ArevaEPRDCPEm Resource

From: WELLS Russell D (AREVA US) [Russell.Wells@areva.com]
Sent: Monday, December 15, 2008 4:36 PM
To: Getachew Tesfaye
Cc: John Rycyna; Pederson Ronda M (AREVA US); BENNETT Kathy A (OFR) (AREVA US); DELANO Karen V (AREVA US)
Subject: Response to U.S. EPR Design Certification Application RAI No. 119, FSAR Ch 9
Attachments: RAI 119 Response US EPR DC.pdf

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 119 Response US EPR DC.pdf" provides technically correct and complete responses to 2 of the 24 questions.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which supports the response to RAI 119 Questions 09.02.01-13 and 09.02.01-15.

The following table indicates the respective pages in the response document, "RAI 119 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 119 — 09.02.01-1	2	2
RAI 119 — 09.02.01-2	3	3
RAI 119 — 09.02.01-3	4	4
RAI 119 — 09.02.01-4	5	6
RAI 119 — 09.02.01-5	7	7
RAI 119 — 09.02.01-6	8	8
RAI 119 — 09.02.01-7	9	9
RAI 119 — 09.02.01-8	10	10
RAI 119 — 09.02.01-9	11	11
RAI 119 — 09.02.01-10	12	12
RAI 119 — 09.02.01-11	13	13
RAI 119 — 09.02.01-12	14	14
RAI 119 — 09.02.01-13	15	15
RAI 119 — 09.02.01-14	16	16
RAI 119 — 09.02.01-15	17	17
RAI 119 — 09.02.01-16	18	18
RAI 119 — 09.02.01-17	19	19
RAI 119 — 09.02.01-18	20	20
RAI 119 — 09.02.01-19	21	21
RAI 119 — 09.02.01-20	22	22
RAI 119 — 09.02.01-21	23	24
RAI 119 — 09.02.01-22	25	25
RAI 119 — 09.02.01-23	26	26
RAI 119 — 09.02.01-24	27	27

A complete answer is not provided for 22 of the 24 questions. The schedule for a technically correct and complete response to these questions is provided below.

Question #	Response Date

RAI 119 — 09.02.01-1	March 27, 2009
RAI 119 — 09.02.01-2	March 27, 2009
RAI 119 — 09.02.01-3	March 27, 2009
RAI 119 — 09.02.01-4	March 27, 2009
RAI 119 — 09.02.01-5	March 27, 2009
RAI 119 — 09.02.01-6	March 27, 2009
RAI 119 — 09.02.01-7	March 27, 2009
RAI 119 — 09.02.01-8	March 27, 2009
RAI 119 — 09.02.01-9	March 27, 2009
RAI 119 — 09.02.01-10	March 27, 2009
RAI 119 — 09.02.01-11	March 27, 2009
RAI 119 — 09.02.01-12	March 27, 2009
RAI 119 — 09.02.01-14	March 27, 2009
RAI 119 — 09.02.01-16	March 27, 2009
RAI 119 — 09.02.01-17	March 27, 2009
RAI 119 — 09.02.01-18	March 27, 2009
RAI 119 — 09.02.01-19	March 27, 2009
RAI 119 — 09.02.01-20	March 27, 2009
RAI 119 — 09.02.01-21	March 27, 2009
RAI 119 — 09.02.01-22	March 27, 2009
RAI 119 — 09.02.01-23	March 27, 2009
RAI 119 — 09.02.01-24	March 27, 2009

Sincerely,

(Russ Wells on behalf of)

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From: Getachew Tesfaye [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Friday, November 14, 2008 10:22 AM
To: ZZ-DL-A-USEPR-DL
Cc: James Tatum; John Segala; Peter Hearn; Joseph Colaccino; John Rycyna
Subject: U.S. EPR Design Certification Application RAI No. 119 (1410), FSARCh. 9

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on October 23, 2008, and on November 13, 2008, you informed us that the RAI is clear and no further clarification is needed. As a result, no change is made to the draft RAI. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,

Getachew Tesfaye
Sr. Project Manager
NRO/DNRL/NARP
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Hearing Identifier: AREVA_EPR_DC_RAIs
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Response to

Request for Additional Information No. 119 (1410), Revision 0

11/14/2008

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 09.02.01 - Station Service Water System
Application Section: FSAR 9.2.1

QUESTIONS for Balance of Plant Branch 1 (AP1000/EPR Projects) (SBPA)

Question 09.02.01-1:

The emergency service water system (ESWS) must be able to withstand natural phenomena without the loss of function in accordance with 10 CFR 50, Appendix A, General Design Criterion (GDC) 2 requirements. The criteria that are specified in Tier 2 of the Final Safety Analysis Report (FSAR), Section 3.2, indicate that non-safety-related parts of the ESWS should be designated as Seismic Category II if a failure under seismic loading conditions could prevent or reduce the functional capability of a safety-related structure, system, or component (SSC). The staff found that insufficient information was provided to determine if the seismic designation for non-safety-related parts of the ESWS is appropriate. Also, the staff noted that the information on Tier 2 Figure 9.2.1-1, "Essential Service Water System Piping & Instrumentation Diagram," (P&ID) was inconsistent with the information in Tier 2 FSAR Table 3.2.2-1, "Classification Summary," in that the table (Sheet 94) shows that the dedicated ESWS pump is classified as non-safety-related supplemental grade (NS-AQ), Seismic Category II and the P&ID shows the dedicated ESWS pump as simply non-safety-related. The applicant needs to provide additional information in Tier 2 FSAR Section 9.2.1 to fully explain why the non-safety-related parts of the ESWS are not classified as Seismic Category II (i.e., why the assumed simultaneous failure of all non-safety-related ESWS piping will not adversely affect safety-related parts of the ESWS or any other safety-related SSCs that are in the same general area as the non-safety-related ESWS piping), and to explain the inconsistency noted above with respect to the Seismic Category II designation for the dedicated ESWS pump, and why other parts of the dedicated ESWS are not similarly designated as NS-AQ, Seismic Category II in Table 3.2.2-1 and on the P&ID.

