

ArevaEPRDCPEm Resource

From: BRYAN Martin (EXTERNAL AREVA) [Martin.Bryan.ext@areva.com]
Sent: Thursday, July 15, 2010 11:31 AM
To: Tesfaye, Getachew
Cc: DELANO Karen (AREVA); ROMINE Judy (AREVA); BENNETT Kathy (AREVA); VAN NOY Mark (EXTERNAL AREVA); CORNELL Veronica (EXTERNAL AREVA)
Subject: Response to U.S. EPR Design Certification Application RAI No. 248, FSAR Ch 3, Supplement 6
Attachments: RAI 248 Question 03.07.02-51 Response US EPR DC -INTERIM.pdf

Getachew,

AREVA NP Inc. (AREVA NP) provided responses to 2 of the 25 questions of RAI No. 248 on August 14, 2009. AREVA NP submitted Supplement 1 to the response on September 29, 2009, to address 5 of the remaining 23 questions. AREVA NP submitted Supplement 2 to the response on November 18, 2009, to address 8 of the remaining 18 questions. AREVA NP submitted Supplement 3 to the response on December 18, 2009, to address 8 of the remaining 10 questions. AREVA NP submitted Supplement 4 to the response on February 25, 2010, to address 1 of the remaining 2 questions. AREVA NP submitted Supplement 5 to the response on June 24, 2010, to provide a revised schedule for responding to this question based on the June 9, 2010, NRC public meeting with AREVA but this response addressed 0 of the remaining 1 remaining questions. The attached file, "RAI 248 Question 03.07.02-51 Response US EPR DC – INTERIM.pdf" provides technically correct and complete INTERIM response to the remaining 1 question, as committed.

The following table indicates the respective pages in the response document, "RAI 248 Question 03.07.02-51 Response US EPR DC – INTERIM.pdf," that contain AREVA NP's INTERIM response to the subject question.

Question #	Start Page	End Page
RAI 248 — 03.07.02-51	2	2

The schedule for technically correct and complete FINAL response to the remaining 1 question is unchanged and provided below:

Question #	Response Date
RAI 248 — 03.07.02-51	January 20, 2011

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
Tel: (434) 832-3016
702 561-3528 cell
Martin.Bryan.ext@areva.com

From: BRYAN Martin (EXT)
Sent: Thursday, June 24, 2010 12:24 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC);

CORNELL Veronica (EXT); VAN NOY Mark (EXT); RYAN Tom (AREVA NP INC); GARDNER George Darrell (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 248, FSAR Ch 3, Supplement 5

Getachew,

AREVA NP Inc. (AREVA NP) provided responses to 2 of the 25 questions of RAI No. 248 on August 14, 2009. AREVA NP submitted Supplement 1 to the response on September 29, 2009 to address 5 of the remaining 23 questions. AREVA NP submitted Supplement 2 to the response on November 18, 2009 to address 8 of the remaining 18 questions. AREVA NP submitted Supplement 3 to the response on December 18, 2009 to address 8 of the remaining 10 questions. AREVA NP submitted Supplement 4 to the response on February 25, 2010 to address 1 of the remaining 2 questions.

Based upon the civil/structural re-planning activities and revised RAI response schedule presented to the NRC during the June 9, 2010, Public Meeting, and to allow time to interact with the NRC on the responses, the schedule for the remaining question has been changed.

Prior to submittal of the final RAI response, AREVA NP will provide an interim RAI response that includes:

- (1) a description of the technical work (e.g., methodology)
- (2) U.S. EPR FSAR revised pages, as applicable

The revised schedule for an interim response and the technically correct and complete response to these questions is provided below.

