ArevaEPRDCPEm Resource

From: BRYAN Martin (EXTERNAL AREVA) [Martin.Bryan.ext@areva.com]
Sent: Monday, August 30, 2010 8:24 AM
To: Tesfaye, Getachew
Cc: Hearn, Peter; KOWALSKI David (AREVA)
Subject: FW: DRAFT RESPONSES FOR FSAR Chapter 9 Weekly NRC Telecon
Attachments: Blank Bkgrd.gif; DRAFT RESPONSE RAI 351 Q.09.02.05-30 (f)(Part 2).pdf; DRAFT FSAR Changes RAI 351 Q.09.02.05-30 (f)(Part 2).pdf

Importance: High

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Subject: DRAFT RESPONSES FOR FSAR Chapter 9 Weekly NRC Telecon
Importance: High

Marty:

Please transmit to Getachew Tesfaye the attached partial set of DRAFT responses to RAI 351 questions. This response will be discussed at Tuesday's (8/31/10) FSAR Chapter 9 Weekly Telecon/GoToMeeting with the NRC.

Attached are the following DRAFT response(s):

- Response to RAI 351 - Question 09.02.05-30(f)(Part 2).
- Response to RAI 351 - Question 09.02.05-30(f)(Part 2) - FSAR Changes.

Note that this DRAFT response has not been through the final Licensing review/approval process; nor does it reflect technical editing.

Please call me if you have any questions. Thanks.

David J. Kowalski, P.E.
Principal Engineer
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Response to

Request for Additional Information No. 351(4112, 4163), Revision 1

01/15/2010

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 09.02.05 - Ultimate Heat Sink
SRP Section: 09.05.01 - Fire Protection Program

Application Section: FSAR Chapter 9

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

DRAFT

Question 09.02.05-30:

Follow-up to RAI 175, Question 9.2.5-17:

Standard Review Plan (SRP) 9.2.5 Section III, paragraph 1 requires confirmation of the overall arrangement of the ultimate heat sink (UHS). The staff reviewed the descriptive information, arrangement, design features, environmental qualification, performance requirements, and interface information provided in Tier 1 Final Safety Analysis Report (FSAR) Section 2.7.11 to confirm completeness and consistency with the plant design basis as described in Tier 2 Section 9.2.5. The staff found that the Tier 1 information is incomplete, inconsistent, inaccurate, or that clarification is needed with respect to the following considerations:

a. 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 9.2.5 (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). This Tier 1 information needs to be added to Tier 2.

b. FSAR Tier 1 does not stipulate that the ultimate heat sink (UHS) is accessible for performing periodic inspections as required by General Design Criteria (GDC) 45.

c. FSAR Tier 1 does not stipulate that the UHS design provide for flow testing of makeup water for accident and emergency conditions.

d. FSAR Tier 1 does not stipulate that the essential service water system (ESWS) pumps are protected from debris from the cooling towers.

e. FSAR Tier 1 does not stipulate that the safety related UHS outdoor piping is adequately protected from the elements and postulated hazards.

f. Tier 1, Figure 2.7.11-1, "Essential Service Water System Functional Arrangement," does not show nominal pipe sizes for the UHS, which are necessary for design certification. This table does not show design information for the UHS fans.

g. Tier 1, Table 2.7.11-2, "Essential Service Water System Equipment I&C and Electrical Design," does not include information pertaining to the UHS fans and corresponding power supplies.

h. The point of Note 2 for Tier 1, 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.

i. The discussion under Item 6 Tier 1 of Table 2.7.11-2 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.

Based on the staff's review of the applicant's response to RAI 9.2.5-17 (ID1817/6814) AREVA #175, Supplement 3, the following were determined as unresolved and needed further clarification/resolution by the applicant.

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The applicant's response to Item (b) focuses on inservice inspection requirements, while the question that was asked focuses on the requirement specified by 10 CFR 50, Appendix A, General Design Criterion (GDC) 45. GDC 45 requires that "the cooling water system shall be designed to permit appropriate periodic inspections of important components, such as heat exchangers and piping, to assure the integrity and capability of the system." Therefore, the capability to perform periodic inspections of important components needs to be described in FSAR Tier 2 and ITAAC need to be established to confirm this aspect of the design.

