ArevaEPRDCPEm Resource

From: BRYAN Martin (EXT) [Martin.Bryan.ext@areva.com]
Sent: Monday, April 26, 2010 1:52 PM
To: Tesfaye, Getachew
Cc: Hearn, Peter; Wheeler, Larry; KOWALSKI David J (AREVA NP INC); GARDNER George Darrell (AREVA NP INC); SLOAN Sandra M (AREVA NP INC); MCINTYRE Brian (AREVA NP INC)
Subject: FW: RAI 345 Supp 1 DRAFT RESPONSES
Attachments: Blank Bkgrd.gif; DRAFT RESPONSES RAI 345 Supp 1 Q.09.02.01-37 and -40.pdf; DRAFT RESPONSE RAI 345 Supp 1 Q.09.02.01-29.pdf; DRAFT RESPONSE RAI 345 Supp 1 Q.09.02.01-30.pdf; DRAFT RESPONSE RAI 345 Supp 1 Q.09.02.01-42.pdf; DRAFT RESPONSE RAI 345 Supp 1 Q.09.02.01-43.pdf; DRAFT RESPONSE RAI 345 Supp 1 Q.09.02.01-45.pdf; DRAFT RESPONSE RAI 345 Supp 1 Q.09.02.01-46.pdf; DRAFT RESPONSE RAI 345 Supp 1 Q.09.02.01-50.pdf; DRAFT RESPONSE RAI 345 Q.09.02.01-49(a+b).pdf

Importance: High

Getachew,

As discussed at the last Ch 9 weekly meeting, attached are DRAFT responses for your review in advance of the weekly Chapter 9 meeting tomorrow as discussed below. It was requested at that meeting to copy directly Larry, and Peter said this was ok so I am copying them for expediency. These responses have not been through the final licensing review process but are being provided in advance to minimize future iterations. Let me know if you have questions.

Thanks,

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From: KOWALSKI David J (AREVA NP INC)
Sent: Monday, April 26, 2010 1:26 PM
To: BRYAN Martin (EXT)
Cc: BALLARD Robert W (AREVA NP INC); CONNELL Kevin J (AREVA NP INC); HUDDLESTON Stephen C (AREVA NP INC); GARDNER George Darrell (AREVA NP INC)
Subject: RAI 345 Supp 1 DRAFT RESPONSES
Importance: High

Marty:

Please transmit to Getachew Tesfaye the attached partial set of DRAFT responses to RAI 345 questions. These responses will be discussed at tommorow's (4/27/10) FSAR Chapter 9 Weekly Telecon/GoToMeeting with the NRC.

These responses represent two different groupings:

1. Responses to Questions 09.02.01-30, -37, -40 and -43 were originally shared with the NRC thru a GoToMeeting last Tuesday (4/20/10); subsequent to the meeting, responses to Questions 09.02.01-30 and 43 have been revised.
2. Responses to Questions 09.02.01-29, -42, -45, -46, -49 (Parts a+b) and -50 have not yet been shared with the NRC.

Note that none of these DRAFT responses have been through the formal Licensing Management approval process; nor do any responses reflect technical editing.

Please call me if you have any questions. Thanks.

David J. Kowalski, P.E.
Principal Engineer
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Mail Envelope Properties (BC417D9255991046A37DD56CF597DB7105F48937)

Subject: FW: RAI 345 Supp 1 DRAFT RESPONSES
Sent Date: 4/26/2010 1:52:09 PM
Received Date: 4/26/2010 1:52:35 PM
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Files	Size	Date & Time
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DRAFT RESPONSE RAI 345 Supp 1 Q.09.02.01-30.pdf	524825	
DRAFT RESPONSE RAI 345 Supp 1 Q.09.02.01-42.pdf	823633	
DRAFT RESPONSE RAI 345 Supp 1 Q.09.02.01-43.pdf	529481	
DRAFT RESPONSE RAI 345 Supp 1 Q.09.02.01-45.pdf	617280	
DRAFT RESPONSE RAI 345 Supp 1 Q.09.02.01-46.pdf	453822	
DRAFT RESPONSE RAI 345 Supp 1 Q.09.02.01-50.pdf	265806	
DRAFT RESPONSE RAI 345 Q.09.02.01-49(a+b).pdf	472546	

Options
Priority: High
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Question 09.02.01-37:

Follow-up to RAI 119, Question 9.2.1-11

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 incorporation 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.

Based on the staff's review of response to RAI 119, Question 9.2.1-11 and an audit by the staff conducted on October 27, 2009, this item remains open and requires further resolution and/or clarification by the applicant. The following description provides the results of the staff's evaluation of the applicant's initial response and justification for the item remaining open.

> The applicant should consider the use of non-destructive examinations (NDE) in the determination of the pipe wall thinning condition during the life of the plant. The applicant should also consider treating this information as a COL information item.

Response to Question 09.02.01-37:

The ASME Code Class portions of the Essential Service Water System (ESWS) piping are inspected and maintained in accordance with Section XI of the ASME Boiler and Pressure Vessel Code. The ASME Section XI Program for Class 2 and 3 components is described in U.S. EPR Tier 2 Section 6.6. Implementation of the ASME Section XI Program is the responsibility of the COL applicant. This activity will be managed by an existing COL information item, which is included in U.S.EPR FSAR Tier 2, Table 1.8-2 – U.S. EPR Combined License Information Items as Combined License Information Item No. 6.6-1.

Implementation of other piping inspection programs that may be required during operation due to regulatory or industry concerns, such as those cited in the above question, are the responsibility of the plant licensee.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 09.02.01-40:

Follow-up to RAI 119, Question 9.2.1-15

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.

Based on the staff's review of response to RAI 119, Question 9.2.1-15 and an audit by the staff conducted on October 27, 2009, this item remains open and requires further resolution and/or clarification by the applicant. The following description provides the results of the staff's evaluation of the applicant's initial response and justification for the item remaining open.

> During the staff review of the applicant's response to RAI 119, it was determined that the applicant's response to RAI 119 conflicted with the applicant's response to RAI 166. The staff noted that the resulting FSAR markup in response to RAI 166 had split out T.S. 3.7.8 into two different sections, UHS (TS 3.7.19) and ESWS (TS 3.7.8). The staff considers the response to RAI 166 to sufficiently address the staff's question. Therefore, the applicant should revise its response to RAI 119 to be consistent with the response to RAI 166.

Response to Question 09.02.01-40:

The response provided to RAI 166 splits out T.S. 3.7.8 into two different sections, UHS (TS 3.7.19) and ESWS (TS 3.7.8). The response to RAI 166 shall supersede the response to RAI 119, Question 9.2.1-15.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 09.02.01-29:

Follow-up to RAI 119, Question 9.2.1-04 (e)

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:

> Part (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.

Based on the staff's review of response to RAI 119, Question 9.2.1-04 and an audit by the staff conducted on October 27, 2009, Part (e) remains open and requires further resolution and/or clarification by the applicant. The following description provides the results of the staff's evaluation of the applicant's initial response and justification for the item remaining open.

> The staff noted that while some new information was provided in this response relative to the purpose and function of the recirculation line, other technical information was missing, such as the initiating signals for the pump recirculation function and whether automatic accident signals are provided. Further, the staff noted that the applicant's response indicated that the FSAR would not be revised as a result of this question. The staff concluded that a functional description is necessary in the FSAR for key system flow paths including the associated valves to provide sufficient information to support a conclusion relative to GDC 44.

Response to Question 09.02.01-29:

Refer to RAI 345, Response to Question 42(a) for a functional description of key system flow paths and key system valves including information to be included in the FSAR.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 9.2.1 will be revised as described in the response.

Question 09.02.01-30:

Follow-up to RAI 119, Question 9.2.1-04 (f)

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:

Part (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.

Based on the staff's review of response to RAI 119, Question 9.2.1-04 and an audit by the staff conducted on October 27, 2009, Part (f) remains open and requires further resolution and/or clarification by the applicant. The following description provides the results of the staff's evaluation of the applicant's initial response and justification for the item remaining open.

The staff reviewed the applicant's response to part (f) of RAI-response 9.2.1-04 above relative to means of periodic confirmation of the adequacy of ESW pump room cooler flow. In this response, the applicant stated that temporary flow instrumentation will be installed for the performance of periodic cooler surveillance testing and testing after repairs. The staff found this response to be unacceptable since plant operators will not have valuable information related to ESWS possible degraded flow rates or degraded heat exchanger performance. This instrumentation should be described in the FSAR.