Question #	Interim Response Date	Final Response Date
RAI 248 — 03.07.02-51	July 16, 2010	January 20, 2011

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
Tel: (434) 832-3016
702 561-3528 cell
Martin.Bryan.ext@areva.com

From: BRYAN Martin (EXT)
Sent: Thursday, February 25, 2010 5:58 PM
To: 'Tsfaye, Getachew'
Cc: DELANO Karen V (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); ROMINE Judy (AREVA NP INC); VAN NOY Mark (EXT); DUNCAN Leslie E (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 248, FSAR Ch 3, Supplement 4

Getachew,

AREVA NP Inc. (AREVA NP) provided responses to 2 of the 25 questions of RAI No. 248 on August 14, 2009. AREVA NP submitted Supplement 1 to the response on September 29, 2009 to address 5 of the remaining 23 questions. AREVA NP submitted Supplement 2 to the response on November 18, 2009 to address 8 of the remaining 18 questions. AREVA NP submitted Supplement 3 to the response on December 18, 2009 to address 8 of the remaining 10 questions. The attached file, "RAI 248 Supplement 4 Response US EPR DC.pdf" provides technically correct and complete responses to 1 of the remaining 2 questions.

One response, RAI 248 Question 03.07.02-51, has been deferred because supporting analysis work remains in progress. The seismic analysis associated with an embedded finite element model (FEM) that includes detailed modeling of walls and floors is being evaluated for potential cracked concrete effects and is interdependent with other RAI responses.

The following table indicates the respective pages in the response document, "RAI 248 Supplement 4 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 248 — 03.07.02-50	2	2

The schedule for technically correct and complete responses to the remaining 1 question has been changed and is provided below:

Question #	Response Date
RAI 248 — 03.07.02-51	August 13, 2010

Sincerely,

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

From: Pederson Ronda M (AREVA NP INC)
Sent: Friday, December 18, 2009 4:23 PM
To: 'Tefaye, Getachew'
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); VAN NOY Mark (EXT)
Subject: Response to U.S. EPR Design Certification Application RAI No. 248, FSAR Ch 3, Supplement 3

Getachew,

AREVA NP Inc. (AREVA NP) provided responses to 2 of the 25 questions of RAI No. 248 on August 14, 2009. AREVA NP submitted Supplement 1 to the response on September 29, 2009 to address 5 of the remaining 23 questions. AREVA NP submitted Supplement 2 to the response on November 18, 2009 to address 8 of the remaining 18 questions. The attached file, "RAI 248 Supplement 3 Response US EPR DC.pdf" provides technically correct and complete responses to 8 of the remaining 10 questions, as committed. Two responses, RAI 248, Questions 03.07.02-50 and 03.08.01-51, have been deferred because supporting analysis work remains in progress.

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 248 Questions 03.07.01-25, 03.07.02-48 and 03.08.01-36.

The following table indicates the respective pages in the response document, "RAI 248 Supplement 3 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 248 – 03.07.01-25	2	8
RAI 248 – 03.07.02-43	9	24
RAI 248 – 03.07.02-44	25	26
RAI 248 – 03.07.02-46	27	28
RAI 248 – 03.07.02-47	29	30
RAI 248 – 03.07.02-48	31	31
RAI 248 – 03.07.02-54	32	32
RAI 248 – 03.08.01-36	33	34

The schedule for technically correct and complete responses to the remaining 2 questions has been changed and is provided below:

Question #	Response Date
RAI 248 – 03.07.02-50	March 2, 2010
RAI 248 – 03.07.02-51	March 2, 2010

Sincerely,

Ronda Pederson

ronda.pederson@areva.com

Licensing Manager, U.S. EPR Design Certification

AREVA NP Inc.

An AREVA and Siemens company

3315 Old Forest Road

Lynchburg, VA 24506-0935

Phone: 434-832-3694

Cell: 434-841-8788

From: WELLS Russell D (AREVA NP INC)

Sent: Wednesday, November 18, 2009 7:25 PM

To: 'Getachew Tesfaye'

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. 248, FSAR Ch 3, Supplement 2

Getachew,

AREVA NP Inc. (AREVA NP) provided responses to 2 of the 25 questions of RAI No. 248 on August 14, 2009. AREVA NP submitted Supplement 1 to the response on September 29, 2009 to address 5 of the remaining 23 questions. The attached file, "RAI 248 Supplement 2 Response US EPR DC.pdf" provides technically correct and complete responses to 8 of the remaining 18 questions, as committed. Two responses, RAI 248, Questions 03.07.02-44 and 03.08.01-36, have been deferred because supporting analysis work remains in progress.