Response to Question 09.02.01-1:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-2:

The ESWS must be able to withstand natural phenomena without the loss of function in accordance with GDC 2 requirements. The system description does not explain the functioning and maximum allowed combined seat leakage of safety-related boundary isolation valves to ensure ESWS integrity and operability during seismic events and other natural phenomena. Consequently, the applicant needs to include additional information in Tier 2 Section 9.2.1 of the FSAR to fully describe: (a) how ESWS integrity and operability is assured by the safety-related boundary isolation valves so that common-cause simultaneous failure of all non-safety-related ESWS piping will not compromise the ESWS safety functions during seismic events, (b) what the maximum allowed combined seat leakage is for the safety-related ESWS boundary isolation valves (including check valve for the non-safety-related dedicated ESWS cooling water supply for the Division 4 ESWS room cooler) and periodic testing that will be performed to ensure that the specified limit will not be exceeded, and (c) a description of any other performance assumptions that pertain to the boundary isolation valves or other parts of the system that are necessary to assure the capability of the ESWS to perform its safety functions during natural phenomena.

Response to Question 09.02.01-2:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-3:

The ESWS must be able to withstand natural phenomena without the loss of function in accordance with GDC 2 requirements. Tier 2 FSAR Table 3.2.2-1 (Sheet 96) indicates that some of the safety-related parts of the ESWS are located in outside areas. The applicant needs to provide additional information in Tier 2 of the FSAR to describe more specifically the location of these parts of the ESWS, identify the other SSCs located in the same general area, and describe the protection of safety-related parts of the ESWS that are located outside including the protection from adverse interactions with these other SSCs during an earthquake and other natural phenomena.

Response to Question 09.02.01-3:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-4:

The ESWS must be capable of removing heat from structures, systems and components (SSCs) important to safety during normal operating and accident conditions over the life of the plant in accordance with GDC 44 requirements. The ESWS description and P&ID were reviewed to assess the design adequacy of the ESWS for performing its heat removal functions. While the P&ID shows the ESWS components and identifies the boundaries between safety-related and non-safety-related parts of the system, some of the information is incomplete, inaccurate, or inconsistent. Consequently, the applicant needs to revise the FSAR to address the following considerations in this regard:

a. Pipe sizes are not shown on the P&ID, and the system description does not explain the criteria that were used in establishing the appropriate pipe sizes (such as limiting flow velocities).

b. The system description does not provide design details such as system operating temperatures, pressures, and flow rates for all operating modes and alignments.

c. The P&ID does not show where indications are displayed (e.g., local, remote panel, control room), and what instruments provide input to a process computer and/or have alarm and automatic actuation functions.

d. The P&ID does not show what the normal valve positions are, what valves are locked in position, and what valves have automatic functions; and these design features are not described.

e. The P&ID shows ESWS pump recirculation, emergency blowdown, and normal blowdown flow paths, but the functions and uses of these flow paths are not described and the flow rates are not provided.

f. The P&ID does not show a flow indicator for the ESWS pump room coolers and additional discussion is needed to explain how the ESWS flow rate through the pump room coolers will be periodically verified and confirmed to be adequate.

g. The ESWS filter high differential pressure alarm is not included in the summary of ESWS alarms provided in Tier 2 FSAR Table 9.2.1-3.

h. The P&ID does not show specific set point for alarms, relief valves, vacuum breakers, air release valves, automatic functions such as filter backwash, etc., and the bases for these set points are not explained in the system description.

i. The P&ID shows the cooling tower basin (sheet 1), makeup, blowdown and chemical treatment as part of the ESWS when they are referred to in the system description and more appropriately designated as part of the ultimate heat sink (UHS).

j. Confirm that the ESWS backwash filter motor and power supply are classified as safety-related, Class1E.

k. The system description (Tier 2 FSAR Section 9.2.1.3) indicates that each of the four safety-related ESWS divisions contains one 50 percent capacity pump. The staff noted that this characterization was only applied to the ESWS pumps and not to the pumps for interfacing systems that are cooled by ESWS (e.g. component cooling water system (CCWS) and residual heat removal/safety injection), and is inconsistent with the description provided in Tier 2 FSAR Section 1.2.3.1.1, “Overview,” which states:

> "Redundant safety systems (one in each Safeguard Building) are physically separated into four divisions, which protect the individual integrity of the electrical and mechanical safety systems. The four divisions of safety systems are consistent with an N+2 safety concept. With four safety divisions, one division can be out of service for maintenance, and one division can fail to operate, while the remaining two divisions are available to perform the necessary safety functions even if one of the two remaining becomes inoperable due to the initiating event."

Clarification is needed for what the 50 percent ESWS pump capacity designation means and how this relates to the interfacing systems that are cooled by ESWS and the description provided in Tier 2 FSAR Section 1.2.3.1.1.

Response to Question 09.02.01-4:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-5:

The ESWS must be capable of removing heat from SSCs important to safety during normal operating and accident conditions over the life of the plant in accordance with GDC 44 requirements. In order for the staff to confirm that the ESWS has been adequately sized, the applicant needs to include additional information in Tier 2 of the FSAR, Section 9.2.1, to fully describe and explain what the minimum system heat transfer and flow requirements are for normal operating, refueling, and accident conditions, the bases for these requirements including limiting assumptions that apply (such as temperature considerations, recirculation flow, and blowdown flows), the degree of excess margin available and the method used to determine it, and the limiting system temperatures and pressures that are assumed with supporting basis.

Response to Question 09.02.01-5:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-6:

The ESWS must be capable of removing heat from SSCs important to safety during normal operating and accident conditions over the life of the plant in accordance with GDC 44 requirements. The system description (Section 9.2.1.3.1) indicates that the ESWS pumps are sized to accommodate head losses in the cooling water inlet piping based on full power flow conditions, fluctuations in the supplied electrical frequency, increased pipe roughness due to aging and fouling, fouled debris filters, and maximum pressure drop through the system heat exchangers. In order for the staff to confirm that the ESWS has been adequately sized, the applicant needs to include additional information in Tier 2 FSAR Section 9.2.1 to fully describe the actual amount of excess margin that is provided by the design and the basis for this determination needs to be explained.

