ArevaEPRDCPEm Resource

From: BRYAN Martin (EXT) [Martin.Bryan.ext@areva.com]
Sent: Friday, March 12, 2010 4:33 PM
To: Tesfaye, Getachew
Cc: DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); LENTZ Tony F (EXT)
Subject: Response to U.S. EPR Design Certification Application RAI No. 324, FSAR Ch 14, Supplement 1
Attachments: RAI 324 Supplement 1 Response US EPR DC - PUBLIC.pdf

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 324 on November 25, 2009. The attached file, "RAI 324 Supplement 1 Response US EPR DC.pdf," provides technically correct and complete responses to the 1 question, as committed.

Because the response file contains security-related sensitive information that should be withheld from public disclosure in accordance with 10 CFR 2.390, a public version is provided with the security-related sensitive information redacted. This email does not contain any security-related information. The unredacted SUNSI version is provided under separate email.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 324 Question 14.03.02-43.

The following table indicates the respective pages in the response document, "RAI 324 Supplement 1 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 324 — 14.03.02-43	2	3

This concludes the formal AREVA NP response to RAI 324, and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

Martin (Marty) C. Bryan
Licensing Advisory Engineer
AREVA NP Inc.
Tel: (434) 832-3016
Martin.Bryan@areva.com

From: WELLS Russell D (AREVA NP INC)
Sent: Wednesday, November 25, 2009 11:09 AM
To: 'Getachew Tesfaye'; 'Michael Miernicki'
Cc: Pederson Ronda M (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 324, FSAR Ch 14

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 324 Response US EPR DC.pdf" provides a schedule for the technically correct and complete response to the 1 question.

The following table indicates the respective pages in the response document, "RAI 324 Response US EPR DC.pdf" that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 324 — 14.03.02-43	2	2

A complete answer is not provided for 1 question. The schedule for a technically correct and complete response to this question is provided below.

Question #	Response Date
RAI 324 — 14.03.02-43	March 12, 2010

Sincerely,

(Russ Wells on behalf of)
Ronda Pederson
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Licensing Manager, U.S. EPR Design Certification
New Plants Deployment
AREVA NP, Inc.
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From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Tuesday, November 03, 2009 5:07 PM
To: ZZ-DL-A-USEPR-DL
Cc: Jeng, David; Hawkins, Kimberly; Miernicki, Michael; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 324 (3869), FSARCh. 14

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on October 30, 2009, and on November 2, 2009, you informed us that the RAI is clear and no further clarification is needed. As a result, no change is made to the draft RAI. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,
Getachew Tesfaye
Sr. Project Manager
NRO/DNRL/NARP
(301) 415-3361

Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 1231

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From: BRYAN Martin (EXT)

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MESSAGE	4048	3/12/2010 4:33:35 PM
RAI 324 Supplement 1 Response US EPR DC - PUBLIC.pdf	93265	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
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Response to

Request for Additional Information No. 324, Supplement 1

11/03/2009

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 14.03.02 - Structural and Systems Engineering - Inspections, Tests, Analyses, and Acceptance Criteria
Application Section: FSAR 14.3.2

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

Question 14.03.02-43:

In Question number 14.03.02-37, the staff asked the applicant to revise Tier 1 Tables 2.1.2-3 and 2.1.5-3 to state that the EPGB and ESWB grade level is located between 12 and 18 inches below finish floor elevation at ground surfaces (see items 3.2 and 3.3 respectively). It is not clear from either the design description or from the tables what the safety significance is of these dimensions. The applicant is requested to identify the safety significance of these dimensions and if the dimensions are related to consideration of external flood protection, discuss the significance of the above noted dimensions, and include the assumed PMF elevation in the design descriptions and the ITAAC tables.

Additionally, in its response of 07/14/2009, the applicant stated that the safety significance of the ITAAC items in U.S. EPR FSAR Tier 1, Table 2.1.2-3, Item 3.2 and Table 2.1.5-3, Item 3.3 is that they determine the position of the building structures relative to site grade. This is important because it confirms the portion of the structure that is embedded below grade for soil loads and other dynamic loading effects. The maximum flood level is already addressed in U.S. EPR FSAR Tier 1, Table 5.0-1. The 12 to 18 inches between the site grade and ground finish floor elevation is an architectural design feature to prevent any localized water that has ponded from entering the building.