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 248 Questions 03.04.02-12, 03.07.02-53, 03.07.02-56, and 03.07.02-57.

The following table indicates the respective pages in the response document, "RAI 248 Supplement 2 Response US EPR DC.pdf" that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 03.04.02-12	2	2
RAI 03.07.02-45	3	3
RAI 03.07.02-49	4	4
RAI 03.07.02-52	5	5
RAI 03.07.02-53	6	8
RAI 03.07.02-56	9	12
RAI 03.07.02-57	13	14
RAI 03.08.04-7	15	15

The schedule for technically correct and complete responses to the remaining 10 questions has been changed and provided below:

Question #	Response Date
RAI 03.07.01-25	December 18, 2009
RAI 03.07.02-43	December 18, 2009
RAI 03.07.02-44	January 28, 2010
RAI 03.07.02-46	December 18, 2009
RAI 03.07.02-47	December 18, 2009
RAI 03.07.02-48	December 18, 2009
RAI 03.07.02-50	December 18, 2009
RAI 03.07.02-51	December 18, 2009
RAI 03.07.02-54	December 18, 2009
RAI 03.08.01-36	January 28, 2010

Sincerely,

(Russ Wells on behalf of)

Ronda Pederson

ronda.pederson@areva.com

Licensing Manager, U.S. EPR Design Certification

New Plants Deployment

AREVA NP, Inc.

An AREVA and Siemens company

3315 Old Forest Road

Lynchburg, VA 24506-0935

Phone: 434-832-3694

Cell: 434-841-8788

From: Pederson Ronda M (AREVA NP INC)

Sent: Tuesday, September 29, 2009 7:16 PM

To: 'Tefaye, Getachew'

Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); VAN NOY Mark (EXT)

Subject: Response to U.S. EPR Design Certification Application RAI No. 248, Ch. 3, Supplement 1

Getachew,

AREVA NP Inc. (AREVA NP) provided responses to 2 of the 25 questions of RAI No. 248 on August 14, 2009. The attached file, "RAI 248 Supplement 1 Response US EPR DC.pdf" provides technically correct and complete responses to 5 of the remaining 23 questions. One response, RAI 248, Question 03.08.04-7, has been deferred because a supporting FSAR change remains in progress.

The following table indicates the respective pages in the response document, "RAI 248 Supplement 1 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 03.07.02-58	2	7
RAI 03.08.01-33	8	9
RAI 03.08.01-34	10	15
RAI 03.08.01-35	16	16
RAI 03.08.03-19	17	18

The schedule for technically correct and complete responses to the remaining 18 questions has been changed and is provided below:

Question #	Response Date
RAI 03.04.02-12	November 18, 2009
RAI 03.07.01-25	December 18, 2009
RAI 03.07.02-43	December 18, 2009
RAI 03.07.02-44	November 18, 2009
RAI 03.07.02-45	November 18, 2009
RAI 03.07.02-46	December 18, 2009
RAI 03.07.02-47	December 18, 2009
RAI 03.07.02-48	December 18, 2009
RAI 03.07.02-49	November 18, 2009
RAI 03.07.02-50	December 18, 2009
RAI 03.07.02-51	December 18, 2009
RAI 03.07.02-52	November 18, 2009
RAI 03.07.02-53	November 18, 2009
RAI 03.07.02-54	December 18, 2009
RAI 03.07.02-56	November 18, 2009
RAI 03.07.02-57	November 18, 2009
RAI 03.08.01-36	November 18, 2009
RAI 03.08.04-7	November 18, 2009

Sincerely,

Ronda Pederson

ronda.pederson@areva.com

Licensing Manager, U.S. EPR Design Certification

AREVA NP Inc.