Response to Question 09.02.01-30:

The following information is provided in addition to the information previously provided in RAI Response 09.02.01-04 (f):

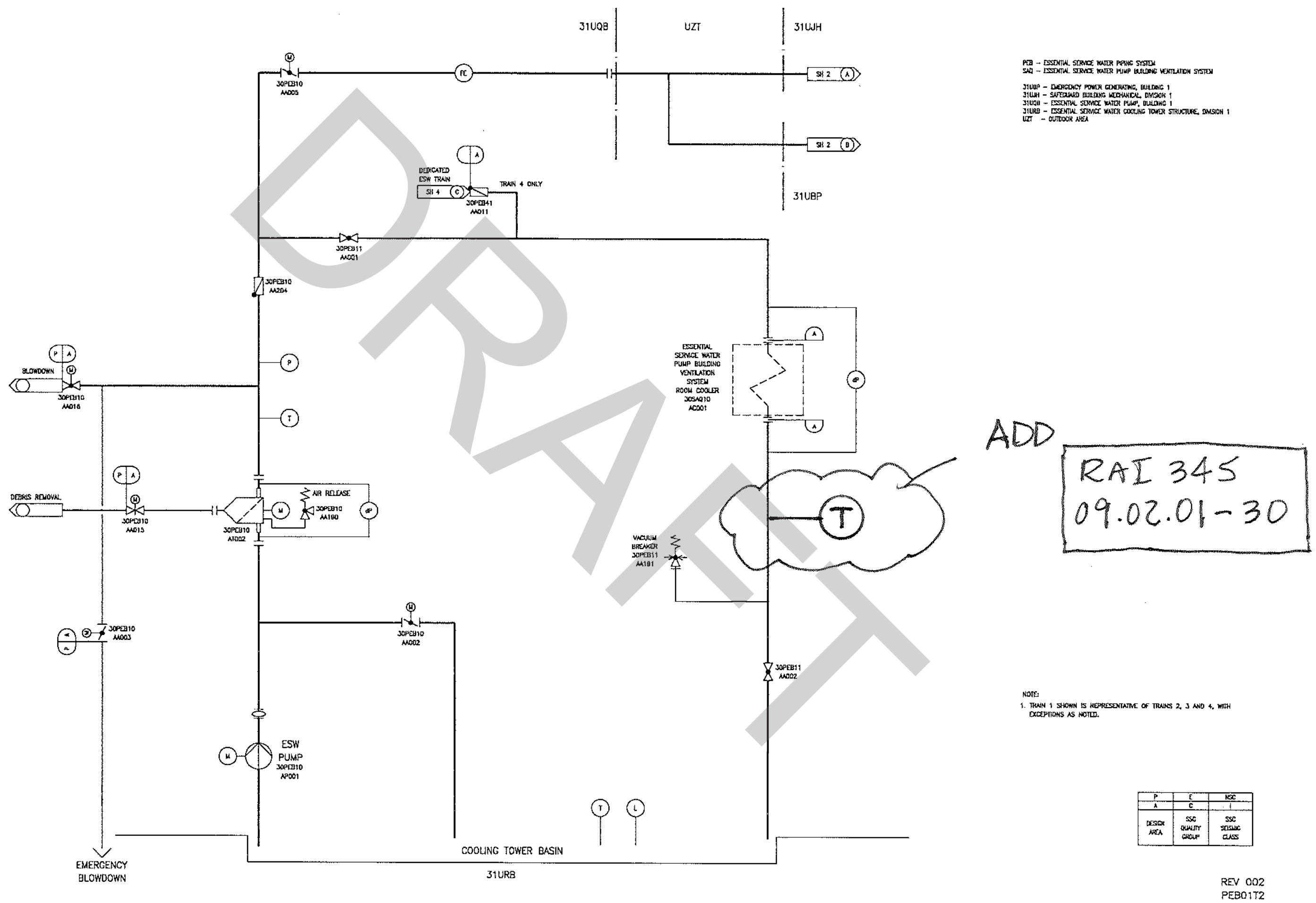
Indication of the ESW pump building room temperature is provided in the MCR as listed in Tier 1, Table 2.6.13-2. ESW temperature measurement is provided at the discharge of the ESWS pump and will be added downstream of the pump building ventilation system room cooler. Differential pressure across the cooler and temperature indications are available in the control room; therefore, plant operators will have information related to possible ESW degraded flow rates or degraded heat exchanger performance. The differential pressure is also available locally.

Indication of temperature measurement downstream of the pump building ventilation system room cooler will be added to U.S. EPR FSAR Tier 2, Figure 9.2.1-1. New instrumentation will be added to U.S. EPR FSAR Tier 2 Tables 3.10-1 and 3.11-1.

FSAR Impact:

U.S. EPR FSAR Tier 2, Figure 9.2.1-1 and Tier 2, Tables 3.10-1 and 3.11-1 will be revised as described in the response and indicated on the enclosed markup.

Figure 9.2.1-1—Essential Service Water System Piping & Instrumentation Diagram Sheet 1 of 4



RAI 345
09.02.01-30

Table 3.10-1 List of Seismically and Dynamically Qualified Mechanical and Electrical Equipment

Name Tag (Equipment Description)	Tag Number	Local Area KKS ID (Room Location)	EQ Environment (Note 1)	Radiation Environment Zone (Note 2)	EQ Designated Function (Note 3)	Safety Class (Note 4)	EQ Program Designation (Note 5)
V 2 UPSTR "QN" USERS	30KAB80AA016	31UJH10004	M	H	ES SI	S C/NM	Y (3) Y (5)
V DNSTR "QN" USERS	30KAB80AA019	31UJH10004	M	H	ES SI	S C/NM	Y (3) Y (5)
CK-V RTEN COM 1B NC	30KAB80AA020	31UJH10004	M	H	ES SI	S C/NM	Y (3) Y (5)
V F KAB80 CF060	30KAB80AA314	31UJH10004	M	H	ES SI	S C/NM	Y (3) Y (5)
V F KAB80 CF060	30KAB80AA315	31UJH10004	M	H	ES SI	S C/NM	Y (3) Y (5)
V F KAB80 CF061	30KAB80AA316	31UJH10004	M	H	ES SI	S C/NM	Y (3) Y (5)
V F KAB80 CF061	30KAB80AA317	31UJH10004	M	H	ES SI	S C/NM	Y (3) Y (5)
D-V SUP COM1B NC	30KAB80AA403	31UJH10004	M	H	ES SI	S C/NM	Y (3) Y (5)
D-V RETN COM1B NC	30KAB80AA406	31UJH10004	M	H	ES SI	S C/NM	Y (3) Y (5)
D-V RETN COM1B NC	30KAB80AA407	31UJH10004	M	H	ES SI	S C/NM	Y (3) Y (5)
V-V SUP COM1B NC	30KAB80AA501	31UJH10004	M	H	ES SI	S C/NM	Y (3) Y (5)
V-V RETN COM1B NC	30KAB80AA504	31UJH10004	M	H	ES SI	S C/NM	Y (3) Y (5)
F UPSTR QNA21 AC002	30KAB80CF060	31UJH10004	M	H	SI	S C/NM	Y (3) Y (5)
F DNSTR KAB80 CHIL	30KAB80CF061	31UJH10004	M	H	SI	S C/NM	Y (3) Y (5)
Essential Service Water System (ESWS)							
CCW HX Inlet Isolation Vlv	30PEB10AA007	31UJH05026	M	H	SI	S C/NM	Y (3) Y (5)
CCW HX Outlet Isolation Vlv	30PEB10AA009	31UJH05026	M	H	SI	S C/NM	Y (3) Y (5)
CCW HX Tube Side Thermal Relief Vlv	30PEB10AA192	31UJH05026	M	H	SI	S C/NM	Y (3) Y (5)
CCW HX Inlet Side DP Root Vlv	30PEB10AA306	31UJH10026	M	H	SI	S C/NM	Y (3) Y (5)
CCW HX Outlet Side DP Root Vlv	30PEB10AA307	31UJH10026	M	H	SI	S C/NM	Y (3) Y (5)
ESW Drain Isolation Vlv	30PEB10AA401	31UJH01026	M	H	SI	S C/NM	Y (3) Y (5)
ESW Drain Isolation Vlv	30PEB10AA402	31UJH10026	M	H	SI	S C/NM	Y (3) Y (5)
ESW Drain Isolation Vlv	30PEB10AA403	31UJH01026	M	H	SI	S C/NM	Y (3) Y (5)
ESW Drain Isolation Vlv	30PEB10AA405	31UJH01026	M	H	SI	S C/NM	Y (3) Y (5)
ESW Drain Isolation Vlv	30PEB10AA407	31UJH01026	M	H	SI	S C/NM	Y (3) Y (5)
ESW Drain Isolation Vlv	30PEB10AA408	31UJH01026	M	H	SI	S C/NM	Y (3) Y (5)
CCW HX Tube Side Vent Vlv	30PEB10AA508	31UJH10026	M	H	SI	S C/NM	Y (3) Y (5)
CCW HX Tube Side Vent Vlv	30PEB10AA509	31UJH10026	M	H	SI	S C/NM	Y (3) Y (5)
Orifice Plate	30PEB10BP002	31UJH05026	M	H	SI	S C/NM	Y (3) Y (5)
CCW HX DP Measurement	30PEB10CP004	31UJH05026	M	H	SI	S	Y (5)
CCW HX Outlet Temp Measurement	30PEB10CT002	31UJH05026	M	H	SI	S	Y (5)
CCW HX Inlet Isolation Vlv	30PEB20AA007	32UJH05020	M	H	SI	S C/NM	Y (3) Y (5)
CCW HX Outlet Isolation Vlv	30PEB20AA009	32UJH05020	M	H	SI	S C/NM	Y (3) Y (5)
CCW HX Tube Side Thermal Relief Vlv	30PEB20AA192	32UJH05020	M	H	SI	S C/NM	Y (3) Y (5)
CCW HX Inlet Side DP Root Vlv	30PEB20AA306	32UJH10020	M	H	SI	S C/NM	Y (3) Y (5)
CCW HX Outlet Side DP Root Vlv	30PEB20AA307	32UJH10020	M	H	SI	S C/NM	Y (3) Y (5)