With regard to the response to Item (d), the staff does not agree that screens and filters that are solely for equipment protection are not safety significant. Filters and screens are relied upon to ensure that debris, aquatic organisms, and other material that find their way into the cooling tower basins do not adversely impact the capability of the essential service water system and ultimate heat sink to perform their safety functions. Without the screens and filters, pumps and valves can be damaged and rendered inoperable, heat exchanger tubes and cooling tower spray nozzles can become clogged, and heat transfer surfaces can become fouled. Therefore, ITAAC are needed to confirm the installation and proper mesh size of the filters and screens that are relied upon. Additionally, FSAR Tier 2 Sections 9.2.1 and 9.2.5 need to be revised to describe important filter and screen design specifications such as maximum allowed differential pressure and mesh size, including the bases for these specifications.

The response to Item (e) indicates that the UHS does not have any safety-significant outdoor piping within the scope of design certification. Based on this, the staff agrees that ITAAC are not needed to confirm adequate protection of exposed equipment. However, ITAAC are needed to confirm that ESWS and UHS piping and components are not exposed to the elements and postulated hazards. Additionally, based upon further review, the staff found that additional information needs to be included in the FSAR to address freeze protection considerations, especially for divisions that are in standby and for those parts of the cooling tower that are exposed and vulnerable to cold weather conditions.

The response to Item (f) refers to a response that was provided to RAI 9.2.1-22 (AREVA RAI No. 119, Supplement 1). The response indicates that line sizing details will be identified later in the design process. Consequently, this item remains open pending submittal of the information that was requested and a schedule for providing this information needs to be established.

In response to second part of Item (f), the applicant stated that design information for the UHS fans will be added to FSAR Tier 1, Table 2.7.11-2, "Essential Service Water System Equipment I&C and Electrical Design," as part of the response to Item (g) of this RAI. The staff noted that the FSAR markup of Table 2.7.11-2 does not specify alternate power supplies for the two fans in Essential Service Water (ESW) Building 4. In this regard, additional information is needed to explain why an alternate power source is not specified for the ESW Building 4 cooling tower fans since they are necessary to support operation of the dedicated ESW train. The dedicated ESW train is provided to mitigate accidents that are beyond the design basis when normal backup power may not be available. Therefore, the applicant should specify an alternate power source for these fans similar to that shown for several other dedicated ESW train components in FSAR Tier 1 Table 2.7.11-2.

Response to Question 09.02.05-30:

Item (f)(2)

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As stated in the response to RAI 345 9.2.1-26 part a, "U.S. EPR FSAR [Tier 1] Table 2.7.11-2 contains the IEEE Class 1E source and, as applicable for certain components, a Class 1E alternate feed source. The indications of SBO in Table 2.7.11-2 for the dedicated ESW pump and dedicated filter blowdown isolation valve have been appropriately deleted in response to RAI 334 9.2.2-76. SBO is not a Class 1E alternate feed source as indicated in Table Note 2."

Similar to the items identified in Table 2.7.11-2 as "Dedicated" components, the division 4 cooling tower fans are capable of being supplied by a standby EDG or a SBODG that is provided as an alternate ac power source. The EDG commitment to ITAAC is already covered by Tier 1 Section 2.7.11, Subpart 5.1.

Tier 1 Section 2.7.11 Subpart 5.4, which was previously added in the response to RAI 345 9.2.1-26 part a, will be revised per insert 1:

Tier 1 Table 2.7.11-3, which was previously, added in the response to RAI 345 9.2.1-26 part a, will be revised per insert 2.

The text in insert 3 will be added to Tier 2 Section 9.2.5.3.1:

FSAR Impact:

U.S. EPR FSAR, Tier 1, Section 2.7.11 Subpart 5.4 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR FSAR, Tier 1, Table 2.7.11-3 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR FSAR, Tier 2, Section 9.2.5.3.1 will be revised as described in the response and indicated on the enclosed markup.

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Insert 1

Items identified in Table 2.7.11-2 as “Dedicated” ESWS motor-operated components (including division 4 cooling tower fans) are capable of being supplied by a SBODG.

Insert 2

5.4	Items identified in Table 2.7.11-2 as “Dedicated” ESWS motor-operated components (including division 4 cooling tower fans) are capable of being supplied by a SBODG.	Testing will be performed for motor-operated components designated as “Dedicated” in Table 2.7.11-2 (including division 4 cooling tower fans) by supplying electrical power from an SBODG.	“Dedicated” components identified in Table 2.7.11-2 (including division 4 cooling tower fans) are capable of being supplied by an SBODG.

