ArevaEPRDCPEm Resource

From: WELLS Russell D (AREVA NP INC) [Russell.Wells@areva.com]
Sent: Thursday, October 29, 2009 1:47 PM
To: Tesfaye, Getachew
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. 245, FSAR Ch 3, Supplement 1
Attachments: RAI 245 Supplement 1 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. (AREVA NP) provided responses to 9 of the 22 questions of RAI No. 245 on August 12, 2009. The attached file, "RAI 245 Supplement 1 Response US EPR DC.pdf" provides a technically correct and complete response to 1 of the remaining 13 questions, as committed.

The following table indicates the respective pages in the response document, "RAI 245 Supplement 1 Response US EPR DC.pdf" that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 245 — 03.09.04-2	2	3

The schedule for technically correct and complete responses to the remaining 12 questions is unchanged and provided below:

Question #	Response Date
RAI 245 — 03.09.02-42 (items 1 and 3)	December 3, 2009
RAI 245 — 03.09.02-44	December 3, 2009
RAI 245 — 03.09.02-45	December 3, 2009
RAI 245 — 03.09.02-46	December 3, 2009
RAI 245 — 03.09.02-47	December 3, 2009
RAI 245 — 03.09.02-48	December 3, 2009
RAI 245 — 03.09.02-49	December 3, 2009
RAI 245 — 03.09.02-50	December 3, 2009
RAI 245 — 03.09.02-51	December 3, 2009
RAI 245 — 03.09.02-53	December 3, 2009
RAI 245 — 03.09.02-54	December 3, 2009
RAI 245 — 03.09.02-59	December 3, 2009

Sincerely,

(Russ Wells on behalf of)

Ronda Pederson
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Licensing Manager, U.S. EPR Design Certification
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From: WELLS Russell D (AREVA NP INC)
Sent: Wednesday, August 12, 2009 4:42 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. 245, FSAR Ch 3

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 245 Response US EPR DC.pdf" provides a technically correct and complete response to 9 of the 22 questions.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which supports the response to RAI 245 Question 03.09.02-40.

The following table indicates the respective pages in the response document, "RAI 245 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 245 — 03.09.02-40	2	3
RAI 245 — 03.09.02-41	4	4
RAI 245 — 03.09.02-42	5	6
RAI 245 — 03.09.02-43	7	11
RAI 245 — 03.09.02-44	12	12
RAI 245 — 03.09.02-45	13	14
RAI 245 — 03.09.02-46	15	15
RAI 245 — 03.09.02-47	16	16
RAI 245 — 03.09.02-48	17	18
RAI 245 — 03.09.02-49	19	19
RAI 245 — 03.09.02-50	20	20
RAI 245 — 03.09.02-51	21	21
RAI 245 — 03.09.02-52	22	22
RAI 245 — 03.09.02-53	23	23
RAI 245 — 03.09.02-54	24	24
RAI 245 — 03.09.02-55	25	25
RAI 245 — 03.09.02-56	26	26
RAI 245 — 03.09.02-57	27	27
RAI 245 — 03.09.02-58	28	28
RAI 245 — 03.09.02-59	29	29
RAI 245 — 03.09.02-60	30	30
RAI 245 — 03.09.04-2	31	31

A complete answer is not provided for 13 of the 22 questions. The schedule for a technically correct and complete response to these questions is provided below.

Question #	Response Date
RAI 245 — 03.09.02-42 (items 1 and 3)	December 3, 2009
RAI 245 — 03.09.02-44	December 3, 2009
RAI 245 — 03.09.02-45	December 3, 2009

RAI 245 — 03.09.02-46	December 3, 2009
RAI 245 — 03.09.02-47	December 3, 2009
RAI 245 — 03.09.02-48	December 3, 2009
RAI 245 — 03.09.02-49	December 3, 2009
RAI 245 — 03.09.02-50	December 3, 2009
RAI 245 — 03.09.02-51	December 3, 2009
RAI 245 — 03.09.02-53	December 3, 2009
RAI 245 — 03.09.02-54	December 3, 2009
RAI 245 — 03.09.02-59	December 3, 2009
RAI 245 — 03.09.04-2	November 13, 2009

