the system, using engineering judgment and the results of failure modes and effects analyses to determine the following:

   a. The failure of portions of the system, or of other systems not designed to seismic Category I standards and located close to essential portions of the system, or of non-seismic Category I structures that house, support, or are close to essential portions of the pool and cooling system, will not preclude essential functions. Reference to SAR Chapter 2, describing site features and the general arrangement and layout drawings, will be necessary as well as to the SAR tabulation of seismic design classifications for structures and systems. Statements in the SAR to the effect that the above conditions are met are acceptable~~. (CP) for the CP review.~~[99]

   b. The essential portions of the spent fuel pool cooling system are protected from the effects of floods, hurricanes, tornadoes, and internally or externally generated missiles. Flood protection and missile protection criteria are discussed and evaluated in detail under the SRP sections for Chapter 3 of the SAR.

      The reviewer utilizes the procedures identified in these plans to ~~assure~~ensure[100] that the analyses presented are valid. A statement to the effect that the system is located in a seismic Category I structure that is tornado missile and flood protected, or that components of the system will be located in individual cubicles

or rooms that will withstand the effects of both flooding and missiles is acceptable. The location and design of the system, structures, and pump rooms (cubicles) are reviewed to determine that the degree of protection provided is adequate.

3. The system design information and drawings are analyzed to ~~assure~~ ensure[101] that the following features will be incorporated. A statement that these features will be included in the design by some appropriate means is a basis for acceptance~~. (CP) for the CP review.~~[102]

   a. A leakage detection system is provided to detect component or system leakage. An adequate means for implementing this requirement is to provide sumps or drains with adequate capacity and appropriate alarms in the immediate area of the system.

   b. Components and headers of the system are designed to provide individual isolation capabilities to ~~assure~~ensure[103] system function, control system leakage, and allow system maintenance.

   c. Design provisions are made to ~~assure~~ensure[104] the capability to detect leakage of radioactivity or chemical contamination from one system to another and to preclude long-term corrosion, organic fouling, or the spreading of radioactivity. Radioactivity monitors and conductivity monitors located in the system discharge lines are acceptable means for implementing this requirement.

4. The SAR descriptive information, P&IDs, layout drawings, and system analyses are reviewed to ~~assure~~ensure[105] that essential portions of the system will function following design basis accidents, assuming a concurrent single active component failure. The reviewer evaluates failure mode and effects analyses presented in the SAR to ~~assure~~ensure[106] function of required components, trace the availability of these components on system drawings, and check that minimum system flow, makeup, and heat transfer requirements are met for each degraded situation over the required time spans. For each case the design will be acceptable if minimum system requirements are met.

5. The spent fuel pool cleanup system and various auxiliary systems are designated as nonsafety-related systems and are designed accordingly (nonseismic Category I). These systems are evaluated to ~~assure~~ensure[107] that their failure cannot affect the functional performance of any safety-related system or component. The relationship and proximity between the nonsafety-related system and safety-related systems or components are determined by reviewing the integrated structure and component layout diagrams. Independent analyses, engineering judgment, and comparisons with previously approved systems are used to verify that where a nonsafety-related system interconnects or interfaces with the cooling system, its failure by any event or malfunction will not preclude adequate functional performance of the cooling system.

~~7~~6.[108] The cleanup system is also reviewed to ~~assure~~ensure[109] that it has been designed with the capability to maintain acceptable pool water conditions. The P&IDS and associated information provided in the SAR is reviewed to verify the following:

a. A means has been provided for mixing to produce a uniform temperature throughout the pool.

b. The cleanup system is reviewed by ~~CMEB~~the EMCB[110] to verify they have the capacity and capability to remove corrosion products, radioactive materials, and impurities so that water clarity and quality will enable safe operating conditions in the pool. This includes instrumentation and sampling to monitor the water purity and need for demineralizer resin replacement, including the chemical and radiochemical limits such as conductivity, gross gamma and iodine activity, demineralizer differential pressure, pH and crud level which are used to initiate corrective action.

c. The capability for processing the refueling canal coolant during refueling operations has been provided.

d. Provisions to preclude the inadvertent transfer of spent filter and demineralized media to any place other than the radwaste facility have been provided.