The staff reviewed this EPR response and determined that the height of the finish floor elevation relative to the site grade is not necessarily an indication of the structure's depth of burial. What needs to be confirmed is not only the height of the finish floor elevation above site grade, but also the height of the finish floor elevation relative to the bottom of the foundation. The applicant should revise Table 2.1.2-3, Item 3.2, and Table 2.1.5-3, Item 3.3 to include this missing information.

Response to Question 14.03.02-43:

U.S. EPR FSAR Tier 1, Table 2.1.1-4, Item 3.7 currently includes key dimensions that can be used to verify the depth of burial for the Nuclear Island common basemat structures. The overall building heights are specified as a key dimension from the top of the basemat to site grade, and another key dimension from site grade to the roof elevation as shown in U.S. EPR FSAR Tier 1, Figures 2.1.1-12, 2.1.1-14, 2.1.1-17, and 2.1.1-19. Additional key dimensions confirm the thickness of the basemat for each building structure. Review of these key dimensions reveals that it is more appropriate to specify the dimensions from the top of the basemat to the finish floor at the +0 ft elevation, and from finish floor to the roof elevation. The affected key dimensions and figures will be revised.

The key dimensions for the height of the Emergency Power Generating Building in U.S. EPR FSAR Tier 1 Table 2.1.2-3, Item 3.6 are not separated into two dimensions because the building is essentially surface-founded. U.S. EPR FSAR Tier 1, Figure 2.1.2-3 will be revised to clarify that the key dimension for the building height is from the finish floor elevation.

U.S. EPR FSAR Tier 1, Table 2.1.5-3 Item 3.7 includes key dimensions that can be used to verify the depth of burial for the Essential Service Water Building (ESWB) structures. The overall building heights are specified as a key dimension from the top of the basemat to site grade, and as a key dimension from site grade to the roof elevation as shown in U.S. EPR FSAR Tier 1, Figure 2.1.5-4. An additional key dimension confirms the thickness of the basemat. Review of these key dimensions reveals that it is more appropriate to specify the

dimensions from the top of the basemat to the +0 ft building elevation, and from the +0 ft building elevation to the roof elevation. Because there is no finish floor at this elevation for the ESWBs, U.S. EPR FSAR Tier 1, Table 2.1.5-3 Item 3.3 will be revised. Site grade for the ESWBs will be confirmed to be at the +0 ft elevation within a reasonable tolerance of +/- 3 inches. This definition of site grade will result in the 22 feet of embedment discussed in the U.S. EPR FSAR Tier 1 Section 2.1.5 certified design material. The affected ITAAC item, key dimensions and figures will be revised.

These key dimensions along with U.S. EPR FSAR Tier 1, Table 2.1.1-4, Item 3.2, Table 2.1.2-3, Item 3.2, and Table 2.1.5-3, Item 3.3, which requires that the as-built site grade elevation relative to building structures must be within 12 to 18 inches of the +0 ft building elevation, establishes the portion of the structure embedded below as-bult site grade that must be accounted for by soil loads and other dynamic loading effects.

FSAR Impact:

U.S. EPR FSAR Tier 1, Section 2.1.5; U.S. EPR FSAR Tier 1, Tables 2.1.1-2, 2.1.5-2, and 2.1.5-3; and U.S. EPR FSAR Tier 1, Figures 2.1.1-12, 2.1.1-14, 2.1.1-17, 2.1.1-19, 2.1.2-3, and 2.1.5-4 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

