ArevaEPRDCPEm Resource

From: BRYAN Martin (EXTERNAL AREVA) [Martin.Bryan.ext@areva.com]
Sent: Wednesday, July 14, 2010 3:46 PM
To: Tesfaye, Getachew
Cc: DELANO Karen (AREVA); ROMINE Judy (AREVA); BENNETT Kathy (AREVA); SLAY Lysa (AREVA); CORNELL Veronica (EXTERNAL AREVA); VAN NOY Mark (EXTERNAL AREVA); PATTON Jeff (AREVA); COLEMAN Sue (AREVA); RYAN Tom (AREVA); WILLIFORD Dennis (AREVA); GARDNER George Darrell (AREVA); BREDEL Daniel (AREVA)
Subject: DRAFT Response to U.S. EPR Design Certification Application RAI No. 384, FSAR Ch. 3, Question 03.04.02-14
Attachments: RAI 384 Question 03.04.02-14 Response US EPR DC - DRAFT.pdf

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for responses to 9 of the 9 questions of RAI No. 384 on June 22, 2010. The attached file, "RAI 384 Question 03.04.02-14 Response US EPR DC - DRAFT.pdf" provides a technically correct and complete **DRAFT** response to 1 of the remaining 8 questions, as committed. A final response date for this question is provided below as August 12, 2010. Please let me know if the staff has questions or if this response can be sent as final.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the DRAFT response to RAI 384 Question 03.04.02-14.

The following table indicates the respective pages in the response document, "RAI 384 Question 03.04.02-14 Response US EPR DC - DRAFT.pdf," that contain AREVA NP's **DRAFT** response to the subject question.

Question #	Start Page	End Page
RAI 384 — 03.04-02-14	2	3

The schedule for technically correct and complete INTERIM and FINAL responses to the remaining 9 questions is unchanged and provided below:

Question #	Interim Response Date	Response Date
RAI 384 — 03.03.02-05	N/A	July 29, 2010
RAI 384 — 03.04.02-13	July 29, 2010	January 17, 2011
RAI 384 — 03.04.02-14	N/A	August 12, 2010
RAI 384 — 03.08.04-11	N/A	August 30, 2010
RAI 384 — 03.08.04-12	N/A	August 30, 2010
RAI 384 — 03.08.04-13	N/A	August 30, 2010
RAI 384 — 03.08.04-14	N/A	August 30, 2010
RAI 384 — 03.09.02-68	N/A	August 30, 2010
RAI 384 — 03.10-31	N/A	September 7, 2010

Sincerely,

Martin (Marty) C. Bryan
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MESSAGE	1884	7/14/2010 3:46:00 PM	
RAI 384 Question 03.04.02-14 Response US EPR DC - DRAFT.pdf			682657

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Response to

Request for Additional Information No. 384 (4350, 4351, 4469, 4498, 4527), Revision 0, Question 03.04.02-14 - DRAFT

5/20/10

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 03.03.02 - Tornado Loads
SRP Section: 03.04.02 - Analysis Procedures
SRP Section: 03.08.04 - Other Seismic Category I Structures
SRP Section: 03.09.02 - Dynamic Testing and Analysis of Systems Structures and Components
SRP Section: 03.10 - Seismic and Dynamic Qualification of Mechanical and Electrical Equipment

Application Section: FSAR Chapter 3

QUESTIONS for Structural Engineering Branch 2 (ESBWR/ABWR Projects) (SEB2)
QUESTIONS for Engineering Mechanics Branch 2 (ESBWR/ABWR Projects) (EMB2)

Question 03.04.02-14:

Follow-up to RAI 248, Question 03.04.02-12

In its response 03.04.02-2, the applicant states that a flexible elastomeric seal bridges the separation gap between the Access Building and the Tendon Gallery. The seal allows differential movement between the structures while providing protection against water ingress. The design of the Access Building is the responsibility of the COL applicant. However, there is no combined license information item which requires the applicant to design the elastomeric seal to allow differential movement between the tendon gallery and the Access Building. The applicant is requested to add such an item to U.S. EPR FSAR Table 1.8-2. In addition, design of the seal must also account for hydrostatic and lateral earth pressure loads. The applicant should describe how these loads will be accommodated by the flexible elastomeric seal and provide the design load combinations that govern the seal's design.

According to the response to RAI 248, Question 03.07.02-56(h) the Access Building will be designed using conventional seismic codes and standards. As such, the building may be damaged, undergo collapse or a partial collapse during an SSE event. The applicant should describe:

a. How the seismic displacement of the Access Building and the differential settlement with the Tendon Gallery will be determined;

b. The effect of damage, partial collapse, or collapse of the Access Building during an SSE event on maintaining the water tight seal between it and the Tendon Gallery; and

c. The impact of water ingress into the tendon gallery if a water tight seal is not maintained during or after a seismic event.

Response to Question 03.04.02-14:

A new COL item will be added to U.S. EPR FSAR Tier 2, Table 1.8-2 and described in Section 3.4.2 to indicate that a COL applicant that references the U.S. EPR design certification will design the elastomeric seal. This item indicates that the design of the elastomeric seal accounts for hydrostatic and lateral earth pressure loads and other applicable loads.