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.[111]

IV. EVALUATION FINDINGS

The reviewer verifies that sufficient information has been provided and that ~~his~~ the[112] review supports conclusions of the following type, to be included in the staff's ~~safety evaluation report~~ SER:[113]

> The spent fuel pool cooling and cleanup system includes all components and piping of the system from inlet to and exit from the storage pool and pits, the seismic Category I water source and piping used for fuel pool makeup, the cleanup system filter-demineralizers and the regenerative process to the point of discharge to the radwaste system. The scope of review of the spent fuel pool cooling and cleanup system included layout drawings, process flow diagrams, piping and instrumentation diagrams, and descriptive information for the system and the supporting systems that are essential to safe operation. The cooling portion of the system and the emergency primary makeup system are designed to seismic Category I, Quality Group C requirements since they are necessary to remove decay heat from the spent fuel and to prevent fuel damage that could lead to unacceptable releases of radioactivity. The cooling portion of the system need not be designed to seismic Category I requirements if the makeup system and the building ventilation and filtration system are seismic Category I, and if the ventilation and filtration system meet the guidelines of Regulatory Guide 1.52.

[114]The staff concludes that the design of the spent fuel pool cooling and cleanup system and its makeup system meets the requirements of General Design Criteria 2, 4, 5, 44, 45, 46, 61, and 63. This conclusion is based on the following:

[115]1. The applicant has met the requirements of General Design Criterion 2 with respect to safety-related portions of the system being protected against natural phenomena. Acceptance is based on meeting the guidelines of Regulatory Guide 1.13, position C.1, which recommends a seismic Category I design for necessary portions of the spent fuel storage facility; position C.2, regarding protection against winds and wind generated missiles; position C.6, as it relates to the system being capable of withstanding earthquakes without loss of coolant that would uncover the fuel; and position C.8, which recommends a seismic Category I makeup system with appropriate redundancy or a backup from a Category I water source. Acceptance is also based on meeting the seismic design requirements of Regulatory Guide 1.29, position C.1, for safety-related portions of the system necessary for adequate cooling to prevent excessive radioactivity releases (position C.1.p of Regulatory Guide 1.29) and position C.2 as it relates to the failure of nonsafety-related portions of the system. If the fuel pool building ventilation and filtration systems are designed to seismic Category I requirements and in accordance with the guidelines of Regulatory Guide 1.52 the cooling portion of the system need not be seismic Category I.

2. The design meets the requirements of General Design Criterion 4 with regards to protection against the effects of externally generated missiles since it is in accordance with position C.2 of Regulatory Guide 1.13 since no loss of watertight integrity or fuel damage occur in the event of tornado missiles.

3. The design meets the requirements of General Design Criterion 5 regarding the sharing of safety-related structures, systems, and components since no single failure will prevent the system from performing its safety-related function which is cooling the spent fuel.

4. The design meets the requirements of General Design Criterion 44 regarding decay heat removal redundancy and power supplies, since the system has the capability to remove decay heat from the spent fuel under both normal operating and accident conditions. The system has redundancy so that decay heat can be removed assuming a single active failure coincident with a loss of all offsite power, and is designed with isolation capability of system components and piping, if required, such that the ability of the system to remove decay heat will not be compromised.

5. The system meets the inspection and testing requirements of General Design Criteria 45 and 46 since the system is designed and constructed with suitable clearances and location to allow periodic inspection of major components, and is designed to permit functional operational testing to ~~assure~~ensure[116] structural integrity and system leak tightness, operability, and adequate performance of active system components.

6. The system is designed in accordance with the requirements of General Design Criterion 61 as it relates to the system design for fuel storage since the system

has the following design capabilities: the system has the capability for periodic testing of components important to safety. The system is designed to provide suitable shielding by maintaining a minimum water level above the fuel. There is redundancy and testability of the decay heat removal portions of the system, and the system is designed to prevent reduction in fuel storage coolant inventory under accident conditions in accordance with position C.6 of Regulatory Guide 1.13. The spent fuel pool cleanup portion of the system (1) provides the capability and capacity of removing radioactive materials, corrosion products, and impurities from the pool water and thus meets the requirements of Criterion 61 as it relates to appropriate filtering systems for fuel cooling and storage, (2) reduces occupational exposure to radiation by removing radioactive materials from the pool water and thus meets the requirements of 10 CFR ~~Part 20, 20.1(c)~~ 20.1101(b)[117] as it relates to maintaining radiation exposures ~~as low as reasonably achievable (~~ALARA~~)~~[118] and, (3) retains radioactive materials and crud in the pool water in the demineralizer and filters and thus meets positions ~~C.2.f(2) and (3)~~C.2.f(2) and C.2.f(3)[119] of Regulatory Guide 8.8.