Table 2.1.1-2—Key Dimensions of Nuclear Island Foundation Footprint

Label	Section Descriptions	Region	Key Dimension	Tolerance
D1	Distance from North edge of SB 2/3 to South edge of FB foundation base slabs.	Refer to Figure 2.1.1-1	344 ft - 10 in.	+/- 12 in.
D2	Distance from West edge of SB 1 to East edge of SB 4 foundation base slabs.	Refer to Figure 2.1.1-1	362 ft - 6 in.	+/- 12 in.
D3	Distance from finish floor at +0 ft elevation~~site grade~~ to FB roof elevation~~s~~.	Refer to Figure 2.1.1-12	111 ft - 7 in.~~112 ft - 6 ½ in.~~	+/- 12 in.(1)
D4	Distance from finish floor at +0 ft elevation~~site grade~~ to top of FB foundation base slab~~elevations~~.	Refer to Figure 2.1.1-12	31 ft - 6 in.~~30 ft - 6 in.~~	
D5	Distance from finish floor at +0 ft elevation~~site grade~~ to SB 1 roof elevation~~s~~.	Refer to Figure 2.1.1-14	96 ft - 2 in.~~97 ft - 1 ½ in.~~	+/- 12 in.(1)
D6	Distance from finish floor at +0 ft elevation~~site grade~~ to top of SB 1 foundation base slab~~elevations~~.	Refer to Figure 2.1.1-14	31 ft - 6 in.~~27 ft - 2 ½ in.~~	
D7	Distance from finish floor at +0 ft elevation~~site grade~~ to SB 2/3 roof elevation~~s~~.	Refer to Figure 2.1.1-17	94 ft - 6 in.~~95 ft - 6 in.~~	+/- 12 in.(1)
D8	Distance from finish floor at +0 ft elevation~~site grade~~ to top of SB 2/3 foundation base slab~~elevations~~.	Refer to Figure 2.1.1-17	31 ft - 6 in.~~27 ft - 2 ½ in.~~	
D9	Distance from finish floor at +0 ft elevation~~site grade~~ to SB 4 roof elevation~~s~~.	Refer to Figure 2.1.1-19	96 ft - 2 in.~~97 ft - 1 ½ in.~~	+/- 12 in.(1)
D10	Distance from finish floor at +0 ft elevation~~site grade~~ to top of SB 4 foundation base slab~~elevations~~.	Refer to Figure 2.1.1-19	31 ft - 6 in.~~27 ft - 2 ½ in.~~	

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Notes:

1. Tolerance specified is for the total dimension from top of foundation to top of roof elevation. The key dimensions individually are permitted to utilize up to the total tolerance specified provided the combined total tolerance for the two key dimensions does not exceed the tolerance specified.

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Figure 2.1.1-12—Fuel Building Elevation Section A-A

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Figure 2.1.1-14—Safeguard Building 1 Elevation Section A-A

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Figure 2.1.1-17—Safeguard Building 2 & 3 Elevation Section B-B

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14.03.02-43

Figure 2.1.1-19—Safeguard Building 4 Elevation Section A-A

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Figure 2.1.2-3—EPGB Elevation ~~Facing North~~Section A-A

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2.1.5 Essential Service Water Building

1.0 Description

Each of the four Essential Service Water Buildings (ESWB) is an independent, safety related, Seismic Category I, reinforced concrete structure. Each ESWB houses an Essential Service Water Cooling Tower structure (ESWCT) and an Essential Service Water Pump Building (ESWPB). The ESWCT houses two cooling towers and a water storage basin. The ESWPB houses pumps and electrical equipment. A total of four ESWBs are located in pairs on each side of the Nuclear Island (NI) complex. The pairs of buildings are separated to protect them from being simultaneously affected by external events such as aircraft hazards and explosion pressure waves. As shown on Figure 2.1.5-1, one pair is located adjacent to the Turbine Building and the other pair is located adjacent to the Fuel Building (FB). Information in tables and figures in this section are for information only with the exception of the specific features listed in the ITAAC for verification.

Each ESWB is embedded 22 feet below grade and is approximately 164 feet by 108 feet wide by 118 feet high (i.e., from the bottom of the basemat to the top of the building at elevation 96 feet, 0 inches). The ESWBs are Seismic Category I structures, which are capable of performing their safety function during and following a safe shutdown earthquake (SSE). The buildings are designed for external hazards including rain and snow, flooding, wind loads, tornado loads, missile impact loads, SSE loads, and site proximity hazards. The buildings are also designed for structure and component dead loads, live loads, pipe reactions, and thermal effects.