SAQ HX Outlet Temp Measurement	30PEB 11/21/31/41 CT001	31UQB02001	M	M	SI	S	Y(5)
SAQ HX DP Measurement	30PEB 11/21/31/41 CP001	31UQB02001	M	M	SI	S	Y(5)

ADD AS INDIVIDUAL COMPONENTS (8 TOTAL) ROOM NUMBERS CHANGE 31/32/33/34

RAI 345
09.02.01-30

ADD AS INDIVIDUAL COMPONENTS (8 TOTAL)
ROOM LOCATIONS CHANGE 31/32/33/34

Table 3.11-1—List of Environmentally Qualified Electrical/I&C Equipment
Sheet 38 of 103

Name Tag (Equipment Description)	Tag Number	Local Area KKS ID (Room Location)	EQ Environment (Note 1)	Radiation Environment Zone (Note 2)	EQ Designated Function (Note 3)	Safety Class (Note 4)	EQ Program Designation (Note 5)
ESW Pump Motor Heater, Train 2	30PEB20AH500	32UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
ESW Pump Motor, Train 2	30PEB20AP001	32UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
30PEB20 AT002 Filter Motor Actuator	30PEB20AT002	32UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
ESW Pump Discharge Flow Indicator	30PEB20CF001	32UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
UHS Tower Basin Level Indicator	30PEB20CL001	32URB01003	M	M	ES SI	S 1E EMC	Y (5) Y (6)
ESW Pump Discharge Pressure Indicator	30PEB20CP002	32UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
ESW Pump Filter Diff Pressure Indicator	30PEB20CP003	32UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
ESW Pump Discharge Thermocouple	30PEB20CT001	32UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
SW Pump Bldg Cooler Pressure Indicator	30PEB21CP501	32UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
30PEB30 AA002 Valve Motor Actuator	30PEB30AA002	33UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
30PEB30 AA003 Valve Motor Actuator	30PEB30AA003	33UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
30PEB30 AA005 Valve Motor Actuator	30PEB30AA005	33UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
30PEB30 AA015 Valve Motor Actuator	30PEB30AA015	33UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
30PEB30 AA016 Valve Motor Actuator	30PEB30AA016	33UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
ESW Pump Motor Heater, Train 3	30PEB30AH500	33UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
ESW Pump Motor, Train 3	30PEB30AP001	33UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
30PEB30 AT002 Filter Motor Actuator	30PEB30AT002	33UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
ESW Pump Discharge Flow Indicator	30PEB30CF001	33UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
UHS Tower Basin Level Indicator	30PEB30CL001	33URB01003	M	M	ES SI	S 1E EMC	Y (5) Y (6)
ESW Pump Discharge Pressure Indicator	30PEB30CP002	33UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
ESW Pump Filter Diff Pressure Indicator	30PEB30CP003	33UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
ESW Pump Discharge Thermocouple	30PEB30CT001	33UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
SW Pump Bldg Cooler Pressure Indicator	30PEB31CP501	33UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
30PEB40 AA002 Valve Motor Actuator	30PEB40AA002	34UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
30PEB40 AA003 Valve Motor Actuator	30PEB40AA003	34UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
30PEB40 AA005 Valve Motor Actuator	30PEB40AA005	34UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
30PEB40 AA015 Valve Motor Actuator	30PEB40AA015	34UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
30PEB40 AA016 Valve Motor Actuator	30PEB40AA016	34UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
ESW Pump Motor Heater, Train 4	30PEB40AH500	34UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
ESW Pump Motor, Train 4	30PEB40AP001	34UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
30PEB40 AT002 Filter Motor Actuator	30PEB40AT002	34UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
ESW Pump Discharge Flow Indicator	30PEB40CF001	34UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
UHS Tower Basin Level Indicator	30PEB40CL001	34URB01003	M	M	ES SI	S 1E EMC	Y (5) Y (6)
ESW Pump Discharge Pressure Indicator	30PEB40CP002	34UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
ESW Pump Filter Diff Pressure Indicator	30PEB40CP003	34UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
ESW Pump Discharge Thermocouple	30PEB40CT001	34UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
SW Pump Bldg Cooler Pressure Indicator	30PEB41CP501	34UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
~~ESW Pump Motor, Dedicated Train~~	~~30PEB80AP001~~	~~34UQB02001~~	~~M~~	~~M~~	- ~~SII~~	~~NS-AQ~~ - ~~EMC~~	~~Y (5) Y (6)~~
30PED10 AA010 Valve Motor Actuator	30PED10AA010	31UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
30PED10 AA011 Valve Motor Actuator	30PED10AA011	31UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
30PED10 AA019 Valve Motor Actuator	30PED10AA019	31UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
30PED10 AA021 Valve Motor Actuator	30PED10AA021	31UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
30PED10 AN001 Fan Motor	30PED10AN001	31URB03001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
30PED10 AN002 Fan Motor	30PED10AN002	31URB03002	M	M	ES SI	S 1E EMC	Y (5) Y (6)
30PED20 AA010 Valve Motor Actuator	30PED20AA010	32UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
30PED20 AA011 Valve Motor Actuator	30PED20AA011	32UQB02001	M	M	ES SI	S 1E EMC	Y (5) Y (6)
SAQ HX Outlet Temp Measurement	30PEG11/21/31/41 CT001	31UQB02001	M	M	ES SI	S 1E EMC	Y(5) Y(6)
SAQ HX DP Measurement	30PEG11/21/31/41 CP001	31UQB02001	M	M	ES SI	S 1E EMC	Y(5) Y(6)

Question 09.02.01-42:

Follow-up to RAI 119, Question 9.2.1-18

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 water hammer 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.

Based on the staff's review of response to RAI 119, Question 9.2.1-18 and an audit by the staff conducted on October 27, 2009, this item remains open and requires further resolution and/or clarification by the applicant. The following description provides the results of the staff's evaluation of the applicant's initial response and justification for the item remaining open.

a. FSAR Tier 2 Section 9.2.1 does not presently include adequate functional descriptions (including any special performance requirements) for several key system valves (e.g. open/ closed stroke time for AA005, AA010, air release valve AA190, vacuum breaker valve AA191 etc.). Valve functional descriptions (and any special performance requirements) are essential to support development of In-service Testing program requirements (IST) that properly represent their intended design function, and thus, the functional descriptions should be provided in the FSAR.

b. SAR Tier 2 Section 14.2 pre-operational Test #048 does not specifically addresses water hammer performance or verifies proper function of vacuum breaker or air release valves etc. This information should be added to Test #048 of the FSAR. Water hammer testing is included in other Chapter 14 preoperational testing including; Chapter 14.2.12.16.3, "Main, Startup and Emergency Feed Water Systems (Test #195)" and Chapter 14.2.12.3.10, "Steam Generator Down Comer Feed Water System Water Hammer (Test #033)".

Response to Question 09.02.01-42:

a. U.S. EPR FSAR Tier 2, Section 9.2.1.3.5 will be revised to include the following functional descriptions.

"The ESWS pump discharge isolation valve, 30PEB10/20/30/40 AA005, is open during normal operations. Prior to train startup, the valve is closed. After pump start, the valve opens automatically. The open/close stroke time for the ESWS pump discharge isolation valve is less than or equal to 120 seconds. Upon receipt of an SI signal, the ESWS pump discharge isolation valve will automatically receive a signal to open.

The pump minimum flow recirculation valve, 30PEB10/20/30/40 AA002 and 30PEB80 AA015, is normally shut during normal operations. Prior to train startup, the valve is closed. In the event the ESWS pump discharge isolation valve 30PEB10/20/30/40 AA005 fails to open after pump start, the minimum flow recirculation valve opens to establish a flow path for water from the pump back to the cooling tower basin, thereby protecting the pump from damage due to overheating. Upon receipt of an SI signal, the pump minimum flow recirculation valve will automatically receive a signal to close.

The normal blowdown flow path extends from the ESWS supply header just downstream of the debris filter to the plant waste water retention basin. Flow from the ESWS to the retention basin is established when the ESWS normal blowdown isolation valve opens. The ESW normal blowdown isolation valve, 30PEB10/20/30/40 AA016, is throttled as necessary during normal operations to maintain ESW water chemistry within established limits. The blowdown flow rate and line size will be based on evaporation loss from the associated cooling tower and maintaining the number of cycles of concentration in the tower basin. The debris removal line joins the normal blowdown flow path downstream of a check valve in the blowdown line. Upon receipt of an SI signal, the ESW normal blowdown isolation valve will automatically receive a signal to close.

The dedicated ESW blowdown isolation valve, 30PEB80 AA016, is throttled as necessary during normal operations to maintain ESW water chemistry within established limits.

The emergency blowdown line extends from the normal blowdown line to its terminal end outside the ESW pump building. The flow path is established when the ESWS emergency blowdown isolation valve is opened by the operator. This flow path is used only in the event of a failure of the normal blowdown flow path. The cooling tower emergency blowdown system isolation valves 30PEB10/20/30/40 AA003, are motor operated valves capable of being throttled, as necessary, to obtain the desired blowdown flow rate, based on water chemistry analysis results. Upon receipt of an SI signal, the cooling tower emergency blowdown system isolation valves will automatically receive a signal to close upon receipt of a safety injection signal.