7. The system design meets the requirements of General Design Criterion 63 since it has provisions to detect the loss of heat removal function through the use of loss of flow and temperature alarms, and to detect conditions that would result in excessive radiation through the use of coolant low level alarms and radiation monitoring alarms. ~~And the~~The[120] system has the capability to initiate appropriate safety actions since it has an automatic makeup system and the cooling system and ventilation and filtration system can be operated from the control room in the event of high radiation or low level alarms.

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.[121]

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.[122] 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.[123]

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

VI. REFERENCES

1. 10 CFR Part 20, ~~§20.1(c), "General Provisions for Standards for Protection Against Radiation."~~Subpart B, § 20.1101(b), "Radiation Protection Programs."[124]

2. 10 CFR Part 50, Appendix A, General Design Criterion 2, "Design Bases for Protection Against Natural Phenomena."

3. 10 CFR Part 50, Appendix A, General Design Criterion 4, "Environmental and ~~Missile~~Dynamic Effects[125] Design Bases."

4. 10 CFR Part 50, Appendix A, General Design Criterion 5, "Sharing of Structures, Systems and Components."

5. 10 CFR Part 50, Appendix A, General Design Criterion 44, "Cooling Water."

6. 10 CFR Part 50, Appendix A, General Design Criterion 45, "Inspection of Cooling Water System."

7. 10 CFR Part 50, Appendix A, General Design Criterion 46, "Testing of Cooling Water System."

8. 10 CFR Part 50, Appendix A, General Design Criterion 61, "Fuel Storage and Handling and Radioactivity Control."

9. 10 CFR Part 50, Appendix A, General Design Criterion 63, "Monitoring Fuel and Waste Storage."

10. Regulatory Guide 1.13, "Fuel Storage Facility Design Basis."

11. Regulatory Guide 1.26 "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants."

12. Regulatory Guide 1.29, "Seismic Design Classification."

13. Regulatory Guide 1.52, "Design, Testing, and Maintenance Criteria for Engineered-Safety-Feature Atmosphere Cleanup System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants."

14. Regulatory Guide 8.8, "Information Relevant to Ensuring That Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable."

SRP Draft Section 9.1.3
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 primary review branch and abbreviation	Changed "Auxiliary Systems Branch (ASB)" to "Plant Systems Branch (SPLB)."
2.	Current secondary review branch and abbreviation	Changed "Chemical Engineering Branch (CMEB)" to "Materials and Chemical Engineering Branch (EMCB)."
3.	Editorial	Modified punctuation and added article, "but," to improve clarity and readability.
4.	Current primary review branch and abbreviation	Changed "ASB" to "SPLB."
5.	Editorial	Added acronym "SFPCCS" to describe the spent fuel pool cooling and cleanup system. This acronym was used elsewhere in this SRP section but had not been defined.
6.	Editorial	Added comma to correct punctuation and clarify sentence.
7.	Editorial	Substituted the word "either" for "one" for clarity.
8.	Editorial	Divided Subsection I.1 by adding Subsection I.1.a. As previously written, it is not clear that the last three sentences in the paragraph only apply to the second option.
9.	Editorial	Added citation of Regulatory Guide 1.29 to explain the reference to "seismic Category 1" in the sentence.
10.	Editorial	Added citation of Regulatory Guide 1.26 to explain the reference to "Quality Group C" in the sentence.
11.	Editorial	Divided Subsection I.1 by adding Subsection I.1.b. As previously written, it is not clear that the last three sentences in the paragraph only apply to the second option.
12.	Current primary review branch and abbreviation	Changed "ASB" to "SPLB."
13.	Current primary review branch and abbreviation	Changed "ASB" to "SPLB."
14.	Editorial	Defined "SRP" as "Standard Review Plan."

