



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)

Secondary - Chemical Engineering Branch (CMEB)

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, 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.

The ASB review of the spent fuel pool cooling and cleanup system 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 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 of two bases. The first basis requires the cooling portion of the system to be designed to seismic Category I, Quality Group C requirements. 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 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

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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.

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shall be the boiling temperature of water when the cooling system is not designed to seismic Category I requirements.

2. The ASB 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 nonsafety-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 also performs the following reviews under the SRP 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.
4. A secondary review is performed by CMEB and the results used by the ASB to complete the overall evaluation. CMEB provides an SER input to ASB 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 will provide ASB 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 will request such input if the materials used in the design differs significantly from previously approved designs.

Coordinated reviews are performed by other branches and the results used by ASB in the overall evaluation of the SFPCS. The coordinated reviews are as follows: The Structural Engineering Branch (SEB) 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. The Mechanical Engineering Branch (MEB) 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, 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 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. The Materials Engineering Branch (MTEB) 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. The review for Fire Protection, Technical Specifications, and Quality Assurance are coordinated and performed by the Chemical Engineering Branch, Licensing Guidance Branch, and Quality Assurance Branch as part of their primary review responsibility for SRP Sections 9.5.1, 16.0 and 17.0, respectively. The EQB 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. The Instrumentation and Control Systems Branch (ICSB) and the Power Systems Branch (PSB) will verify the adequacy of the design, installation, inspection and testing all electrical systems (sensing, control and power) required for proper operation of the SFPCS as part of their primary review responsibility for SRP Section 7.1 and Appendix 7-A for ICSB and SRP Section 8.3.1 for PSB. 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.

For those areas of review identified above as being the responsibility of other branches, the acceptance criteria and methods of review are contained in the SRP sections corresponding to those branches.

## 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, 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 and position C.2 of Regulatory Guide 1.29 for nonsafety-related portions of the system. 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, 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. The cooling and makeup system should also 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, 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. 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.
- c. General Design Criterion 5, as related to shared systems and components important to safety being capable of performing required safety functions.
- d. General Design Criterion 44, to include:
  - (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 acceptance is based on the recommendations of Branch Technical Position ASB 9-2 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, as related to the design provisions to permit periodic inspection of safety-related components and equipment.
- f. General Design Criterion 46, as related to the design provisions to permit operational functional testing of safety-related systems or components to assure 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, 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, 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) as it relates to radiation doses being kept as low as is reasonably achievable (ALARA). In meeting this regulation Regulatory Guide 8.8, positions C.2.f(2) and C.2.f(3) will be used as a basis for acceptance.

### 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 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, will provide an input on a routine basis for those areas of review indicated in this SRP section. The primary reviewer (ASB) obtains and uses such input as required to assure 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 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 Quality Group C and nonseismic Category I requirements provided the spent fuel pool water makeup system, and the building ventilation and filtration system are designed to seismic Category I requirements, are protected from the effects of tornadoes and meet the single failure requirements. The ventilation and filtration system must also meet the guidelines of Regulatory Guide 1.52. The review for seismic design is performed by SEB and the review for seismic and quality group classification is performed by MEB as 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. 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 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 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. The backup system need not be a permanently installed system, nor Category I, but must take water from a Category I source. Engineering judgment and comparison with plants of similar design are used to determine that the makeup capacities and the time required to 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. These SRP sections are reviewed by the MTEB and MEB respectively.
- h. 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) under the following assumed conditions.
  - i. The uncertainty factor K is set equal to 0.1 for long-term cooling (greater than  $10^7$  seconds).
  - ii. 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°F)
  - iii. 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. 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)
  - 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 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 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)
  - 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 system function, control system leakage, and allow system maintenance.
  - c. Design provisions are made to assure 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 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 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 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 judgement, 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. The cleanup system is also reviewed to assure 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 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.

#### IV. EVALUATION FINDINGS

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

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.

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:

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 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) as it relates to maintaining radiation exposures as low as reasonably achievable (ALARA) 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) 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 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.

#### V. IMPLEMENTATION

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

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

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

#### VI. REFERENCES

1. 10 CFR Part 20, §20.1(c), "General Provisions for Standards for Protection Against Radiation."

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 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."