The debris filter blowdown isolation valve, 30PEB10/20/30/40 AA015 and 30PEB80 AA009, is cycled open and shut automatically as necessary during normal operations to provide a flow path for debris removal from the debris filter during the automatic backwash cycle. Upon receipt of an SI signal, the debris filter blowdown isolation valve will automatically receive a signal to close.

The ESWS cooling tower return isolation valve, 30PED10/20/30/40 AA010, is open during normal operations. The valve shuts automatically when the ESWS pump for that train is de-energized. The open/close stroke time for the ESWS return header isolation valve is less than or equal to 120 seconds. Upon receipt of an SI signal, the ESWS cooling tower return isolation valve will automatically receive a signal to open.

The ESWS cooling tower bypass isolation valve, 30PED10/20/30/40 AA011, is shut during normal operations. The valve will be repositioned automatically under low heat load/low ambient conditions to help maintain ESWS basin water temperature above established limits.

Upon receipt of an SI signal, the ESWS cooling tower bypass isolation valve will automatically receive a signal to close.

The ESWS normal makeup water isolation valve, 30PED10/20/30/40 AA019, is cycled open and shut as necessary during normal operations to maintain cooling tower basin water level within the established operating band. Upon receipt of an SI signal, the valve shuts automatically, isolating the non-safety-related normal makeup water system from the safety-related emergency makeup system.

The ESWS emergency makeup water isolation valve, 30PED10/20/30/40 AA021, is shut during normal operations. Upon receipt of an SI signal, the valve opens automatically to establish the flow path from the ESWS emergency makeup system to the tower basin.

The ESWS air release valve, 30PEB10/20/30/40 AA190, is integral to ESW debris filter and opens and shuts as necessary during normal operations to provide a flow path to remove air from the system.

The ESWS vacuum relief valve, 30PEB10/20/30/40 AA191, opens and shuts as necessary during normal operations to provide an air flow path for vacuum relief."

b. U.S. EPR Chapter 14.2 Test #048 will be revised to specifically address verification that water hammer during normal and emergency system evolutions. This will include but not be limited to valve realignments, pump starts/stops, filter backwashes, and operation of vacuum breaker valves.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 9.2.1.3.5 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR FSAR Tier 2, Section 14.2 Test #048 will be revised as described in the response and indicated on the enclosed markup.

To make sure the performance of the safety-related functions, all manually operated valves in the main lines of the safety-related ESWS divisions are mechanically locked in the proper position.

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09.02.01-42 (a)

In-service testing of valves shall be performed as described in Section 3.9.6.3. Leakage rates for boundary isolation valves that require testing are based on ASME OM Code, 2004 Edition, Subsection ISTC.

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A maximum valve leakage criterion will be specified for the safety-related check valves which will be no less stringent than the API-598 metal seated check valve criterion. A hydraulic transient analysis will be performed to confirm the integrity of ESW piping to withstand the effects of water hammer.

In general, butterfly valves are used in the ESWS for isolation (open or closed) service and not for throttling. In those applications where a butterfly valve is used in the ESWS and is subject to substantial throttling service for extended periods of time, design provisions are considered to prevent consequential pipe wall thinning immediately downstream of these valves. Such design provisions include the use of erosion resistant materials, the use of thick wall pipe and installing straight pipe lengths immediately downstream of the affected valves.

9.2.1.4 Operation

9.2.1.4.1 Normal Operating Conditions

Safety-Related Divisions

The ESWS supply is vital for all phases of plant operation and is designed to provide cooling water both during power operation and shutdown of the plant. During normal plant operation, two of four pumps are in operation with the remaining divisions in standby. The pumps are switched over periodically, thus changing the operational divisions.

The four divisions are filled and vented prior to operation. Under normal system operating conditions on a per division basis, the ESWS pump is in operation, the debris filter is functioning and all the valves in the main line are open. If the differential pressure across the debris filter reaches the predefined setpoint, automatic filter cleaning is initiated.

During standby, the divisions not in operation are aligned for normal operation (manual valves in the main line are open) and the system is filled and vented. The debris filter is in standby and ready to start. The system can be started manually from the main control room or automatically. In all cases, only the start signal needs to be actuated; preparatory measures are not necessary. The stopping of a particular division is performed manually.

INSERT for RAI 345, Question 09.02.01-42

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"The ESWS pump discharge isolation valve, 30PEB10/20/30/40 AA005, is open during normal operations. Prior to train startup, the valve is closed. After pump start, the valve opens automatically. The open/close stroke time for the ESWS pump discharge isolation valve is less than or equal to 120 seconds. Upon receipt of an SI signal, the ESWS pump discharge isolation valve will automatically receive a signal to open.

The pump minimum flow recirculation valve, 30PEB10/20/30/40 AA002 and 30PEB80 AA015, is normally shut during normal operations. Prior to train startup, the valve is closed. In the event the ESWS pump discharge isolation valve 30PEB10/20/30/40 AA005 fails to open after pump start, the minimum flow recirculation valve opens to establish a flow path for water from the pump back to the cooling tower basin, thereby protecting the pump from damage due to overheating. Upon receipt of an SI signal, the pump minimum flow recirculation valve will automatically receive a signal to close.

The normal blowdown flow path extends from the ESWS supply header just downstream of the debris filter to the plant waste water retention basin. Flow from the ESWS to the retention basin is established when the ESWS normal blowdown isolation valve opens. The ESW normal blowdown isolation valve, 30PEB10/20/30/40 AA016, is throttled as necessary during normal operations to maintain ESW water chemistry within established limits. The blowdown flow rate and line size will be based on evaporation loss from the associated cooling tower and maintaining the number of cycles of concentration in the tower basin. The debris removal line joins the normal blowdown flow path downstream of a check valve in the blowdown line. Upon receipt of an SI signal, the ESW normal blowdown isolation valve will automatically receive a signal to close.

The dedicated ESW blowdown isolation valve, 30PEB80 AA016, is throttled as necessary during normal operations to maintain ESW water chemistry within established limits.

The emergency blowdown line extends from the normal blowdown line to its terminal end outside the ESW pump building. The flow path is established when the ESWS emergency blowdown isolation valve is opened by the operator. This flow path is used only in the event of a failure of the normal blowdown flow path. The cooling tower emergency blowdown system isolation valves 30PEB10/20/30/40 AA003, are motor operated valves capable of being throttled, as necessary, to obtain the desired blowdown flow rate, based on water chemistry analysis results. Upon receipt of an SI signal, the cooling tower emergency blowdown system isolation valves will automatically receive a signal to close upon receipt of a safety injection signal.

The debris filter blowdown isolation valve, 30PEB10/20/30/40 AA015 and 30PEB80 AA009, is cycled open and shut automatically as necessary during normal operations to provide a flow path for debris removal from the debris filter during the automatic backwash cycle. Upon receipt of an SI signal, the debris filter blowdown isolation valve will automatically receive a signal to close.

The ESWS cooling tower return isolation valve, 30PED10/20/30/40 AA010, is open during normal operations. The valve shuts automatically when the ESWS pump for that train is de-energized. The open/close stroke time for the ESWS return header isolation valve is less than or equal to 120 seconds. Upon receipt of an SI signal, the ESWS cooling tower return isolation valve will automatically receive a signal to open.

The ESWS cooling tower bypass isolation valve, 30PED10/20/30/40 AA011, is shut during normal operations. The valve will be repositioned automatically under low heat load/low ambient conditions to help maintain ESWS basin water temperature above established limits. Upon receipt of an SI signal, the ESWS cooling tower bypass isolation valve will automatically receive a signal to close.

The ESWS normal makeup water isolation valve, 30PED10/20/30/40 AA019, is cycled open and shut as necessary during normal operations to maintain cooling tower basin water level within the established operating band. Upon receipt of an SI signal, the valve shuts automatically, isolating the non-safety-related normal makeup water system from the safety-related emergency makeup system.

The ESWS emergency makeup water isolation valve, 30PED10/20/30/40 AA021, is shut during normal operations. Upon receipt of an SI signal, the valve opens automatically to establish the flow path from the ESWS emergency makeup system to the tower basin.

The ESWS air release valve, 30PEB10/20/30/40 AA190, is integral to ESW debris filter and opens and shuts as necessary during normal operations to provide a flow path to remove air from the system.

The ESWS vacuum relief valve, 30PEB10/20/30/40 AA191, opens and shuts as necessary during normal operations to provide an air flow path for vacuum relief."

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09.02.01-42(b)

2.4 CCWS available to provide a heat load.

2.5 Appropriate AC and DC power sources are available.

2.6 Support systems required for operation of the ESWS are complete and functional.

2.7 The Ultimate Heat Sink (UHS) is available and functional.

2.8 The UHS basin is filled to normal level.

2.9 The UHS basin support systems required for operation of the ESWS and UHS are available, as required.

3.0 TEST METHOD

3.1 Demonstrate that the ESWS can be operated from the ~~MCR~~PICS.

3.2 Demonstrate that the ESWS starts automatically in response to a~~n~~ ~~emergency~~Protection signal and applicable realignments are performed in a satisfactory manner.

3.3 Verify that the ESWS pumps supply cooling water at the rated flow and design conditions.

3.4 Verify ESWS water flow is supplied to components at required flow rates, ~~and~~ developed head, and maximum particle size.

3.5 Verify alarms, interlocks, indicating instruments, and status lights are functional.

3.6 Verify head versus flow characteristics for the ESWS water pump.

3.6.1 $NPSH_a \geq NPSH_R$.