SRP Draft Section 9.1.3
Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
15.	SRP-UDP format item	Added Subsection I.3.e, "Review for fire protection is performed under SRP Section 9.5.1." This information was extracted from the paragraph that formerly followed and could not be subsumed under "Review Interfaces" because the primary review branch for SRP Section 9.5.1 is now SPLB.
16.	SRP-UDP format item	Added Subsection 1.3.f, "Review of environmental qualification of mechanical and electrical equipment is performed under SRP Section 3.11." This information was extracted from the paragraph that formerly followed and could not be subsumed under "Review Interfaces" because the primary review branch for SRP Section 3.11 is now SPLB.
17.	SRP-UDP format item	Added Subsection 1.3.g, "Verification that the limits for radioactivity concentrations are not exceeded is performed under SRP Sections 11.1 and 11.2. This information was extracted from the paragraph that formerly followed and could not be subsumed under "Review Interfaces" because the primary review branch for SRP Sections 11.1 and 11.2 is now SPLB.
18.	SRP-UDP format item	Added "Review Interfaces" under REVIEW RESPONSIBILITIES.
19.	Editorial	Changed Subsection I.4 to Subsection I.A under "Review Interfaces."
20.	Current review interface branch designation	Changed "CMEB" to "the EMCB."
21.	Current review interface branch designation	Changed "ASB" to "SPLB."
22.	Current secondary review branch designation	Changed "CMEB" to "The EMCB."
23.	Editorial	Defined "SER" as "safety evaluation report."
24.	Current primary review branch designation	Changed "ASB" to "the SPLB."
25.	Current secondary review branch designation	Changed "CMEB" to "EMCB."
26.	Current primary review branch designation	Changed "ASB" to "the SPLB."
27.	Current primary review branch designation	Changed "ASB" to "The SPLB."

Item	Source	Description
28.	SRP-UDP format item. Current secondary review branch designation	Moved paragraph on inservice inspection review and provided current secondary review branch designation to conform to established format.
29.	SRP-UDP format item	Added designation of Subsection I.B under "Review Interfaces," the text of which is generally the same as previously written, except as noted.
30.	Current primary review branch designation	Changed "ASB" to "the SPLB."
31.	SRP-UDP format item	Added Subsection I.B.1, under "Review Interfaces," the text of which is generally the same as previously written, except as noted.
32.	Current review interface branch designation	Changed "Structural Engineering Branch (SEB)" to "Civil Engineering and Geosciences Branch (ECGB)."
33.	SRP-UDP format item	Added Subsection I.B.2, under "Review Interfaces," the text of which is generally the same as previously written, except as noted.
34.	Current review interface branch designation	Changed "MEB" to "EMEB."
35.	Current review interface branch designation	Changed "MEB" to "EMEB."
36.	Current review interface branch designation	Changed "MEB" to "EMEB."
37.	SRP-UDP format item	Identified the ECGB as the current PRB responsible for SRP Section 6.6, and deleted text in current location related to material compatibility reviews and relocated it as the new second paragraph under Subsection I.A.
38.	SRP-UDP format item	Added Subsection I.B.4, under "Review Interfaces," the text of which is generally the same as previously written, except as noted.
39.	SRP-UDP format item	Deleted reference to fire protection because this is now a primary review branch (SPLB) responsibility. See new Subsection 1.3.e.
40.	Editorial	Broke the review of technical specifications and the review of quality assurance into two separate review interfaces.
41.	SRP-UDP format item	Deleted "Chemical Engineering Branch, Licensing Guidance Branch, and Quality Assurance Branch" and inserted "Technical Specifications Branch (TSB) and the Quality Assurance and Maintenance Branch (HQMB)" to reflect current review interface branch responsibilities for SRP Sections 16.0 and 17.1/2.

Item	Source	Description
42.	SRP-UDP format item	Deleted citation of SRP Section 9.5.1 in this subsection. See new Subsection I.3.e.
43.	SRP-UDP format item	Moved the interface for review of quality assurance down from the previous paragraph, corrected the responsible review branch, and added SRP Section 17.3 as guidance for that review.
44.	SRP-UDP format item	Added Subsection I.B.6, under "Review Interfaces," the text of which is generally the same as previously written, except as noted.
45.	Current review interface branch designation	Deleted "EQB" and inserted "EMEB" pertaining to primary review responsibility for SRP Section 3.10.
46.	SRP-UDP format item	Deleted "and the environmental qualification of mechanical and electrical equipment as part of its primary review responsibility for SRP Sections 3.10 and 3.11, respectively" and substituted "as part of its primary review responsibility for SRP Section 3.10." The SPLB has responsibility for primary review of SRP Section 3.11, which is covered under new Subsection I.3.f.
47.	SRP-UDP format item	Added Subsection I.B.7, under "Review Interfaces," the text of which is generally the same as previously written, except as noted.
48.	Current review interface branch designation and abbreviation	Deleted "Systems" from the title and substituted "HICB" for "ICSB."
49.	SRP-UDP format item	Broke the reviews by ICSB and PSB into two separate review interfaces and clarified the subject of the review covered by SRP Section 7.1.
50.	SRP-UDP format item	Moved the interface for review of onsite ac power down from the previous paragraph, corrected the responsible review branch, and added wording describing the subject matter addressed by SRP Section 8.3.1