Response to Question 09.02.01-6:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-7:

The ESWS must be capable of removing heat from SSCs important to safety during normal operating and accident conditions over the life of the plant in accordance with GDC 44 requirements. With respect to ESWS flow requirements, Tier 2 FSAR Table 9.2.1-1 states that the safety related ESWS pump normal flow rate is 73.2 m^3/min (19,340 gpm) at 0.55 MPa (185 feet) of water. Each ESWS train includes parallel connected flow paths to one CCWS heat exchanger (HX), one emergency diesel generator (EDG) and an ESWS pump room cooler. ESWS flow appears to be continuously supplied to all components for both normal and accident conditions. Tier 2 FSAR Table 9.2.5-1 indicates that nominal CCWS HX flow is 4.31×10^6 Kg/hr (9.504×10^6 lbm/hr) and EDG flow is 0.48×10^6 Kg/hr (1.06×10^6 lbm/hr). No flow rate information (or heat load) is provided for the pump room cooler. However, the total ESWS flow rate for the EDG plus the CCW HX at ≤32.2 ˚C (90 ˚F) converts roughly to 80.25 m^3/min (21,200 gpm), which exceeds the normal pump flow of 73.2 m^3/min (19,340 gpm). In order for the staff to confirm that the ESWS has been adequately sized, the applicant needs to provide additional information in the FSAR to address this apparent inconsistency.

Response to Question 09.02.01-7:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-8:

The ESWS must be capable of removing heat from SSCs important to safety during normal operating and accident conditions over the life of the plant in accordance with GDC 44 requirements. In order to satisfy system flow requirements, the ESWS design must assure that the minimum net positive suction head (NPSH) for the ESWS pumps will be met for all postulated conditions, including consideration of vortex formation. The staff found that the NPSH requirement for the ESWS pumps was not specified and Tier 2 FSAR Section 9.2.1 did not describe how the ESWS design will assure that the NPSH requirement for the ESWS pumps is satisfied (including consideration of vortex formation) and how much excess margin is provided by the ESWS design for the most limiting assumptions. Consequently, the applicant needs to provide additional information in Tier 2 FSAR Section 9.2.1 to specify the minimum NPSH requirement for the ESWS pumps and fully explain the satisfying of the minimum NPSH requirement by the system design when taking vortex formation into consideration, and providing the excess margin available for the most limiting case. Sufficient information is needed to enable the staff to independently confirm that the design is adequate in this regard, including limiting assumptions that were used along with supporting justification.

Response to Question 09.02.01-8:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-9:

The ESWS must be capable of removing heat from SSCs important to safety during normal operating and accident conditions over the life of the plant in accordance with GDC 44 requirements. System design features, operating procedures, and surveillance testing must provide adequate assurance that the ESWS safety functions will not be compromised due to damaging waterhammer events. Two of the four safety-related trains are normally in operation with the remaining two trains in standby. All valves in the main flow path of each train, including the two trains in standby, are kept open (Tier 2 FSAR Section 9.2.1.4). Since the cooling tower spray nozzles are located at an elevation that is well above the cooling tower basin water level, there is a potential for the standby loops to drain to their respective cooling tower basins and create a large air void in the piping of the ESWS standby trains. If this occurs, an automatic actuation of the standby ESWS trains could result in a waterhammer. Any loop seals in the ESWS that are caused by component design or piping configuration would tend to result in a much more severe waterhammer event. The ESWS description does not adequately consider and address waterhammer vulnerabilities (such as this) in the FSAR and does not explain how system design features, operating procedures, and periodic surveillance testing provide adequate assurance that the ESWS safety functions will not be compromised by waterhammer events. Accordingly, the applicant needs to provide additional information in Tier 2 FSAR Section 9.2.1 to address waterhammer considerations. If system valves are relied upon to prevent excessive back-leakage, the ESWS description in the FSAR needs to fully explain and justify the maximum amount of back-leakage that is allowed, and specify the leakage acceptance criteria that will be established in the in-service testing program for these valves along with the basis for this determination.

Response to Question 09.02.01-9:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-10:

The ESWS must be capable of removing heat from SSCs important to safety during normal operating and accident conditions over the life of the plant in accordance with GDC 44 requirements. Also, 10 CFR 52.47(a)(22) requires including in the FSAR information demonstrating the incorporation of operating experience insights into the plant design. Generic Letter (GL) 89-13, "Service Water System Problems Affecting Safety-Related Equipment," was issued to address the observed degradation over time of service water systems. The GL called for licensees to implement programmatic controls, surveillance, and routine inspection and maintenance requirements to assure that the performance capability and integrity of service water systems are adequately maintained over time. However, the staff noted that the ESWS description in the FSAR does not explain the implementation of the provisions of GL 89-13 for the EPR design. Also, while Tier 2 FSAR Table 9.1-3, "U.S. EPR Conformance with TMI Requirements (10 CFR 50.34(f)) and Generic Issues," (NUREG-0933) indicates that Issue 51, "Proposed Requirements for Improving the Reliability of Open-Cycle Service Water Systems," and Issue 153, "Loss of Essential Service Water in LWRs," are applicable to the EPR standard plant and refers to Tier 2 FSAR Section 9.2.1, there is no discussion in Section 9.2.1 addressing these issues. Issue 51 and Issue 153 are included within the scope of GL 89-13. Consequently, the applicant needs to provide additional information in Tier 2 FSAR Section 9.2.1 to describe the implementation of GL 89-13, the allowance for component degradation, and procedures that will be implemented to identify and correct unacceptable conditions.

Response to Question 09.02.01-10:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-11:

The ESWS must be capable of removing heat from SSCs important to safety during normal operating and accident conditions over the life of the plant in accordance with GDC 44 requirements. Also, 10 CFR 52.47(a)(22) requires that information demonstrating the incorproation of operating experience insights into the plant design be included in the FSAR. During a recent review of industry operating experience, the staff found that some licensees were experiencing significant wall thinning of pipe downstream of butterfly valves that were being used to throttle service water flow. In order to assure that this will not occur in the ESWS for the EPR design, the applicant needs to provide additional information in Tier 2 FSAR Section 9.2.1 to describe the extent to which the butterfly valves will be used to throttle ESWS flow and the design provisions that will be implemented to prevent consequential pipe wall thinning from occurring.

Response to Question 09.02.01-11:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-12:

The ESWS must be designed so that periodic inspections of piping and components can be performed to assure that the integrity and capability of the system will be maintained over time in accordance with GDC 45 requirements. The staff finds the design to be acceptable if the FSAR describes inspection program requirements that will be implemented and are considered to be adequate for this purpose. While Tier 2 FSAR Section 9.2.1.6 indicates that periodic inspections will be performed, the extent and nature of these inspections and procedural controls that will be implemented to assure that the ESWS is adequately maintained over time were not described. Furthermore, the accessibility and periodic inspection of buried ESWS piping is of particular interest and needs to be addressed. Consequently, the applicant needs to provide additional information in the FSAR to describe the extent and nature of inspections that will be performed and procedural controls that will be implemented commensurate with this requirement.