3.6.2 Discharge head.

3.6.3 Flow corresponding to head at each point.

3.6.4 Starting time (motor start time and time to reach rated flow.

3.7 Record valve performance data, where required.

3.8 Verify and ~~R~~record valve position indication.

3.9 Record position response of valves to loss of motive power.

3.10 Verify system baseline performance during HFT (with RHRS in service).

3.11 Check electrical independence and redundancy of power supplies for safety-related functions by selectively removing power and determining loss of function.

3.12 Verify filter backwash operation at simulated or actual high filter differential pressure.

3.13 Verify adequate $NPSH_a$ for the ESW pump ($NPSH_a > NPSH_R$.

3.14 Verify ESW/CCW response (simulated or actual) to inadvertant isolation of the operating ESW pump's discharge valve meets design requirements.

3.15 The normal and emergency ESW system realignments occur without introducing water hammer events (valve realignments, pump starts/stops, filter backwashes, operation of vacuum breaker valves, etc.).

3.16 Verify operation of the CCWS switchover sequence meets design requirements.

4.0 DATA REQUIRED

4.1 Record flows as required to components and throttle valve positions.

4.2 Record alarm, interlocks, and control setpoints.

4.3 Record pump head versus flow and operating data.

4.4 System operating parameters during HFT.

4.5 Verify flow to the CCW heat exchangers using the ESW pump in the normal system alignment.

4.6 Verify flow to the SAHRS using the dedicated ESW pump.

4.7 Valve position upon loss of motive power and valve position indication data.

4.8 Verify flow to the EDG heat exchangers using the ESW pump in the normal system alignment.

4.9 Verify flow to the ESW/PBVS room cooler using the ESW pump in the normal system alignment.

5.0 ACCEPTANCE CRITERIA

5.1 The ESWS meets design requirements (refer to Section 9.2.1):

5.1.1 Verify that each ESWS can be operated from the ~~MCR~~PICS.

5.1.2 Verify that each ESWS starts automatically in response to a~~n~~ ~~emergency~~Protection signal.

5.1.3 Verify that the ESWS pumps supply cooling water at the rated flow and design conditions.

5.1.4 Verify ESWS water flow supplied to components.

5.1.5 Verify alarms, interlocks, indicating instruments, and status lights perform as designed.

5.1.6 Verify head versus flow characteristics for the ESWS water pumps meets design requirements.

5.1.7 Verify that system valves meet design requirements. (i.e., thrust, ability to initiate and terminate ESW system flow without introducing water hammers).

5.1.8 Verify system baseline performance during HFT (with RHRS in service).

5.1.9 Verify filter backwash operation in response to high filter differential pressure.

5.1.10 Verify that ESW system vacuum breaker / air release devices perform as designed and do not initiate a water hammer in the ESW system.

5.1.11 Verify that ESW system pumps perform as designed (reach rated flow within the alloted time and do not cause a water hammer when flow is initiated or terminated).

5.1.12 Verify that ESW system debris filters function as designed (perform manual and automatic backwash filter alarms and automatic actions, particle size acceptance criteria, etc.).

5.2 Verify that safety-related components meet electrical independence and redundancy requirements.

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09.02.01-42(b)

Question 09.02.01-43:

Follow-up to RAI 119, Question 9.2.1-19

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.

Based on the staff's review of response to RAI 119, Question 9.2.1-19 and an audit by the staff conducted on October 27, 2009, this item remains open and requires further resolution and/or clarification by the applicant. The following description provides the results of the staff's evaluation of the applicant's initial response and justification for the item remaining open.

> No response or FSAR markup was provided by the applicant with regard to identification of "essential valves that must be realigned to their post accident position." As previously identified, FSAR Tier 2 Section 9.2.1 does not presently include sufficient functional descriptions for several key system valves that automatically re-align in response to an accident or a pump start/ stop (e.g. AA005, AA010 etc.).

Response to Question 09.02.01-43:

The following valves receive a signal to automatically align to their post accident position (closed) upon receipt of a safety injection signal:

- ESWS normal blowdown isolation valves 30PEB10/20/30/40 AA016
- Cooling tower emergency blowdown system isolation valves 30PEB10/20/30/40 AA003
- Debris filter blowdown isolation valves 30PEB10/20/30/40 AA015
- ESWS cooling tower bypass isolation valves 30PED10/20/30/40 AA011
- ESWS normal makeup water isolation valves 30PED10/20/30/40 AA019
- ESWS pump recirculation isolation valves 30PEB10/20/30/40 AA002

The following valves receive a signal to automatically align to their post accident position (open) upon receipt of a safety injection signal:

- ESWS pump discharge isolation valves 30PEB10/20/30/40 AA005
- ESWS cooling tower return isolation valves 30PED10/20/30/40 AA010
- ESWS emergency makeup water isolation valves 30PED10/20/30/40 AA021

The following valves are automatically re-aligned in response to a pump start/stop:

- ESWS pump discharge isolation valves 30PEB10/20/30/40 AA005 (open/closed)
- ESWS cooling tower return isolation valves, 30PED10/20/30/40 AA010 (open/closed)

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 9.2.1.7 and Tier 1, Section 2.7.11 will be revised as described in the response and indicated on the enclosed markup.

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.

Pursuant to the recommendations included in Generic Letter 89-13 (Reference 2), the design of safety-related portions of the ESWS considers the potential for capability and performance degradation and subsequent system failure due to siltation, erosion, corrosion, protective coating failure, and the presence of organisms that subject the system to microbiological influenced corrosion, as well as macro-fouling. A combination of design means, such as chemical treatment to reduce biological challenges; provisions to permit regular, periodic inspections, preventative maintenance, testing and performance trending; the use of best design practices for piping material selection and layout to minimize erosion and corrosion; and administrative controls in the form of operating, maintenance and emergency procedures, provide a level of assurance that the ESWS is able to perform its safety function when required.

Consistent with GL 89-13, design provisions of the ESWS accommodate performing the following:

- Identify and reduce the incidence of flow blockage problems caused from biofouling.
- Verify the heat transfer capability of safety-related heat exchangers connected to or cooled by the ESWS.
- Conduct routine inspection and maintenance activities of ESWS piping and components to provide assurance that corrosion, erosion, protective coating failure, silting, and biofouling cannot degrade the performance of safety-related systems supplied by ESW.

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.

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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.

5.0 Electrical Power Design Features

5.1 The components designated as Class 1E in Table 2.7.11-2 are powered from the Class 1E division as listed in Table 2.7.11-2 in a normal or alternate feed condition.

5.2 Valves listed in Table 2.7.11-2 fail as-is on loss of power.

5.3 Deleted.

6.0 Environmental Qualifications

6.1 Deleted.

7.0 Equipment and System Performance

7.1 The ESWS UHS as listed in Table 2.7.11-1 has the capacity to remove the design heat load from the CCWS.

7.2 The pumps listed in Table 2.7.11-1 have sufficient net positive suction head absolute.

7.3 Class 1E valves listed in Table 2.7.11-2 can perform the function listed in Table 2.7.11-1 under system operating conditions. including safety injection

7.4 The ESWS provides for flow testing of the ESWS pumps during plant operation.

7.5 Deleted.~~The non-safety-related dedicated ESWS as listed in Table 2.7.11-1 has the capacity to remove the design heat load from the non-safety-related dedicated CCWS heat exchanger and ESWPBVS division 4 room cooler.~~

7.6 The ESWS delivers water to the CCWS and EDG heat exchangers and the ESWPBVS room coolers.

8.0 Interface Requirements~~Information~~

8.1 The site specific emergency makeup water system provides 300 gpm makeup water to each ESW cooling tower basin ~~in order~~ to maintain the minimum basin water level ~~in the ESW cooling tower basins~~.

9.0 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.11-3 lists the ESWS ITAAC.

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Table 2.7.11-3—Essential Service Water System ITAAC (6 Sheets)

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
7.3	Class 1E valves listed in Table 2.7.11-2 perform the function listed in Table 2.7.11-1 under system operating conditions including safety injection.	Tests and analyses or a combination of tests and analyses will be performed to demonstrate the ability of the valves listed in Table 2.7.11-2 to change position as listed in Table 2.7.11-1 under system operating conditions including safety injection.	The ~~as-installed~~ valve changes position as listed Table 2.7.11-1 under system operating conditions including safety injection.
7.4	The ESWS has provisions to allow flow testing of the ESWS pumps during plant operation.	Testing for flow of the ESWS pumps back to the ESW cooling tower basin will be performed.	The ~~flow test line~~closed loop allows ESWS pump flow back to the ESW cooling tower basin.
7.5	Deleted.~~The non-safety related dedicated ESWS as listed in Table 2.7.11-1 has the capacity to remove the design heat load from the non-safety-related dedicated CCWS heat exchanger and ESWPBVS division 4 room cooler.~~	Deleted.~~Tests and analyses will be performed to demonstrate the capability of the non-safety-related dedicated ESWS as listed in Table 2.7.11-1 to remove the design heat load from the non-safety-related dedicated CCWS heat exchanger and ESWPBVS division 4 room cooler.~~	Deleted.~~The non-safety-related dedicated ESWS has the capacity to remove the design heat load from the non-safety-related dedicated CCWS heat exchanger and ESWPBVS division 4 room cooler.~~
7.6	The ESWS delivers water at the required flow~~ and within the required time due to design basis events~~.	a. Tests and analyses will be performed to ~~determine~~ verify the ESWS delivery rate under design conditions. ~~b. An integrated system test will be performed using a simulated actuation signal to verify the startup time of the ESWS.~~	a. A report exists and concludes that the ESWS system delivers the following combined total design flowrate of at least~~:~~ 19,340 gpm. ~~b. A report exists and concludes that the ESWS starts within the following required time in response to a simulated actuation signal.~~