Item	Source	Description
51.	SRP-UDP Format Item, Review Interfaces	This review interface identifies reviews conducted to satisfy SECY 93-087 and ABWR FSER Staff guidance on Shutdown and Low Power Operations. The staff requested that design certification applicants complete an assessment of shutdown and low-power risk. The shutdown and low-power risk assessment must identify design-specific vulnerabilities and weaknesses and document consideration and incorporation of design features that minimize such vulnerabilities. The spent fuel pool cooling system was included in the ABWR FSER risk assessment as a system that can provide alternative core cooling capability in the event of the loss of normal decay heat removal. Consideration of the spent fuel pool cooling system in the shutdown and low-power risk assessment is the responsibility of the SPSB and will be included in the proposed SRP Section 19.1 on risk assessments.
52.	SRP-UDP format item	Deleted paragraph regarding SRP Sections 11.1 and 11.2. SPLB has primary review branch responsibility for these SRP sections and new Subsection I.3.g now applies.
53.	SRP-UDP format item	Added new Subsection number I.C. Text is the same as previously written, except as noted.
54.	Editorial	Modified for clarity and readability.
55.	Editorial	Provided "GDC 2" as initialism for "General Design Criterion 2."
56.	Editorial	Added comma to separate phrases and improve clarity of the sentence.
57.	Editorial	Added paragraph break to Subsection II.1.a. for clarification.
58.	Editorial	Added the words "meet this criterion" to clarify the meaning of the sentence.
59.	Editorial	Added paragraph break to Subsection II.1.a for clarification.
60.	Editorial	Deleted the word "also" which is confusing in this sentence.
61.	Editorial	Provided "GDC 4" as initialism for "General Design Criterion 4."
62.	Editorial	Added paragraph break to Subsection II.1.b for clarification.
63.	Editorial	Made minor corrections to grammar and punctuation in sentence for clarification.

Item	Source	Description
64.	Editorial	Provided "GDC 5" as initialism for "General Design Criterion 5."
65.	Editorial	Provided "GDC 44" as initialism for "General Design Criterion 44."
66.	Editorial	Deleted "to include" and substituted "as related to" to make the subsection compatible with the introductory phrase in Subsection II.1.
67.	Editorial	Added comma to set off the prepositional phrase.
68.	Editorial	Changed designation from "ASB 9-2" to "SPLB 9-2," and added title and description at first occurrence of citation of this appendix.
69.	Editorial	Provided "GDC 45" as initialism for "General Design Criterion 45."
70.	Editorial	Provided "GDC 46" as initialism for "General Design Criterion 46."
71.	Editorial	Changed "assure" to "ensure" to correct usage.
72.	Editorial	Provided "GDC 61" as initialism for "General Design Criterion 61."
73.	Editorial	Provided "GDC 63" as initialism for "General Design Criterion 63."
74.	SRP-UDP format item	Changed "Part 20, paragraph 20.1(c)" to "20.1101(b)" to reflect the current location of the regulation concerning ALARA in the CFR.
75.	Editorial	Added comma to clarify sentence.
76.	SRP-UDP format item	Added "Technical Rationale" and lead-in sentence under ACCEPTANCE CRITERIA.
77.	SRP-UDP format item	Added technical rationale for GDC 2.
78.	SRP-UDP format item	Added technical rationale for GDC 4.
79.	SRP-UDP format item	Added technical rationale for GDC 5.
80.	SRP-UDP format item	Added technical rationale for GDC 44.
81.	SRP-UDP format item	Added technical rationale for GDC 45.
82.	SRP-UDP format item	Added technical rationale for GDC 46.
83.	SRP-UDP format item	Added technical rationale for GDC 61.
84.	SRP-UDP format item	Added technical rationale for GDC 63.
85.	SRP-UDP format item	Added technical rationale for 10 CFR 20.1101(b).