The function of the ESWBs is to house equipment and cooling water associated with the Essential Service Water System.

2.0 Arrangement

2.1 The ~~as-installed~~ basic configuration of the four ESWBs is as shown on Figure 2.1.5-1.

3.0 Key Design Features

3.1 Physical separation of the two pairs of ESWBs by the NI complex is as shown on Figure 2.1.5-1.

3.2 The ESWBs have five tornado-generated missile protection shields provided for the safety-related fans and pumps is as shown on Figure 2.1.5-2, Figure 2.1.5-3, Figure 2.1.5-4 and Figure 2.1.5-5.

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3.3 The ESWBs site grade level is located within +/- 3 inches of the building +0 ft elevation.~~between 12 inches and 18 inches below finish floor elevation at ground entrances..~~

3.4 The ~~as-installed~~ basic configuration of the ESWB structures contain an internal hazards separation barrier so that the impact of internal hazards, including fire, flood, high energy line break and missile impact, is contained within the ESWB of hazard origination. Figure 2.1.5-6 identifies the internal hazards separation barrier.

Table 2.1.5-2—Key Dimensions of Essential Service Water Building Foundation Footprint

Label	Section Descriptions	Region	Key Dimension	Tolerance (inches)
D14	Distance from North to South edge of ESWB foundation base slab.	Refer to Figure 2.1.5-1.	164 ft (2)	+/- 12 in.
D15	Distance from East to West edge of ESWB foundation base slab.	Refer to Figure 2.1.5-1.	107 ft – 11 ¼ in. (2)	+/- 12 in.
D16	Distance from +0 ft elevation~~site grade~~ to ESWB roof elevation~~s~~.	Refer to Figure 2.1.5-4.	96 ft	+/- 12 in.(1)
D17	Distance from +0 ft elevation~~site grade~~ to top of ESWB foundation ~~elevations~~base slab.	Refer to Figure 2.1.5-4.	16 ft	

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Notes:

1) Tolerance specified is for the total dimension from top of foundation to top of roof elevation. The key dimensions individually are permitted to utilize up to the total tolerance specified provided the combined total tolerance for the two key dimensions does not exceed the tolerance specified.

2) Key dimension does not include basemat extensions.

Table 2.1.5-3—Essential Service Water Building ITAAC (3 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
2.1	The ~~as-installed~~ basic configuration of the four ESWBs is as shown on Figure 2.1.5-1.	An inspection of the ESWBs will be performed.	The as-built~~as-installed~~ configuration of the ESWBs is that there are four separate ESWBs as shown on Figure 2.1.5-1.
3.1	Physical separation of the two pairs of ESWBs by the NI complex is as shown on Figure 2.1.5-1,.	An inspection of the ESWBs will be performed.	The as-built~~as-installed~~ configuration of the ESWBs is that the two pairs of ESWBs are separated by the NI complex as shown on Figure 2.1.5-1.
3.2	The ESWBs have tornado-generated missile protection shields provided for the safety-related fans and pumps as shown on Figure 2.1.5-2, Figure 2.1.5-3, Figure 2.1.5-4, and Figure 2.1.5-5.	a. An analysis of the tornado-generated missile protection shields in the ESWB structures for the design basis loads will be performed. b. An inspection of the as-installed tornado-generated missile protection shield structures versus final construction drawings will be performed.	a. The ESWBs have tornado-generated missile protection shields provided for the safety-related fans and pumps as shown on Figure 2.1.5-2, Figure 2.1.5-3, Figure 2.1.5-4, and Figure 2.1.5-5. b. The missile protection shields conform to the associated construction drawings.
3.3	The ESWBs site grade level is located within +/- 3 inches of the building +0 ft elevation.~~between 12 inches and 18 inches below finish floor elevation at ground entrances..~~	An inspection of the ESWBs site grade level will be performed.	The as-built~~as-installed~~ ESWB site grade level is located within +/- 3 inches of the building +0 ft elevation.~~between 12 inches and 18 inches below finish floor elevation at ground entrances.~~

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14.03.02-43

Figure 2.1.5-4—ESWB Elevation ~~Facing West~~Section A-A

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