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Next File

INSERT for RAI 345, Response 09.02.01-43

INSERT for Section 9.2.1.7

Upon receipt of a safety injection signal, the following valves will receive a signal to automatically align to their post accident position as indicated:

- ESWS normal blowdown isolation valves 30PEB10/20/30/40 AA016 (closed)
- Cooling tower emergency blowdown system isolation valves 30PEB10/20/30/40 AA003 (closed)
- Debris filter blowdown isolation valves 30PEB10/20/30/40 AA015 (closed)
- ESWS cooling tower bypass isolation valves 30PED10/20/30/40 AA011 (closed)
- ESWS normal makeup water isolation valves 30PED10/20/30/40 AA019 (closed)
- ESWS pump recirculation isolation valves 30PEB10/20/30/40 AA002 (closed)
- ESWS pump discharge isolation valves 30PEB10/20/30/40 AA005 (open)
- ESWS return header tower isolation valves 30PED10/20/30/40 AA010 (open)
- ESWS emergency makeup water isolation valves 30PED10/20/30/40 AA021 (open)

The following valves are automatically re-aligned in response to a pump start/stop:

- ESWS pump discharge isolation valves 30PEB10/20/30/40 AA005 (open/closed)
- ESWS return header isolation valves, 30PED10/20/30/40 AA010 (open/closed)

Question 09.02.01-45:

Follow-up to RAI 119, Question 9.2.1-21

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:

Part 2 question: 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.

Based on the staff's review of response to RAI 119, Question 9.2.1-21 and an audit by the staff conducted on October 27, 2009, this item remains open and requires further resolution and/or clarification by the applicant. The following description provides the results of the staff's evaluation of the applicant's initial response and justification for the item remaining open.

> The applicant should reconsider adding back the 'EDG cooling' to Tier 1. The applicant had removed EDG cooling as part of this RAI response from the Tier 1 list of ESW system safety-related functions. The applicant states that "safety significance" is used to determine if a design function is of sufficient importance to be included in the Tier 1 list of safety-related functions and provides criteria used to determine safety significance. One such criterion provided by the applicant states key features that provide functions credited in the key safety analyses. Since the availability of on-site class 1E power is a basic assumption of typical DBA analysis and the EDGs cannot function without cooling water, the applicant should reconsider the removal of the EDG cooling function from Tier 1, and ITAAC Item 7.1 and 7.6 should be restored to recognize that the flow rate specified as acceptance criteria includes flow to individual heat exchangers including the CCWS HX, EDG and ESW pump room coolers.

Response to Question 09.02.01-45:

The EDG cooling function will be added back to Tier 1, and ITAAC Item 7.1 and 7.6 will be restored to recognize that the flow rate specified as acceptance criteria includes flow to individual heat exchangers including the CCWS HX, EDG and ESW pump room coolers.

FSAR Impact:

U.S. EPR FSAR Tier 1, Section 2.7.11 will be revised as described in the response and indicated on the enclosed markup.

2.7.11 Essential Service Water System

1.0 Description

The essential service water system (ESWS) is a safety-related system that provides cooling water to the component cooling water system (CCWS) heat exchangers, the emergency diesel generator (EDG) heat exchangers, and the essential service water pump building ventilation system (ESWPBVS) room coolers under normal operating, shutdown/cooldown, design basis events. The Ultimate Heat Sink (UHS) dissipates heat rejected from the ESW during normal operation and post accident shutdown.

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The ESWS provides the following safety related functions:

INSERT A →

- The ESWS provides the capability to transfer heat from CCWS to the environment following an anticipated operational occurrence (AOO) or postulated accident.
- The ESWS provides continued heat transfer from the fuel pool cooling system (FPCPS) via the CCWS as long as any fuel assemblies are in the spent fuel storage pool located outside containment.
- ~~The ESW normal and emergency makeup water systems and blowdown system piping from pump discharge piping up to and including the isolation valves provided for isolation of the tower basins to prevent loss of tower water inventory.~~
- The ESW emergency makeup water system and blowdown system isolation valves provide automatic isolation of the tower basins under DBA conditions to prevent loss of tower water inventory.
- ~~Pursuant to NRC Regulatory Guide 1.27 requirements,~~ Each UHS cooling tower basin is sized to contain sufficient water to allow for 72 hours of ESW train operation under DBE conditions without addition of makeup water. The water level in the basin at the end of the 72 hour period is sufficient to meet pump minimum suction head (NPSH) requirements.
- After 72 hours have elapsed since the initiation of design basis event, the ESW emergency makeup water system provides water to the ESW system to replenish cooling water lost to evaporation, drift, blowdown and other losses in order to ensure cooling tower basin water levels remain within established limits under DBE conditions.
- The site specific ESW emergency makeup water system will provide this makeup water for at least 27 days following the initial 72 hour post-accident period (balance of 30 day scenario).

The ESWS provides the following non-safety-related functions:

- The ESWS provides the cooling of the system users during all normal plant operating conditions.
- Deleted.

5.0 Electrical Power Design Features

5.1 The components designated as Class 1E in Table 2.7.11-2 are powered from the Class 1E division as listed in Table 2.7.11-2 in a normal or alternate feed condition.

5.2 Valves listed in Table 2.7.11-2 fail as-is on loss of power.

5.3 Deleted.

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6.0 Environmental Qualifications

6.1 Deleted.

7.0 Equipment and System Performance

INSERT B

7.1 The ESWS UHS as listed in Table 2.7.11-1 has the capacity to remove the design heat load from the CCWS.

7.2 The pumps listed in Table 2.7.11-1 have sufficient net positive suction head absolute.

7.3 Class 1E valves listed in Table 2.7.11-2 can perform the function listed in Table 2.7.11-1 under system operating conditions.

7.4 The ESWS provides for flow testing of the ESWS pumps during plant operation.

7.5 Deleted.~~The non-safety-related dedicated ESWS as listed in Table 2.7.11-1 has the capacity to remove the design heat load from the non-safety-related dedicated CCWS heat exchanger and ESWPBVS division 4 room cooler.~~

7.6 The ESWS delivers water to the CCWS and EDG heat exchangers and the ESWPBVS room coolers.

8.0 Interface Requirements~~Information~~

8.1 The site specific emergency makeup water system provides 300 gpm makeup water to each ESW cooling tower basin ~~in order~~ to maintain the minimum basin water level ~~in the ESW cooling tower basins~~.

9.0 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.11-3 lists the ESWS ITAAC.

Table 2.7.11-3—Essential Service Water System ITAAC (6 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
5.1	The components designated as Class 1E in Table 2.7.11-2 are powered from the Class 1E division as listed in Table 2.7.11-2 in a normal or alternate feed condition.	a. Testing will be performed for components designated as Class 1E in Table 2.7.11-2 by providing a test signal in each normally aligned division.	a. The test signal provided in the normally aligned division is present at the respective Class 1E component identified in Table 2.7.11-2.
		b. Testing will be performed for components designated as Class 1E in Table 2.7.11-2 by providing a test signal in each division with the alternate feed aligned to the divisional pair.	b. The test signal provided in each division with the alternate feed aligned to the divisional pair is present at the respective Class 1E component identified in Table 2.7.11-2.
5.2	Valves listed in Table 2.7.11-2 fail as-is on loss of power.	Testing will be performed for the valves listed in Table 2.7.11-2 to fail as-is on loss of power.	Following loss of power, the valves listed in Table 2.7.11-2 fail as-is.
5.3	Deleted.	Deleted.	Deleted.
6.1	Deleted.	Deleted.	Deleted.
7.1	The ESW UHS as listed in Table 2.7.11-1 has the capacity to remove the design heat load from the CCWS.	Tests and analyses will be performed to demonstrate the capability of the ESWS UHS as listed in Table 2.7.11-1 to remove the design heat load from CCWS.	The ESWS UHS has the capacity to remove the design heat load from the CCWS of 2.913 E+08 BTU/hr.
7.2	The pumps listed in Table 2.7.11-1 have sufficient NPSHA.	Testing and analyses will be performed to verify NPSHA for pumps listed in Table 2.7.11-1.	A report exists and concludes that the pumps listed in Table 2.7.11-1 have NPSHA that is greater than net positive suction head required (NPSHR) at system run-out flow with consideration for minimum allowable cooling tower basin water level (as corrected to account for actual temperature and atmospheric conditions).