Response to Question 09.02.01-12:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-13:

The ESWS must be designed so that periodic pressure and functional testing of components can be performed in accordance with GDC 46 requirements to assure the structural and leak tight integrity of system components, the operability and performance of active components, and the operability of the system as a whole and performance of the full operational sequences that are necessary for accomplishing the ESWS safety functions. The staff finds the design to be acceptable if the FSAR describes pressure and functional test program requirements that will be implemented and are considered to be adequate for this purpose. While Tier 2 FSAR Section 9.2.1.6 indicates that periodic testing will be performed, the extent and nature of these tests and procedural controls that will be implemented to assure continued ESWS structural and leak tight integrity and system operability over time were not described. Consequently, the applicant needs to provide additional information in the FSAR to describe the extent and nature of testing that will be performed and procedural controls that will be implemented commensurate with this requirement.

Response to Question 09.02.01-13:

The essential service water system (ESWS) is a safety-related system (ASME Code Class 3) and is subject to inservice inspection and testing in accordance with ASME Section XI and the ASME OM Code, respectively. Piping and components in the ESWS subject to inservice inspection and testing are listed in U.S. EPR FSAR Tier 2, Table 3.2.2-1—Classification Summary; inservice testing requirements are described in U.S. EPR FSAR Tier 2, Section 3.9.6; and inservice inspection requirements are discussed in U.S. EPR FSAR Tier 2, Section 6.6.

U.S. EPR FSAR Tier 2, Section 9.2.1.6 will be revised to clarify inspection and testing requirements.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 9.2.1.6 will be revised as described in the response and indicated on the enclosed markup.

Question 09.02.01-14:

Means must be provided for monitoring effluent discharge paths and the plant environs for radioactivity that may be released in accordance with GDC 64 requirements. Also, 10 CFR 52.47(a)(6) and 10 CFR 20.1406 require applicants for standard plant design certifications to describe facility design and procedures for operation that will minimize contamination of the facility and the environment. The staff's review criteria (SRP Section 9.2.1, Paragraph III.3.D) specify that provisions should be provided to detect and control leakage of radioactive contamination into and out of the ESWS. The design is considered to be acceptable by the staff if the ESWS P&IDs show that radiation monitors are located on the ESWS discharge and at components that are susceptible to leakage, and if the components that are susceptible to leakage can be isolated. However, the staff noted that Tier 2 FSAR Section 9.2.1 and the ESWS P&ID do not include radiation monitors in the system design and the NRC regulations in this regard have not been addressed. Therefore, the applicant needs to provide additional information in Tier 2 FSAR Section 9.2.1 to address the NRC requirements referred to above.

Response to Question 09.02.01-14:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-15:

Criteria are specified in 10 CFR 50.36 for establishing Technical Specification (TS) requirements. Proposed TS requirements are evaluated in part to confirm consistency with the Standard TS (STS) requirements that have been established as reflected in NUREG 1431, "Standard Technical Specifications Westinghouse Plants," Rev. 3. EPR TS 3.7.8, "Essential Service Water (ESW) System," provides limiting conditions for operation (LCO) and surveillance requirements (SR) for the ESWS and the UHS. The staff noted that TS 3.7.8 is misleading in that it includes requirements for both the ESWS and the UHS, while the TS title only refers to the ESWS. Therefore, the applicant should revise the title for TS 3.7.8 to also include the UHS.

Response to Question 09.02.01-15:

U.S. EPR FSAR Tier 2, Section 16.0, Surveillance Requirement (SR) 3.7.8 will be revised to explicitly include the ultimate heat sink (UHS).

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 16.0, SR 3.7.8 will be revised as described in the response and indicated on the enclosed markup.

Question 09.02.01-16:

Criteria are specified in 10 CFR 50.36 for establishing Technical Specification (TS) requirements. Proposed TS requirements are evaluated in part to confirm consistency with the STS. LCO 3.7.8, Action A, allows one ESWS train to be inoperable for up to 120 days. The staff notes that the description provided in Tier 2 FSAR Chapters 1 and 3 are not entirely clear and are rather inconsistent in places with respect to how the ESWS is protected from internal and external hazards. To the extent that anything other than physical protection is credited, the proposed 120 day allowed outage time may not be appropriate. For instance, if one train is out of service and one train is rendered inoperable due to a pipe break, flooding, or some other hazard, no margin is available for a single active failure on one of the other trains and a 72 hour action allowed outage time should be specified consistent with STS requirements. Likewise, two trains out of service could render the ESWS unable to perform its safety function if one of the operable trains is rendered inoperable due to a pipe break, flooding, or some other hazard. The applicant needs to provide additional information to justify the proposed allowed outage times and Tier 2 FSAR Chapters 1 and 3 need to be revised accordingly to specify physical protection for the ESWS consistent with the allowed outage times that are proposed.

Response to Question 09.02.01-16:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-17:

With respect to Surveillance Requirement (SR) 3.7.8.1, Tier 2 FSAR Figure 3.8-101 shows that the normal cooling tower basin water level is at 3.05 meters (10 feet) above grade elevation. SR 3.7.8.1 requires that the water level in the ESWS basin be maintained greater than or equal to 8.29 meters (27.2 feet) above the bottom of the basin. However, Figure 3.8-101 shows the bottom of the basin to be -4.88 meters (-16 feet) below grade. Therefore, Figure 3.8-101 shows that the normal basin water level is at 3.05+4.88=7.93 meters (16+10= 26 feet) above the bottom of the basin, which conflicts with the SR value of 8.29 meters (27.2 feet). The applicant needs to provide additional information in the FSAR to correct this apparent inconsistency.

Response to Question 09.02.01-17:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-18:

Surveillance requirements are established in accordance with 10 CFR 50.36 requirements to assure that the necessary quality of systems and components is maintained, that operation will be within safety limits, and that the LCOs will be met. Also, GDC 46 requires periodic pressure and functional testing of components to assure the structural and leak tight integrity of system components, the operability and performance of active components, and the operability of the system as a whole and performance of the full operational sequences that are necessary for accomplishing the ESWS safety functions. SR 3.7.8.6 establishes a requirement to verify that each ESWS pump and cooling tower fan starts automatically on an actual or simulated actuation signal every 24 months. This test does not adequately demonstrate ESWS operability, especially with respect to waterhammer considerations and the proper functioning of vacuum breakers during loss of power and ESWS drain down scenarios, and demonstrating that the ESWS flow balance is properly set. Furthermore, the staff noted that surveillance requirements are also not proposed for demonstrating proper functioning of the ESWS vacuum breakers. Therefore, the proposed surveillance requirement does not satisfy GDC 46 requirements and the applicant needs to provide additional information in the FSAR to resolve this issue.