Item	Source	Description
86.	Current secondary review branch abbreviation	Changed "CMEB" to "EMCB."
87.	Current primary review branch abbreviation.	Changed "ASB" to "SPLB."
88.	Editorial	Changed "assure" to "ensure."
89.	Editorial	Changed "assure" to "ensure."
90.	Current review interface branch designation	Changed "SEB" to "the ECGB."
91.	Current review interface branch designation	Changed "MEB" to "the EMEB" in the sentence. Also changed "is" to "as" to correct an apparent typographical error.
92.	SRP-UDP format item	Deleted "140°F" and substituted "60 °C (140 °F)" to apply metric units with English conversion.
93.	SRP-UDP format item	Deleted "10 feet" and substituted "3 meters (10 feet)" to apply metric units with English conversion.
94.	Editorial	Changed designation of SRP Section "3.6.6" to "3.9.6" to correct a typographical error.
95.	Current review interface branch abbreviations	Changed "MTEB and MEB" to "EMCB and EMEB."
96.	Editorial	Cited reference to BTP SPLB 9-2 and deleted the title quoted in the text above.
97.	Editorial	Renumbered subparagraphs i through iv as (1) through (4), respectively, to conform to the established convention in Subsections II.1.d and II.1.g.
98.	SRP-UDP format item	Deleted "140°F" and substituted "60 °C (140 °F)" to apply metric units with English conversion.
99.	Editorial	Deleted the parenthetical notation "(CP)", which is ambiguous, and included the phrase "for the CP review."
100.	Editorial	Changed "assure" to "ensure."
101.	Editorial	Changed "assure" to "ensure."
102.	Editorial	Deleted the parenthetical notation "(CP)", which is ambiguous, and included the phrase "for the CP review."
103.	Editorial	Changed "assure" to "ensure."
104.	Editorial	Changed "assure" to "ensure."

SRP Draft Section 9.1.3
Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
105.	Editorial	Changed "assure" to "ensure."
106.	Editorial	Changed "assure" to "ensure."
107.	Editorial	Changed "assure" to "ensure."
108.	Editorial	Corrected subsection number from 7 to 6.
109.	Editorial	Changed "assure" to "ensure."
110.	Current secondary review branch designation	Changed "CMEB" to "the EMCB."
111.	SRP-UDP Guidance, Implementation of 10 CFR 52	Added standard paragraph to address application of Review Procedures in design certification reviews.
112.	Editorial	Modified to eliminate gender-specific reference.
113.	Editorial	Defined "SER" as "safety evaluation report" in item 23 above.
114.	Editorial	Indented paragraph for to improve clarity.
115.	Editorial	Indented Subsections IV.1 through IV.7 for clarity.
116.	Editorial	Changed "assure" to "ensure."
117.	SRP-UDP format item	Changed "Part 20, 20.1(c)" to "20.1101(b)" to reflect the current location of the regulation concerning ALARA in the CFR.
118.	Editorial	Modified to reflect that "ALARA" had previously been defined for this section.
119.	Editorial	Clarified citation of subsections in Regulatory Guide 8.8 to avoid confusion with numbering of phrases in the sentence.
120.	Editorial	Deleted the word "And" at the beginning of a sentence.
121.	SRP-UDP Format Item, Implement 10 CFR 52 Related Changes	To address design certification reviews a new paragraph was added to the end of the Evaluation Findings. This paragraph addresses design certification specific items including ITAAC, DAC, site interface requirements, and combined license action items.
122.	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.
123.	SRP-UDP Guidance	Added standard paragraph to indicate applicability of this section to reviews of future applications.

SRP Draft Section 9.1.3

Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
124.	SRP-UDP format item	Changed "20.1(c), 'General Provisions for Standards for Protection Against Radiation.'" to "Subpart B, § 20.1101(b), 'Radiation Protection Programs.'" to reflect the current location of the regulation concerning ALARA in the CFR.
125.	Editorial	Corrected title of GDC 4 to reflect change since this SRP section was last published.

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SRP Draft Section 9.1.3

Attachment B - Cross Reference of Integrated Impacts

Integrated Impact No.	Issue	SRP Subsections Affected
1171	Revise the Acceptance Criteria, Review Procedures, and Evaluation Findings as necessary to incorporate the guidance of the proposed draft Regulatory Guide CE-913 (proposed revision 2 to Regulatory Guide 1.13).	This is a placeholder integrated impact. No change made.

SRP Draft Section 9.1.3
Description of Changes

1. Review Responsibilities
   No changes were incorporated.

2. Areas of Review
   No changes were incorporated.

3. Acceptance Criteria
   No changes were incorporated.

4. Review Procedures
   a. Modified review procedure to clarify requirements of capability to vent steam/moisture to atmosphere.

   b. Modified review procedure to redefine the minimum operational heat removal capacity of the SFPCS.

   c. Modified review procedure to clarify Seismic Category I and makeup system capacity requirements for the SFPCS.

   d. Modified review procedure to reflect current staff position with regards to the evaluation criteria for SFP cooling capacity.

5. Evaluation Findings
   No changes were incorporated.

6. Implementation
   No changes were incorporated.

7. References
   No changes were incorporated.