An AREVA and Siemens company

3315 Old Forest Road
Lynchburg, VA 24506-0935
Phone: 434-832-3694
Cell: 434-841-8788

From: Pederson Ronda M (AREVA NP INC)
Sent: Friday, August 14, 2009 5:05 PM
To: 'Tesfaye, Getachew'
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); VAN NOY Mark (EXT)
Subject: Response to U.S. EPR Design Certification Application RAI No. 248, Ch. 3

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 248 Response US EPR DC.pdf" provides technically correct and complete responses to 2 of the 25 questions.

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 248 Question 03.07.02-55.

The following table indicates the respective pages in the response document, "RAI 248 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 03.04.02-12	2	2
RAI 03.07.01-25	3	3
RAI 03.07.02-43	4	4
RAI 03.07.02-44	5	5
RAI 03.07.02-45	6	6
RAI 03.07.02-46	7	7
RAI 03.07.02-47	8	9
RAI 03.07.02-48	10	10
RAI 03.07.02-49	11	11
RAI 03.07.02-50	12	12
RAI 03.07.02-51	13	13
RAI 03.07.02-52	14	14
RAI 03.07.02-53	15	16
RAI 03.07.02-54	17	17
RAI 03.07.02-55	18	20
RAI 03.07.02-56	21	22
RAI 03.07.02-57	23	23
RAI 03.07.02-58	24	24
RAI 03.08.01-32	25	25
RAI 03.08.01-33	26	26
RAI 03.08.01-34	27	27
RAI 03.08.01-35	28	28
RAI 03.08.01-36	29	29
RAI 03.08.03-19	30	30
RAI 03.08.04-7	31	31

A complete answer is not provided for 23 of the 25 questions. The schedule for a technically correct and complete response to these questions is provided below.

Question #	Response Date
RAI 03.04.02-12	November 18, 2009
RAI 03.07.01-25	December 18, 2009
RAI 03.07.02-43	December 18, 2009
RAI 03.07.02-44	November 18, 2009
RAI 03.07.02-45	November 18, 2009
RAI 03.07.02-46	December 18, 2009
RAI 03.07.02-47	December 18, 2009
RAI 03.07.02-48	December 18, 2009
RAI 03.07.02-49	November 18, 2009
RAI 03.07.02-50	December 18, 2009
RAI 03.07.02-51	December 18, 2009
RAI 03.07.02-52	November 18, 2009
RAI 03.07.02-53	November 18, 2009
RAI 03.07.02-54	December 18, 2009
RAI 03.07.02-56	November 18, 2009
RAI 03.07.02-57	November 18, 2009
RAI 03.07.02-58	September 29, 2009
RAI 03.08.01-33	September 29, 2009
RAI 03.08.01-34	September 29, 2009
RAI 03.08.01-35	September 29, 2009
RAI 03.08.01-36	November 18, 2009
RAI 03.08.03-19	September 29, 2009
RAI 03.08.04-7	September 29, 2009

Sincerely,

Ronda Pederson

ronda.pederson@areva.com

Licensing Manager, U.S. EPR Design Certification

AREVA NP Inc.

An AREVA and Siemens company

3315 Old Forest Road

Lynchburg, VA 24506-0935

Phone: 434-832-3694

Cell: 434-841-8788

From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]

Sent: Tuesday, July 14, 2009 7:50 PM

To: ZZ-DL-A-USEPR-DL

Cc: Candra, Hernando; Chakravorty, Manas; Xu, Jim; Patel, Jay; Miernicki, Michael; Colaccino, Joseph; ArevaEPRDCPEm Resource

Subject: U.S. EPR Design Certification Application RAI No. 248(2934,3030,3034,3098,3099,3100), Ch. 3

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on June 18, 2009, and discussed with your staff on July 14, 2009. No changes were made to the draft RAI questions as a result of that discussion. 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: 1702

Mail Envelope Properties (BC417D9255991046A37DD56CF597DB7106DF7492)

Subject: Response to U.S. EPR Design Certification Application RAI No. 248, FSAR Ch 3, Supplement 6
Sent Date: 7/15/2010 11:31:10 AM
Received Date: 7/15/2010 11:31:12 AM
From: BRYAN Martin (EXTERNAL AREVA)
Created By: Martin.Bryan.ext@areva.com