As stated in the Response to RAI 370, Supplement 3 DRAFT, Question 03.07.02-65, AREVA NP will design Seismic Category II structures, including the Access Building (AB), using codes and standards associated with Seismic Category I structures. As a result, the AB will sustain a full safe shutdown earthquake (SSE) seismic event without collapse or partial collapse. Additional description is as follows:

a) The U.S. EPR FSAR Tier 2, Table 1.8-2, Item 3.4-7 revisions submitted with the Response to RAI 370, Supplement 3 DRAFT, Question 03.07.02-65 states that a COL applicant that references the U.S. EPR design certification will demonstrate that the gap between the AB and adjacent Category I structures (in this case, the tendon gallery) is sufficient to prevent interaction. The COL applicant will determine the displacement of the AB and the differential settlement with respect to the tendon gallery when performing this interaction analysis.

b) As stated in the second paragraph of this response, the AB will not be damaged or undergo collapse or partial collapse during the postulated SSE event.

c) If damage to the water tight seal is incurred, water ingress to the tendon gallery may occur. A licensee would respond to this occurrence in accordance with the licensee's maintenance program. Reactor Containment Building (RCB) tendons are grouted and their ends capped, which provides protection from corrosion in the event of water ingress to the tendon gallery. The tendon gallery contains no additional safety-related structures, systems, and components (SSC) to be affected by water ingress.

FSAR Impact:

U.S. EPR FSAR Tier 2, Table 1.8-2 and Section 3.4.2 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

Table 1.8-2—U.S. EPR Combined License Information Items
Sheet 12 of 54

Item No.	Description	Section	~~Action Required by COL Applicant~~	~~Action Required by COL Holder~~
3.4-3	A COL applicant that references the U.S. EPR design certification will define the need for a site-specific permanent dewatering system.	3.4.3.11	~~Y~~	
3.4-4	A COL applicant that references the U.S. EPR design certification will perform internal flooding analyses prior to fuel load for the Safeguard Buildings and Fuel Building to demonstrate that the impact of internal flooding is contained within the Safeguard Building or Fuel Building division of origin.	3.4.1		~~Y~~
3.4-5	A COL applicant that references the U.S. EPR design certification will perform an internal flooding analysis prior to fuel load for the Reactor Building and Reactor Building Annulus to demonstrate that the essential equipment required for safe shutdown is located above the internal flood level~~ or is designed to withstand flooding~~.	3.4.1		~~Y~~
3.4-6	A COL applicant that references the U.S. EPR design certification will include in its maintenance program appropriate watertight door preventive maintenance in accordance with manufacturer recommendations so that each Safeguards Building watertight door above elevation +0 feet remains capable of performing its intended function.	3.4.1		
3.4-7	A COL applicant that references the U.S. EPR design certification will design the watertight seal between the Access Building and the adjacent Category I access path to the Reactor Building Tendon Gallery. Watertight seal design will account for hydrostatic loads, lateral earth pressure loads, and other applicable loads.	3.4.2		

03.04.02-14

Category I structures, provide protection from external floods and groundwater by incorporating the following external flood protection measures:

- The PMF elevation of the U.S. EPR generic design is one foot below finished yard grade (as noted in Section 2.4).
- The maximum groundwater elevation for the U.S. EPR generic design is 3.3 ft below finished yard grade (as noted in Section 2.4).
- The finished yard grade slopes away from Seismic Category I structures so that external flood water flows away from these structures.
- No access openings or tunnels penetrate the exterior walls of the ~~n~~Nuclear ~~i~~Island or any other Seismic Category I structures below grade.
- Portions of Seismic Category I structures located below grade elevation incorporate the use of waterstops and waterproofing to mitigate environmental deterioration of exposed surfaces and thereby minimize long term maintenance. ~~are protected from external flooding by waterstops and waterproofing. Below grade exterior construction joints have waterstops to prevent in-leakage.~~
- Exterior wall or floor penetrations of Seismic Category I structures below grade have watertight seals.
- The roofs of Seismic Category I structures prevent the undesirable buildup of standing water in conformance with RG 1.102. The roofs of the structures do not have parapets that could collect water.
- The maximum rainfall rate for roof design is 19.4 inches per hour and the maximum static roof load because of snow and ice is 100 pounds per square foot.
- Seismic Category I structures can withstand hydrostatic loads resulting from groundwater pressure and external flooding.

03.04.02-14

A COL applicant that references the U.S. EPR design certification will design the watertight seal between the Access Building and the adjacent Category I access path to the Reactor Building Tendon Gallery. Watertight seal design will account for hydrostatic loads, lateral earth pressure loads, and other applicable loads.

The reinforced concrete Seismic Category I structures, together with the waterproofing and sealing features described above, provide hardened protection from the effects of external flooding for safety-related SSC as defined in RG 1.59. Additionally, the external flood protection measures described above protect against flooding from postulated failures of onsite storage tanks. Further information on the potential causes of external flooding from natural phenomena is provided in Sections 2.4.1 through 2.4.14.