INSERT C

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Table 2.7.11-3—Essential Service Water System ITAAC (6 Sheets)

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
7.3	Class 1E valves listed in Table 2.7.11-2 perform the function listed in Table 2.7.11-1 under system operating conditions.	Tests and analyses or a combination of tests and analyses will be performed to demonstrate the ability of the valves listed in Table 2.7.11-2 to change position as listed in Table 2.7.11-1 under system operating conditions.	The ~~as-installed~~ valve changes position as listed Table 2.7.11-1 under system operating conditions.
7.4	The ESWS has provisions to allow flow testing of the ESWS pumps during plant operation.	Testing for flow of the ESWS pumps back to the ESW cooling tower basin will be performed.	The ~~flow test line~~closed loop allows ESWS pump flow back to the ESW cooling tower basin.
7.5	Deleted.~~The non-safety related dedicated ESWS as listed in Table 2.7.11-1 has the capacity to remove the design heat load from the non-safety related dedicated CCWS heat exchanger and ESWPBVS division 4 room cooler.~~	Deleted.~~Tests and analyses will be performed to demonstrate the capability of the non-safety-related dedicated ESWS as listed in Table 2.7.11-1 to remove the design heat load from the non-safety related dedicated CCWS heat exchanger and ESWPBVS division 4 room cooler.~~	Deleted.~~The non-safety related dedicated ESWS has the capacity to remove the design heat load from the non-safety-related dedicated CCWS heat exchanger and ESWPBVS division 4 room cooler.~~
7.6	The ESWS delivers water at the required flow~~and within the required time due to design basis events.~~	a. Tests and analyses will be performed to ~~determine~~ verify the ESWS delivery rate under design conditions. ~~b. An integrated system test will be performed using a simulated actuation signal to verify the startup time of the ESWS.~~	a. A report exists and concludes that the ESWS system delivers the following combined total design flowrate of at least~~:~~ 19,340 gpm. ~~b. A report exists and concludes that the ESWS starts within the following required time in response to a simulated actuation signal.~~

INSERT D — RAI 345 09.02.01-45

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INSERT for RAI 345, Question 09.02.01-45 Response

Reword Section 2.7.11, Section 7.1, Para.2, Bullet 1, as follows:

INSERT A

The ESWS provides the capability to transfer heat from CCWS and EDG to the environment following an anticipated operational occurrence (AOO) or postulated accident.

Reword Section 2.7.11, Section 7.1 with:

INSERT B

The ESW UHS as listed in Table 2.7.11-1 has the capacity to remove the design heat load from the CCWS and EDG heat exchangers, and the ESWPBVS room coolers.

INSERT C

Reword Item 7.1 in Table 2.7.11.-3:

7.1	The ESW UHS as listed in Table 2.7.11-1 has the capacity to remove the design heat load from the CCWS and EDG heat exchangers, and the ESWPBVS room coolers.	Tests and analyses will be performed to demonstrate the capability of the ESWS UHS as listed in Table 2.7.11-1 to remove the design heat load from CCWS and EDG heat exchangers, and the ESWPBVS room coolers.	The ESWS UHS has the capacity to remove the design heat load from the CCWS and EDG heat exchangers, and the ESWPBVS room coolers with: a. Design CCWS heat exchanger heat load of 2.913 E+08 BTU/hr b. Design EDG heat exchanger heat load of 2.20 E+07 BTU/hr c. Design ESWPBVS room cooler heat load of 619,400 BTU/hr

INSERT D

Reword Item 7.6 in Table 2.7.11.-3:

7.6	The ESWS delivers water to the CCWS and EDG heat exchangers, and the ESWPBVS room coolers.	Tests and analyses will be performed to verify the ESWS delivery rate under design conditions to the CCWS and EDG heat exchangers, and the ESWPBVS room coolers.	A report exists and concludes that the ESWS system delivers the design flow rate to the CCWS and EDG heat exchangers, and the ESWPBVS room coolers with: a. Design CCWS flow rate of 7.54 E+06 lb_m/hr

			b. Design EDG flow rate of 1.06 E +06 lb_m/hr c. Design ESWPBVS room cooler flow rate of 0.0685 E+06 lb_m/hr

Question 09.02.01-46:

Follow-up to RAI 119, Question 9.2.1-21

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:

a. Part 6 Question: Specifications to assure that the filters satisfy design and performance requirements, and to confirm alarm functions, were not provided.

b. Parts 16 and 17 Question: Table 2.7.11-2, "Essential Service Water System Equipment I&C and Electrical Design," did not include information pertaining to the ESWS filter motors and corresponding power supplies. Similar to Parts 6 and 16, Part 17 pointed out that Tables 2.7.11-1 and table 2.7.11-2 did not describe the ESWS pump downstream filters.

Based on the staff's review of response to RAI 119, Question 9.2.1-21 and an audit by the staff conducted on October 27, 2009, this item remains open and requires further resolution and/or clarification by the applicant. The following description provides the results of the staff's evaluation of the applicant's initial response and justification for these items remaining open.

In the applicant's response to parts 6, 16 and 17 of RAI 9.2.1-21, it is stated that filters (and filter motors) in the ESWS are solely provided for equipment protection and are not credited in safety analyses; therefore, they are not 'safety significant' and do not require Tier 1 treatment. The applicant also refers to guidance provided by SRP 14.3 (ITAAC), Appendix C, Fluid Systems Review Checklist, item (4) in support of this position.

Depending on water quality for many operating plants, cooling water pump discharge filter (strainer) performance can have a direct impact on service water pump and heat exchanger operability and can therefore affect the ability of the system to fulfill its design functions. These are large safety-related components that are provided with class 1E motors and active controls that are intended to protect the system safety functions by removing debris before it can challenge system operation. The applicant should reconsider the importance of these components to the system and the filters should be identified in FSAR Tier 1 Tables 2.7.11-1 and 2.7.11-2.

Proper strainer function must be specifically addressed in the initial test program of U.S. EPR FSAR Tier 2 Section 14.2 Test #48. This test does not presently include a specific requirement to confirm proper strainer function (e.g. backwash, alarms etc.).

Response to Question 09.02.01-46:

Refer to RAI 345, Question 09.02.01-31 for the inclusion of the ESW debris filters in FSAR Tier 1 Tables 2.7.11-1 and 2.7.11-2.

U.S. EPR FSAR Section 2.7.11, Section 7.0 Equipment and System Performance, will be revised to add Item 7.7 as follows:

"The ESWS debris filters listed in Table 2.7.11-1 function to backwash upon high differential pressure."

The corresponding ITAAC item will be added to Table 2.7.3-1.

Refer to RAI 345, Question 09.02.01-42 (b) for the inclusion of a specific requirement to confirm proper function of the ESW debris filters in the initial test program of U.S. EPR FSAR Tier 2 Section 14.2 Test #48.

FSAR Impact:

U.S. EPR FSAR Tier 1, Section 2.7.11 and Tier 2, Section 14.2 will be revised as described in the response and indicated on the enclosed markup.

5.0 Electrical Power Design Features

5.1 The components designated as Class 1E in Table 2.7.11-2 are powered from the Class 1E division as listed in Table 2.7.11-2 in a normal or alternate feed condition.

5.2 Valves listed in Table 2.7.11-2 fail as-is on loss of power.

5.3 Deleted.

6.0 Environmental Qualifications

6.1 Deleted.

7.0 Equipment and System Performance

7.1 The ESWS UHS as listed in Table 2.7.11-1 has the capacity to remove the design heat load from the CCWS.

7.2 The pumps listed in Table 2.7.11-1 have sufficient net positive suction head absolute.

7.3 Class 1E valves listed in Table 2.7.11-2 can perform the function listed in Table 2.7.11-1 under system operating conditions.

7.4 The ESWS provides for flow testing of the ESWS pumps during plant operation.

7.5 Deleted.~~The non-safety-related dedicated ESWS as listed in Table 2.7.11-1 has the capacity to remove the design heat load from the non-safety-related dedicated CCWS heat exchanger and ESWPBVS division 4 room cooler.~~

7.6 The ESWS delivers water to the CCWS and EDG heat exchangers and the ESWPBVS room coolers.

INSERT

8.0 Interface Requirements~~Information~~

8.1 The site specific emergency makeup water system provides 300 gpm makeup water to each ESW cooling tower basin ~~in order~~ to maintain the minimum basin water level ~~in the ESW cooling tower basins~~.

9.0 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.11-3 lists the ESWS ITAAC.

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Table 2.7.11-3—Essential Service Water System ITAAC (6 Sheets)

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
7.3	Class 1E valves listed in Table 2.7.11-2 perform the function listed in Table 2.7.11-1 under system operating conditions.	Tests and analyses or a combination of tests and analyses will be performed to demonstrate the ability of the valves listed in Table 2.7.11-2 to change position as listed in Table 2.7.11-1 under system operating conditions.	The ~~as-installed~~ valve changes position as listed Table 2.7.11-1 under system operating conditions.
7.4	The ESWS has provisions to allow flow testing of the ESWS pumps during plant operation.	Testing for flow of the ESWS pumps back to the ESW cooling tower basin will be performed.	The ~~flow test line~~closed loop allows ESWS pump flow back to the ESW cooling tower basin.
7.5	Deleted.~~The non-safety related dedicated ESWS as listed in Table 2.7.11-1 has the capacity to remove the design heat load from the non-safety related dedicated CCWS heat exchanger and ESWPBVS division 4 room cooler.~~	Deleted.~~Tests and analyses will be performed to demonstrate the capability of the non-safety-related dedicated ESWS as listed in Table 2.7.11-1 to remove the design heat load from the non-safety related dedicated CCWS heat exchanger and ESWPBVS division 4 room cooler.~~	Deleted.~~The non-safety related dedicated ESWS has the capacity to remove the design heat load from the non-safety-related dedicated CCWS heat exchanger and ESWPBVS division 4 room cooler.~~
7.6	The ESWS delivers water at the required flow ~~and within the required time due to design basis events~~.	a. Tests and analyses will be performed to ~~determine~~ verify the ESWS delivery rate under design conditions. ~~b. An integrated system test will be performed using a simulated actuation signal to verify the startup time of the ESWS.~~	a. A report exists and concludes that the ESWS system delivers the following combined total design flowrate of at least ~~:~~ 19,340 gpm. ~~b. A report exists and concludes that the ESWS starts within the following required time in response to a simulated actuation signal.~~

INSERT — RAI 345 09.02.01-46

Next File

INSERT for RAI 345, Question 09.02.01-46

INSERT as Item 7.7:

"The ESWS debris filters listed in Table 2.7.11-1 function to backwash upon high differential pressure"

INSERT as Item 7.7 in Table 2.7.11-3

7.7	The ESWS debris filters listed in Table 2.7.11-1 function to backwash upon high differential pressure.	Tests will be performed to verify the ESWS debris filters function to backwash on high differential pressure under system operating conditions.	The filters initiate backwash flow to filter blowdown.