Recipients:

"DELANO Karen (AREVA)" <Karen.Delano@areva.com>
Tracking Status: None
"ROMINE Judy (AREVA)" <Judy.Romine@areva.com>
Tracking Status: None
"BENNETT Kathy (AREVA)" <Kathy.Bennett@areva.com>
Tracking Status: None
"VAN NOY Mark (EXTERNAL AREVA)" <Mark.Vannoy.ext@areva.com>
Tracking Status: None
"CORNELL Veronica (EXTERNAL AREVA)" <Veronica.Cornell.ext@areva.com>
Tracking Status: None
"Tsfaye, Getachew" <Getachew.Tsfaye@nrc.gov>
Tracking Status: None

Post Office: AUSLYNCMX02.adom.ad.corp

Files	Size	Date & Time	
MESSAGE	17287	7/15/2010 11:31:12 AM	
RAI 248 Question 03.07.02-51 Response US EPR DC -INTERIM.pdf			60095

Options

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

Response to

Request for Additional Information No. 248, Supplement 6

7/14/2009

U.S. EPR Standard Design Certification

AREVA NP Inc.

Docket No. 52-020

SRP Section: 03.04.02 - Analysis Procedures

SRP Section: 03.07.01 - Seismic Design Parameters

SRP Section: 03.07.02 - Seismic System Analysis

SRP Section: 03.08.01 - Concrete Containment

**SRP Section: 03.08.03 - Concrete and Steel Internal Structures of Steel or
Concrete Containments**

SRP Section: 03.08.04 - Other Seismic Category I Structures

Application Section: FSAR Ch 3

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

Question 03.07.02-51:**Follow-up to RAI Question 03.07.02-16**

The in-plane stiffness of structural elements along with the modeling of the soil and embedment effects will be the primary determinant of a structure's seismic response. The issue that needs to be addressed is whether the structural response as determined from the seismic model is amplified for walls and floors in the out-of-plane direction due to their flexibility relative to that of the overall structure. The staff agrees that the cutoff frequency of 40 Hz is appropriate as this represents the cutoff frequency of the time histories used for the seismic input of the certified design. The staff does not agree that it is appropriate to use un-cracked section properties of the concrete to determine whether a wall or slab meets this cutoff frequency. It is likely that under the combination of normal operating loads and seismic loads that concrete sections will crack. The use of the assumption of uncracked concrete could eliminate a significant number of walls and slabs from further evaluation, with the result that both their structural design loads and ISRS could potentially be under-predicted. The applicant makes the statement that since normal operating loads for affected slabs and walls do not exceed one-half their ultimate capacity, un-cracked properties are normally used. It isn't clear to the staff what the basis for this statement is, but the normal loads and other appropriate loads need to be combined with the seismic loads to determine whether or not a slab is in a cracked or un-cracked state. To demonstrate what the applicant has done is conservative, it is requested that the following information be provided:

- a. Provide the results of analyses for typical walls and floors to demonstrate that walls and slabs with a fundamental un-cracked frequency in excess of 40 Hz remain un-cracked under the appropriate load combinations which include seismic loads. For each example provide the loads that are used in the calculation and provide the level of concrete stress.
- b. Provide technical justification for the statement that since normal operating loads for affected slabs and walls do not exceed one-half their ultimate capacity, un-cracked properties are normally used. Provide examples that illustrate this conclusion.
- c. Describe using examples how the fundamental frequencies of walls and floors are determined.

In its response, the applicant is requested to include in its sample locations both lower and higher elevations of the NI structures.

Response to Question 03.07.02-51:

An embedded finite element model that includes detailed modeling of the walls and floors is currently being used for soil structure interaction (SSI) analysis. Each wall and floor slab will be analyzed for cracked and uncracked conditions, regardless of stress level or fundamental frequency. SSI analysis results based on the embedded finite element model, including concrete cracking effects, will be provided in the Response to RAI 335, Question 03.08.01-44.

FSAR Impact:

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