Response to Question 09.02.01-18:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-19:

The Bases for TS 3.7.8 (Page B 3.7.8-1) states that for an accident: "The pumps aligned to the critical loops are automatically started upon receipt of a safety injection signal, and all essential valves are aligned to their post accident position." However, no description of what the critical loops are or what valves must be realigned is provided in Tier 2 FSAR Section 9.2.1 or in the TS Bases. Therefore, the applicant needs to provide additional information in Tier 2 FSAR Section 9.2.1 to fully describe these design features and operating considerations.

Response to Question 09.02.01-19:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-20:

Applications for standard plant design approval must contain proposed inspections, tests, analyses, and acceptance criteria (ITAAC) in accordance with 10 CFR 52.47(b)(1) requirements. Tier 1 FSAR Section 2.7.11, “Essential Service Water System,” provides EPR design certification information and ITAAC for the ESWS and UHS. The staff noted that the title for Tier 1 FSAR Section 2.7.11 is misleading in that it includes requirements for the UHS along with those that are specified for the ESWS. However, the ESWS and the UHS each involve significant safety considerations that are described separately in Tier 2 of the FSAR and are reviewed separately by the staff in this report. Therefore, consistent with the approach that is used in Tier 2 of the FSAR, the applicant needs to provide the required Tier 1 information for the ESWS and the UHS in their own respective sections.

Response to Question 09.02.01-20:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-21:

Applications for standard plant design approval must contain proposed ITAAC in accordance with 10 CFR 52.47(b)(1) requirements. Proposed ITAAC for the ESWS are provided in Tier 1 FSAR Section 2.7.11. The staff reviewed the descriptive information, arrangement, design features, environmental qualification, performance requirements, and interface information provided in Tier 1 FSAR Section 2.7.11 to confirm completeness and consistency with the plant design basis as described in Tier 2 Section 9.2.1. The staff found that the Tier 1 information is incomplete, inconsistent, inaccurate, or that clarification is needed and the applicant needs to revise the Tier 1 information to address the following considerations in this regard:

- 1. Although the Introduction Section in Chapter 1 of the Tier 1 FSAR states that the information in the Tier 1 portion of the FSAR is extracted from the detailed information contained in Tier 2, the staff found that much of the information provided in FSAR Tier 1 is not described in Tier 2 FSAR Section 9.2.1 (e.g., equipment locations, valve functional requirements, indication and control information, priority actuation and control system description and functions, automatic actuation and interlock details, valve failure modes, and harsh environment considerations).
- 2. In the listing of safety-related functions, the first bullet does not include the capability to remove heat from the ESWS pump room cooler. This is not consistent with the ESWS design basis.
- 3. In the listing of non-safety-related functions, the second bullet includes the capability to maintain temperatures in the component cooling water system within their specified limits as a non-safety-related function. First, this is not stated as a function and needs to be corrected accordingly. Second, this is not entirely true in that temperature limits for safety-related SSCs must be maintained in accordance with accident analysis and operability considerations and equipment qualification requirements.
- 4. The specifications do not stipulate that the ESWS is accessible for performing periodic inspections as required by GDC 45.
- 5. The specification that stipulates that the ESWS design provide for flow testing of the pumps during operation is incomplete in that it does not specify provisions for flow testing the individual component flow paths to verify flow balance requirements are satisfied.
- 6. Specifications to assure that the filters satisfy design and performance requirements, and to confirm alarm functions, are not provided.
- 10. Specifications to assure that the vacuum breakers satisfy design and performance requirements are not provided.
- 11. Specifications to assure that the blowdown piping satisfy design and performance requirements are not provided.
- 12. Specifications to assure that ESWS outdoor piping is adequately protected from the elements and postulated hazards are not provided.
- 13. Figure 2.7.11-1, “Essential Service Water System Functional Arrangement,” does not show nominal pipe sizes, which are necessary for design certification.
- 14. Figure 2.7.11-1 does not show vacuum breaker and air release valve locations and these components are not listed in the applicable tables.

- 15. Figure 2.7.11-1 does not show flow control valves for the individual flow paths of the components being cooled and these components are not listed in the applicable tables, which is necessary for design certification.
- 16. Table 2.7.11-2, “Essential Service Water System Equipment I&C and Electrical Design,” does not include information pertaining to the ESWS filter motors and corresponding power supplies.
- 17. Tables 2.7.11-1 and -2, do not describe the ESWS pump downstream filters, 30PEB10/20/30/40 AT002.
- 18. Table 2.7.11-1 conflicts with Figure 2.7.11-1 related to the blowndown check valves, 30PEB10/20/30/40 AA205. The Figure shows the check valves as non-safety, non-seismic while the Table shows the check valves as ASME III and Seismic Category I.
- 19. The point of Note 2 for Table 2.7.11-2 is not clear since it does not appear to pertain to anything on the table. However, this appears to be due to an oversight whereby dedicated ESWS components are not listed in the table.
- 20. The discussion under Item 6 related to environmental qualification is inconsistent with the information provided in Table 2.7.11-2 in that no equipment is listed in the table for harsh environment considerations.

Response to Question 09.02.01-21:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-22:

Applications for standard plant design approval must contain proposed ITAAC in accordance with 10 CFR 52.47(b)(1) requirements. Proposed ITAAC for the ESWS are provided in Tier 1 FSAR Section 2.7.11. The staff reviewed the information provided in Table 2.7.11-3, "Essential Service Water System Inspections, Tests, Analyses, and Acceptance Criteria," to confirm that the proposed ITAAC are adequate for EPR design certification. In addition to the items referred to in **RAI 9.2.1-1 through -9 and RAI 9.2.1-21**, some of which involve ITAAC considerations, the staff found that the proposed ITAAC are incomplete, inconsistent, inaccurate, or that clarification is needed and the applicant needs to revise the Tier 1 information to address the following considerations in this regard:

1. Item 2.1 only refers to functional arrangement, but it should refer to functional arrangement and design details since nominal pipe size is an important consideration that needs to be verified.
2. Item 2.3 is incomplete in that it does not address physical separation criteria for outdoor piping.
3. Item 7.2 needs to specify that ESWS pump testing to demonstrate adequate net positive suction head will be completed at the maximum ESWS flow rate conditions, with the inventory in the cooling tower basin at the lowest allowable level (as corrected to account for actual temperature and atmospheric pressure conditions). The maximum ESWS flow rate and minimum allowable cooling tower basin water level, along with the corresponding design basis water temperature and atmospheric pressure that apply need to be listed to assure that test conditions are properly established. The acceptance criteria for an acceptable test need to be specified.
4. Quantitative acceptance criteria need to be established for all ITAAC as applicable (flow rates, heat transfer rates, completion times, etc.).
5. No test item is provided to demonstrate that water hammer will not occur in the as built system upon manual or automatic start of a previously idle train, and during loss-of-power scenarios.
6. Some items for the dedicated ESWS train from the text of Tier 1 FSAR Section 2.7.11 are converted into ITAAC (e.g. Item 7.5), whereas many are not (e.g. 3.5, 3.6. 3.7, 4.6, 4.7, 5.3.). An explanation is needed for this apparent inconsistency.
7. Item 3.2 commitment wording should reference Table 2.7.11-1 not 2.7.8-1.
8. Items 4.5 and 4.6 (automatic train switch-over on spurious valve closure) appear to be the same.

Response to Question 09.02.01-22:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-23:

Interface requirements to be met by those parts of the plant design that are not included within the scope of the design certification must be provided in accordance with the provisions specified by 10 CFR 52.47(a)(25). The staff noted that Tier 1 FSAR Section 4.7, "Buried Piping and Pipe Ducts for Service Water," states that interface requirements for buried ESWS pipe and ducts are provided in Tier 1 FSAR Section 2.7.11. However, the interface requirements that are referred to are not provided in Section 2.7.11, the interface requirements are not listed in Tier 2 FSAR Table 1.8-1, "Summary of U.S. EPR Plant Interfaces with Remainder of Plant," and there is no discussion of the interface requirements for buried ESWS pipe and ducts in Tier 2 Section 9.2.1. Therefore, the applicant needs to revise the FSAR to provide the missing interface requirements for buried ESWS pipe and ducts.

Response to Question 09.02.01-23:

A response to this question will be provided by March 27, 2009.

Question 09.02.01-24:

The ESWS must be capable of removing heat from SSCs important to safety during normal operating and accident conditions over the life of the plant in accordance with GDC 44 requirements. Also, 10 CFR 52.47(a)(22) requires that information demonstrating how operating experience insights have been incorporated into the plant design be included in the FSAR. With respect to piping, valves, and fittings, Tier 2 FSAR Section 9.2.1.5 states that system materials must be selected that are suitable to the site location, ESWS fluid properties, and site installation; and that system materials that come into contact with one another must be chosen so as to minimize galvanic corrosion. Since detailed information about the materials that are being used for the ESWS are not included within the scope of the EPR design certification, this information will be evaluated by the staff during its review of EPR COL applications that are submitted. Therefore, the applicant needs to establish a COL information item for COL applicants to provide detailed information concerning materials that will be used for the ESWS at their site location, including the basis for determining that the materials being used are appropriate for the site location and for the fluid properties that apply.

Response to Question 09.02.01-24:

A response to this question will be provided by March 27, 2009.

U.S. EPR Final Safety Analysis Report Markups

A spurious closure of the isolation valve in a safety-related ESWS division has the same consequences as the failure of the respective pump for that division.

A failure of the cleaning function of the debris filter in a safety-related division is monitored by the elevated differential pressure or function alarm. In this case, the operator initiates a division switchover.

9.2.1.5 Safety Evaluation

The ESWS pump buildings are designed to withstand the effects of earthquakes, tornadoes, hurricanes, floods, external missiles, and other natural phenomena. Section 3.3, Section 3.4, Section 3.5, Section 3.7 and Section 3.8 provide the basis for the adequacy of the structural design of these structures.

The ESWS is designed to remain functional after a safe shutdown earthquake (SSE). Section 3.7 and Section 3.9 provide the design loading conditions that are considered. Section 3.5, Section 3.6 and Section 9.5.1 provide the hazards analyses to verify that a safe shutdown, as outlined in Section 7.4, can be achieved and maintained.

The four division design of the ESWS provides complete redundancy; therefore a single failure will not compromise the ESWS system safety-related functions. Each division of ESWS is independent of any other division and does not share components with other divisions or with other nuclear power plant units.

Considering a single failure and preventative maintenance, two ESW divisions may be lost, but the ability to achieve the safe shutdown state under DBA conditions can be reached by the remaining two ESWS divisions. In case of LOOP the four ESW pumps have power supplied by their respective division EDGs.

During SAs, containment heat is removed by the dedicated cooling chain consisting of the severe accident heat removal system (SAHRS), dedicated CCWS, and dedicated ESWS. This cooling chain is manually actuated. In case of loss of the dedicated ESWS division, the SAHRS cooling chain is lost. This condition is outside the DBA.

In the event of an LOCA during power operations, the engineered safety features system (ESFS) (refer to Section 7.3) initiates a safety injection and containment isolation phase 1 signal. The ESWS divisions previously not in operation are automatically started by the PS.

9.2.1.6 Inspection and Testing Requirements

09.02.01-13

The ESWS is initially tested with the program given in Chapter 14.2, Test # 48.

~~After the plant is brought into operation, periodic inspections and tests of the ESWS components and subsystems are performed to verify proper operation. Scheduled~~

09.02.01-13

~~inspections and tests are necessary to verify system operability.~~The installation and design of the ESWS provides accessibility for the performance of periodic inservice inspection and testing. Periodic inspection and testing of all safety-related equipment verifies its structural and leak tight integrity and its availability and ability to fulfill its functions. Inservice inspection and testing requirements are in accordance with Section XI of the ASME BPV Code and the ASME OM Code.

U.S. EPR FSAR Tier 2, Section 3.9 and Section 6.6 outline the inservice testing and inspection requirements. Refer to U.S. EPR FSAR Tier 2, Section 16.0, Surveillance Requirement (SR) 3.7.8 for surveillance requirements that verify continued operability of the ESWS.

9.2.1.7 Instrumentation Requirements

Instrumentation is provided in order to control, monitor and maintain the safety-related and non-safety-related functions of the ESWS.

9.2.1.7.1 System Monitoring

The ESWS system is monitored for the following parameters:

- Fluid flow rate and pressure downstream of the ESWS pumps and the dedicated ESWS pump.
- Differential pressure at the ESWS and the dedicated ESWS debris filters, CCWS HXs, and Essential Service Water Pump Building Ventilation System (SAQ) room cooler.
- Fluid flow from the CCWS and EDG HXs.
- Temperature of the ESWS and the dedicated ESWS pump discharge.
- Temperature at the outlet of the HXs.