Insert 3

The division 4 cooling tower fans are capable of being supplied by a standby EDG or a station blackout diesel generator (SBODG) that is provided as an alternate ac power source.”

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3.11 Deleted.

3.12 ESWS piping shown as ASME Code Section III on Figure 2.7.11-1 is designed in accordance with ASME Code Section III requirements.

3.13 ESWS piping shown as ASME Code Section III on Figure 2.7.11-1 is installed in accordance with an ASME Code Section III Design Report.

3.14 Pressure boundary welds in ESWS piping shown as ASME Code Section III on Figure 2.7.11-1 are in accordance with ASME Code Section III.

3.15 ESWS piping shown as ASME Code Section III on Figure 2.7.11-1 retains pressure boundary integrity at design pressure.

3.16 ESWS piping shown as ASME Code Section III on Figure 2.7.11-1 is installed and inspected in accordance with ASME Code Section III requirements.

3.17 Components listed in Table 2.7.11-1 as ASME Code Section III are installed in accordance with ASME Code Section III requirements.

4.0 I&C Design Features, Displays and Controls

4.1 Displays listed in Table 2.7.11-2— Essential Service Water System Equipment I&C and Electrical Design are retrievable in the main control room (MCR) and the remote shutdown station (RSS) as listed in Table 2.7.11-2.

4.2 The ESWS equipment controls are provided in the MCR and the RSS as listed in Table 2.7.11-2.

4.3 Equipment listed as being controlled by a priority and actuator control system (PACS) module in Table 2.7.11-2 responds to the state requested by a test signal.

4.4 If one ESWS pump (30PEB10/20/30/40 AP001) fails during normal operation, a switchover to the other ESWS train is carried out automatically for the entire cooling train and is initiated by the CCWS Switchover sequence.

4.5 A spurious closure of the ESWS pump discharge valve (30PEB10/20/30/40 AA005) results in a switchover to the other ESWS train automatically for the entire cooling train and is initiated by the CCWS Switchover sequence.

4.6 Deleted.

4.7 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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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. 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.	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. 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 at least 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 NPSHA that is greater than NPSHR at system run-out flow.	Testing will be performed to verify NPSHA for pumps listed in Table 2.7.11-1.	The pumps listed in Table 2.7.11-1 have NPSHA that is greater than 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).
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 valve changes position as listed Table 2.7.11-1 under system operating conditions.

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The UHS operates for a nominal 30 days following a loss of coolant accident (LOCA) without requiring any makeup water to the source or demonstrates that replenishment or use of an alternate or additional water supply can be effected to ensure continuous capability of the sink to perform its safety-related functions.

9.2.5.2 System Description

The UHS consists of four separate, redundant, safety-related divisions. Also included is one dedicated non-safety-related division which is located in division 4. Each safety-related UHS division consists of one mechanical draft cooling tower with two fans, piping, valves, controls and instrumentation. System design parameters are listed on Table 9.2.5-2. The system is shown in Figure 9.2.5-1—Ultimate Heat Sink Piping and Instrumentation Diagram.

A COL applicant that references the U.S. EPR design certification will provide site-specific information for the UHS support systems such as makeup water, blowdown and chemical treatment (to control biofouling).

A COL applicant that references the U.S. EPR design certification will provide a description of materials that will be used for the UHS 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.

The UHS contains isolation valves at the cooling towers to isolate the safety related portions of the system from the non-safety-related basin support systems provided by the COL applicant. The site-specific UHS systems are shown in Figure 9.2.5-2—[[Conceptual Site-Specific UHS Systems]].

9.2.5.3 Component Description

9.2.5.3.1 Mechanical Draft Cooling Towers

The cooling towers are rectangular mechanical-induced draft-type towers. Each tower consists of two cells in a back-to-back arrangement. The two cells of the cooling tower in a particular division share a single cooling tower basin and each cell is capable of transferring fifty percent of the design basis heat loads for one division from the ESWS to the environment under worst-case ambient conditions. The division four cooling tower shares use with the dedicated ESW train and can transfer severe accident (SA) heat loads to the environment under worst-case ambient conditions.

The cooling tower fill design and arrangement maximize contact time between water droplets and air inside the tower. The tower fill spacing is chosen to minimize the buildup of biofilm and provide for ease of cleaning, maintenance, and inspection.

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