Question 09.02.01-50:

Follow-up to RAI 119, Question 9.2.1-21

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:

> Part 13 question: Figure 2.7.11-1, "Essential Service Water System Functional Arrangement," does not show nominal pipe sizes, which are necessary for design certification.

Based on the staff's review of response to RAI 119, Question 9.2.1-21, the following related item was identified.

Tier 1 Figure 2.7.11-1 does not clearly show ASME Code Classifications, for example, ASME Class 2 or 3, reference Appendix A to RG 1.206, Page C.II.1-A-1, item 4. The applicant should consider adding this information to Tier 1 Figure 2.7.11-1.

Response to Question 09.02.01-50:

The specification of ASME Code Section III in U.S. EPR FSAR Tier 1, Figure 2.7.11-1, is consistent with existing certified designs and other systems within this design certification application. The ASME Code Class boundaries within ASME Section III are provided in Tier 2. ASME Code Section III class changes are not a requirement of SRP 14.3 and no design certification ITAAC are based on the boundaries between the classes within ASME Section III.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 09.02.01-49:

Follow-up to RAI 119, Question 9.2.1-25

Flooding isolation of the Essential Service Water System (ESWS) pumps is discussed in two sections of the Final Safety Analysis Report (FSAR) (see below); however, Tier 2, Section 9.2.1 makes no mention of this important feature to mitigate a flood in the Safeguard Building (SB) or Fuel Building (FB). Provide a detailed discussion in the appropriate sections of 9.2.1 related to the flood signals and ESWS isolation. Clarify how the logic will isolate each division of ESWS pumps (or all ESWS pumps) and clarify if any pump receives a lockout from starting. Provide schematic diagrams showing all inputs (i.e., logic inputs , sensor inputs, all variables, actuation logic, binary limitation signals), with input types (i.e., hardwired, fiber, type of isolation used), ESWS circuit components, and all ESWS control signal outputs of the ESWS control system. The schematic provided should be of the type provided by Figure RAI 19-1, page 5, and Figure RAI 19-2, page 6, in "Response to Second Request for Additional information", Attachment A, ANP-10284Q2P, dated June 13, 2008. In addition, describe operator actions that are required and justify the non-safety-related classification for the ESWS flooding isolation logic.

From Tier 2 FSAR 19.1.5.2.2.5

"Floods caused by a break in a system with very large flooding potential (ESWS or DWS) are assumed to be contained below ground level of the affected buildings (SB or FB). This is a reasonable assumption since those systems are automatically isolated if the building sump detects a large flooding event. Moreover, expansive time is needed to flood a building up to ground level, so operator isolation is likely to succeed if automatic isolation failed."

From Tier 2 FSAR 3.4.3.4.

"Relevant component and system piping failures considered in the analysis for this elevation include failures in the essential service water system (ESWS) and component cooling water system (CCWS) heat exchangers, leaks in the emergency feed water system, leaks in the CCWS, and pipe failure in the fire water distribution system.

A postulated pipe break or erroneous valve alignment in the ESWS has the potential to impact more than one division. The ESWS piping penetrates the SBs at elevation -14 feet, 9-1/4 inches and is routed to the CCWS heat exchangers at elevation +0 feet. The worst case scenario assumed in the analysis is an erroneous valve alignment where the CCW heat exchanger is left open after plant maintenance, resulting in the entire cross section of the associated ESW line releasing water at elevation +0 feet. To cope with non-closure of the heat exchanger or a large break in the ESWS piping, the pump must be stopped and the isolation valve in the discharge line of the affected ESWS train must be closed to limit the flooding volume in the affected SB.

Non safety-related detection and isolation signals are provided in the nuclear island drain and vent system in each SB to isolate the ESWS. The alarm that actuates the isolation is above the floor level so only large flooding events can activate the alarm. Two level sensors in a one-of-two logic activate the alarm. If a level instrument fails, that sensor is not considered for the voting, and the signal is activated when one sensor alarms.

Based on the staff's review of response to RAI 119, Question 9.2.1-25 and an audit by the staff conducted on October 27, 2009, this item remains open and requires further resolution and/or clarification by the applicant. The following description provides the results of the staff's evaluation of the applicant's initial response and justification for the item remaining open.

a. The corresponding markup of FSAR Tier 2 Section 3.4.3.4 should recognize that a control room alarm is provided (removed in the markup) and that no operator actions are required for this scenario to trip the associated ESWS pump and isolate the pump discharge.

b. The end of the last sentence in the FSAR markup appears to be incomplete, Tier 2 FSAR Revision 1, page 3.4-9 (i.e. when one sensor detects). The sentence should be revised for Tier 2, Section 3.4.3.4.

c. The applicant should provide a markup of FSAR Tier 2 Section 9.3.3 "Equipment and Floor Drains" to recognize that safety-related controls are provided in the SB non-controlled area sumps to support the flood protection design features for the scenario described above. The applicant should consider for Section 9.2.1.7.2, "System Alarms", a discussion related to this feature, namely the ESWS pump discharge valve isolation and pump trip due to flooding.

d. The applicant stated that the control details requested by the staff will not be available until later in the design process. The applicant should provide a date when this material will be available for the staff to review.

Response to Question 09.02.01-49:

a. U.S. EPR FSAR Tier 2 Section 3.4.3.4 will be revised to recognize that a control room alarm is provided and that no operator actions are required to trip the associated ESWS pump and isolate the pump discharge in a SB flooding event.

b. U.S. EPR FSAR Tier 2 Section 3.4.3.4 was revised in response to RAI 163 Question 09.03.03-5 which deleted the sentence in question.

FSAR Impact:

a. U.S. EPR FSAR Tier 2 Section 3.4.3.4 will be revised as described in the response and indicated on the enclosed markup.

b. U.S. EPR FSAR Tier 2 Section 3.4.3.4 will not be revised as a result of this question.

in only one division. Common flooding of SB-1 and the left hand side of the FB (i.e., FB-1, see Section 3.4.3.5 and the general arrangement drawings in Section 1.2), or of SB-4 and the right hand side of the FB (i.e., FB-2, see Section 3.4.3.5 and the general arrangement drawings in Section 1.2), is acceptable, because they belong to the same division.

Relevant component and system piping failures considered in the analysis of these building levels include loss of one demineralized water pool, a leak in the SIS suction line from the IRWST, a pipe leak in the SIS/RHRS during normal operation, and a break in the fire water distribution system piping. The bounding flooding source below elevation +0 feet is considered to be a postulated break in the main piping of the fire water distribution system. The volume of released water is based on an assumed full break in the piping, a flow rate limited by the maximum pump capacity, and an operator action time of thirty minutes to isolate the system after receiving the first alarm in the MCR. At these levels, the rooms within one division have sufficient interconnections so that the maximum released water volume can be stored within the division. Based on the available free volume of these building levels in each division, the maximum released water volume can be contained within the affected division.

Elevation +0 Feet, 0 Inches

At elevation +0 feet, 0 inches there is no physical separation of divisions with respect to flooding. A corridor connects the SBs and the FB. To avoid water ingress into adjacent divisions at this elevation and above, a combination of watertight doors, existing openings (e.g., stairwells), and designed openings for water flow to the lower building levels are provided.

Relevant component and system piping failures considered in the analysis for this elevation include failures in the essential service water system (ESWS) and component cooling water system (CCWS) heat exchangers, leaks in the emergency feedwater system, leaks in the CCWS, and pipe failure in the fire water distribution system.

A postulated pipe break or erroneous valve alignment in the ESWS has the potential to impact more than one division. The ESWS piping penetrates the SBs at elevation -14 feet, 9-1/4 inches and is routed to the CCWS heat exchangers at elevation +0 feet. The worst case scenario assumed in the analysis is an erroneous valve alignment where the CCW heat exchanger is left open after plant maintenance, resulting in the entire cross section of the associated ESW line releasing water at elevation +0 feet. To cope with nonclosure of the heat exchanger or a large break in the ESWS piping, the [associated motor-driven ESWS pump discharge isolation valve is automatically closed and the ESWS pump is tripped] ~~pump must be stopped and the isolation valve in the discharge line of the affected ESWS train must be closed~~ to limit the flooding volume in the affected SB. No operator action is required to isolate the ESWS in a large flooding event. Safety-related detection and isolation signals are provided in the nuclear island drain and vent system in each SB to isolate the ESWS. The level sensors that actuate the [initiate an alarm in the MCR and automatically]