9.2.1.7.2 System Alarms

- High temperature ESW and dedicated ESW.
- ESW and dedicated ESW pump abnormal.
- Low flow across the CCWS and dedicated CCWS HX.
- High ΔP across the CCWS, dedicated CCWS HX, and SAQ room cooler.
- Low temperature ESW.
- Table 9.2.1-3—Alarm Summary provides additional information.

3.7 PLANT SYSTEMS

3.7.8 Essential Service Water (ESW)/Ultimate Heat Sink (UHS) Systems

LCO 3.7.8 Four ESW/UHS trains shall be OPERABLE.

09.02.01-15

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

----------NOTES----------

1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources - Operating," for emergency diesel generators made inoperable by ESW/UHS Systems.

2. Enter applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loop - MODE 4," for residual heat removal loops made inoperable by ESW/UHS Systems.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One ESW/UHS train inoperable.	A.1 Restore ESW/UHS train to OPERABLE status.	120 days 09.02.01-15
B. Two ESW/UHS trains inoperable.	B.1 Restore one ESW/UHS train to OPERABLE status.	72 hours
C. Required Action and associated Completion Time not met.	C.1 Be in MODE 3. AND C.2 Be in MODE 5.	6 hours 36 hours

09.02.01-15

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.7.8.1	Verify water level of each ~~ESW~~ UHS cooling tower basin is ≥ 27.2 feet.	24 hours
SR 3.7.8.2	Verify water temperature of each ~~ESW~~ UHS cooling tower basin is ≤ 90°F.	24 hours
SR 3.7.8.3	----------NOTE---------- Isolation of ESW flow to individual components does not render the ESW System inoperable. ----------	
	Verify each ESW/UHS manual, power operated, and automatic valve in the flow path servicing safety related equipment, that is not locked, sealed, or otherwise secured in position, is in the correct position.	31 days
SR 3.7.8.4	Operate each ~~ESW~~ UHS cooling tower fan for ≥ 15 minutes in all speed settings.	31 days
SR 3.7.8.5	Verify each ESW/UHS automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	24 months
SR 3.7.8.6	Verify each ESW pump and UHS cooling tower fan starts automatically on an actual or simulated actuation signal.	24 months
SR 3.7.8.7	Verify the ability to supply makeup water to each ~~ESW~~ UHS basin at ≥ 300 gpm.	24 months

09.02.01-15

ESW/UHS System
B 3.7.8

B 3.7 PLANT SYSTEMS

B 3.7.8 Essential Service Water (ESW)/Ultimate Heat Sink (UHS) Systems

09.02.01-15

BASES

BACKGROUND

The ESW/UHS Systems provides a heat sink for the removal of process and operating heat from safety related components during an anticipated operational occurrence (AOO) or postulated accident. During normal operation, and a normal shutdown, the ESW/UHS Systems also provides this function for the associated safety related and nonsafety related systems. The safety related function is covered by this LCO.

The ESW/UHS Systems consists of four separate safety related, cooling water trains. Each train consists of one mechanical draft cooling tower, associated basin, pump, piping, valving, instrumentation, and mechanical filtration. Each safety related 2-cell seismic Category I mechanical draft cooling tower rejects energy from the ESW fluid to the ambient and returns the cooled fluid to the ESW UHS cooling tower basin, from which the ESW pumps take suction. Each ESW UHS cooling tower basin is sized for 3 days of post loss of coolant accident (LOCA) operation and ensures adequate volume for the required net positive suction head (NPSH) for the associated ESW pump. Post LOCA evaporative losses are replenished by a safety related seismic Category I source of makeup water. The train associated safety related make-up source delivers water to each basin at ≥ 300 gpm to maintain the NPSH for the ESW pump for up to 30 days following a LOCA. The system pumps and valves are remote and manually aligned, except in the unlikely event of a LOCA or loss of offsite power. The pumps aligned to the critical loops are automatically started upon receipt of a safety injection signal, and all essential valves are aligned to their post accident positions.

The mechanical draft cooling towers and basins are safety related, seismic Category I structures sized to provide heat dissipation for safe shutdown following an accident. The cooling tower is protected from tornado missiles.

[The seismic Category 1 makeup necessary to support 30 days of post accident mitigation is site specific and details are to be provided by the Combined License applicant].

09.02.01-15

Additional information about the design and operation of the ESW/UHS Systems, along with a list of the components served, is presented in FSAR Section 9.2.1 (Ref. 1) and FSAR Section 9.2.5 (Ref. 5). The principal safety related functions of the ESW/UHS Systems is are the removal of decay heat from the reactor and reactor coolant pump thermal barrier cooling via the Component Cooling Water (CCW) System and removal of operational heat from the emergency diesel generator (EDG).

BASES

APPLICABLE SAFETY ANALYSES

The design basis of the ESW/UHS Systems is for two ESW/UHS trains, in conjunction with the CCW System, to remove core decay heat and support containment cooling following a design basis LOCA as discussed in FSAR Section 6.2 (Ref. 2). This maintains the In-containment Water Storage Tank fluid within acceptable limits following a LOCA as it is supplied to the Reactor Coolant System by the Emergency Core Cooling System pumps. The ESW/UHS Systems also provides cooling to the train EDG during an anticipated operational occurrence (AOO) or postulated accident.

09.02.01-15

The ESW/UHS Systems, in conjunction with the CCW System, also cools the unit from residual heat removal (RHR), as discussed in FSAR Section 5.4.7 (Ref. 3), entry conditions to MODE 5 during normal and post accident operations. The time required for this evolution is a function of the number of CCW and RHR loops that are operating. Two ESW/UHS trains are sufficient to remove decay heat during subsequent operations in MODES 5 and 6. This assumes a maximum ESW/UHS Systems temperature of 95°F occurring simultaneously with maximum heat loads on the system.

Each ESW UHS basin is sized for 3 days of post LOCA operation without requiring makeup. ESW UHS basin makeup is required to maintain NPSH for the ESW pumps beyond 3 days. This volume of water is assumed to be at ≤ 90°F during normal plant operation to prevent exceeding the maximum ESW temperature during a LOCA.

The operating limits are based on conservative heat transfer analyses for the worst case LOCA. Reference 15 provides the details of the assumptions used in the analysis, which include worst expected meteorological conditions, conservative uncertainties when calculating decay heat, and worst case single active failure. The ESW UHS cooling tower and basin is designed in accordance with Regulatory Guide 1.27 (Ref. 4), which requires a 30 day supply of cooling water in the ESW UHS basin, or equivalent make-up.

The ESW/UHS Systems satisfies satisfy Criterion 2 and 3 of 10 CFR 50.36(dc)(2)(ii).

LCO

The ESW/UHS Systems consists of four trains. Four ESW/UHS trains are required to be OPERABLE to provide the required redundancy to ensure that the system functions to remove post accident heat loads.

09.02.01-15

An ESW/UHS train is considered OPERABLE when two cooling tower fans, pump, associated piping, valves, and instrumentation and controls required to perform the safety related function are OPERABLE and the ESW UHS basin contains ≥ 27.2 feet of water at ≤ 90°F with capability from makeup from OPERABLE source. [COL applicant to provide definition of OPERABLE makeup source.]

BASES

APPLICABILITY

09.02.01-15

In MODES 1, 2, 3, and 4, the ESW/UHS Systems ~~is~~ are ~~a~~ normally operating systems that ~~is~~ are required to support the OPERABILITY of the equipment serviced by the ESW/UHS Systems and required to be OPERABLE in these MODES.

In MODES 5 and 6, the OPERABILITY requirements of the ESW/UHS Systems are determined by the systems ~~it~~ they support~~s~~.

ACTIONS

The ~~actions~~ ACTIONS have two Notes added. The first Note indicates that the applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources - Operating," should be entered if an inoperable ESW/UHS train results in an inoperable EDG. The second Note indicates that the applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops - MODE 4," should be entered if an inoperable ESW/UHS train results in an inoperable decay heat removal train. This is an exception to LCO 3.0.6 and ensures the proper actions are taken for these components.

09.02.01-15

A.1

If one ESW/UHS train is inoperable, action must be taken to restore OPERABLE status within 120 days. In this condition, the remaining OPERABLE ESW/UHS trains are adequate to perform the heat removal function.

The 120 day Completion Time to restore an ESW/UHS train to OPERABLE is reasonable since its operation is not assumed in the safety analysis to mitigate the consequences of postulated accidents or AOOs, it provides a reasonable time for repairs, and the low probability of a postulated accident or AOO occurring during this period.

B.1

If two ESW/UHS trains are inoperable, action must be taken to restore one to OPERABLE status within 72 hours. In this condition, the two remaining OPERABLE ESW/UHS trains are adequate to perform the heat removal function. However, the overall reliability is reduced because a single failure in one of the OPERABLE ESW/UHS trains could result in loss of ESW/UHS System function.

The 72 hour Completion Time is based on the redundant capabilities afforded by the two OPERABLE trains, and the low probability of a postulated accident occurring during this time period.

BASES

09.02.01-15

ACTIONS (continued)

C.1 and C.2

If an ESW/UHS train cannot be restored to OPERABLE status within the associated Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 6 hours and in MODE 5 within 36 hours.

The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power.

SURVEILLANCE REQUIREMENTS

SR 3.7.8.1

This SR verifies that adequate short term (3 day) cooling can be maintained. The specified level also ensures that sufficient NPSH is available to operate the ESW pumps during the first 3 days post LOCA. The 24 hour Frequency is based on operating experience related to trending of the parameter variations during the applicable MODES. This SR verifies that the ~~ESW~~ UHS basin water level is ≥ 27.2 feet from the bottom of the basin.

SR 3.7.8.2

This SR verifies that the ESW/UHS Systems ~~is~~ are available to cool the CCW System and EDG to at least its maximum design temperature with the maximum accident or normal design heat loads for 30 days following a postulated accident. With water temperature of the ~~ESW~~ UHS basin ≤ [90]°F, the design basis assumption associated with initial ~~ESW~~ UHS temperature are bounded. With the water temperature of the ~~ESW~~ UHS basin > 90°F, long term cooling capability of the Emergency Core Cooling System (ECCS) loads and Emergency Diesel Generators (EDG~~s~~) may be affected. The 24 hour Frequency is based on operating experience related to trending of the parameter variations during the applicable MODES.

SR 3.7.8.3

09.02.01-15 → This SR is modified by a Note indicating that the isolation of the ESW/UHS components or systems may render those components inoperable, but does not affect the OPERABILITY of the ESW System.

SURVEILLANCE REQUIREMENTS (continued)

Verifying the correct alignment for manual, power operated, and automatic valves in the ESW/UHS flow path provides assurance that the proper flow paths exist for ESW/UHS System operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since they are verified to be in the correct position prior to being locked, sealed, or secured. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves.

The 31 day Frequency is based on engineering judgment, is consistent with the procedural controls governing valve operation, and ensures correct valve positions.

SR 3.7.8.4

Operating each cooling tower fan for ≥ 15 minutes in all speed settings verifies that all fans are OPERABLE and that all associated controls are functioning properly. It also ensures that fan or motor failure, or excessive vibration, can be detected for corrective action. The 31 day Frequency is based on operating experience, the known reliability of the fan units, the redundancy available, and the low probability of significant degradation of the ~~ESW~~ UHS cooling tower fans occurring between surveillances.

SR 3.7.8.5

This SR verifies proper automatic operation of the ESW/UHS valves on an actual or simulated actuation signal. The ESW/UHS Systems ~~is~~ are ~~a~~ normally operating systems that cannot be fully actuated as part of normal testing. This Surveillance is not required for valves that are locked, sealed, or otherwise secured in the required position under administrative controls. The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

BASES

09.02.01-15

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.8.6

This SR verifies proper automatic operation of the ESW pumps and UHS cooling tower fans on an actual or simulated actuation signal. The ESW/UHS Systems ~~is a~~are normally operating systems that cannot be fully actuated as part of normal testing during normal operation. The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

SR 3.7.8.7

This SR verifies that adequate long term (30 day) cooling can be maintained. The specified makeup flowrate ensures that sufficient NPSH can be maintained to operate the ESW pumps following the first 3 days post LOCA. The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint. This SR verifies that the ~~ESW~~ UHS makeup flowrate is ≥ 300 gpm.

09.02.01-15

REFERENCES

1. FSAR Section 9.2.1.
2. FSAR Section 6.2.
3. FSAR Section 5.4.7.
4. Regulatory Guide 1.27.
5. FSAR Section 9.2.5.