Sincerely,

(Russ Wells on behalf of)

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From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Friday, July 10, 2009 7:36 PM
To: ZZ-DL-A-USEPR-DL
Cc: Spicher, Terri; Dixon-Herrity, Jennifer; Patel, Jay; Miernicki, Michael; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 245 (2981, 3036),FSAR Ch. 3

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on June 5, 2009, and discussed with your staff on June 25, 2009. Draft RAI Questions 03.09.02 -53 was modified as a result of that discussion. In addition, the staff has modified Question 03.09.02-49 (shown with yellow highlight) to ensure clarity. 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: 920

Mail Envelope Properties (1F1CC1BBDC66B842A46CAC03D6B1CD4102226E27)

Subject: Response to U.S. EPR Design Certification Application RAI No. 245, FSAR Ch 3, Supplement 1
Sent Date: 10/29/2009 1:46:30 PM
Received Date: 10/29/2009 1:47:15 PM
From: WELLS Russell D (AREVA NP INC)

Created By: Russell.Wells@areva.com

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Tracking Status: None
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Tracking Status: None

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Files	**Size**	**Date & Time**
MESSAGE	5848	10/29/2009 1:47:15 PM
RAI 245 Supplement 1 Response US EPR DC.pdf	63079	

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

Response to

Request for Additional Information No. 245 (2981, 3036), Supplement 1, Revision 0

7/10/2009

U.S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 03.09.02 - Dynamic Testing and Analysis of Systems Structures and Components
SRP Section: 03.09.04 - Control Rod Drive Systems
Application Section: 3.9

QUESTIONS for Engineering Mechanics Branch 1 (AP1000/EPR Projects) (EMB1)

Question 03.09.04-2:

Follow-up to RAI Question 03.09.04-1a

In **RAI 03.09.04-1a**, the staff requested the applicant to provide a reference that documents CRDM qualification to operate in the RPV environment for 60 years. The applicant in their response indicated that the Primary Stress Analysis will provide justification for the 60 year design life. The NRC staff finds this response acceptable. The applicant went on to explain that endurance testing was based on nine million steps. The NRC staff requests the applicant to provide the basis for enveloping the number of cycles or steps for the 60 year design life.

Response to Question 03.09.04-2:

To evaluate the number of steps over the 60-year design life of the plant, three parameters were defined: transients to be analyzed, control rod drive mechanism (CRDM) steps for a given transient, and number of occurrences of the transient over the 60-year life of the plant. Each of these parameters is described below:

Transients Analyzed

U.S. EPR FSAR Tier 2, Section 3.9.1.1 describes the design transients that were used in the analysis of the reactor coolant pressure boundary (RCPB). The conditions and number of cycles represented in these transients are selected to maximize stress and fatigue on the RCPB so that the analysis conservatively bounds the normal operation of the plant over a 60 year life. Only normal and upset transients were considered and evaluated for applicability to the CRDM stepping analysis. Emergency transients were not considered due to the low frequency of occurrence (generally one occurrence per transient) and because these transients do not involve stepping of the CRDMs. Faulted transients are not anticipated operational occurrences and were therefore neglected. The consideration of a normal or upset transient is based on whether the transient involved a change in core power resulting from rod cluster control assembly (RCCA) movement (120 rod drop tests were considered). The CRDM stepping analysis did not consider the transients in U.S. EPR FSAR Tier 2, Section 3.9.1.1 for load following. Because nuclear power plant operation in the U.S. is currently not used as in Europe for grid stability or load regulation, the load regulation transients in U.S. EPR FSAR Tier 2, Section 3.9.1.1.1.3 (see the changes to the U.S. EPR FSAR associated with the Response to RAI 179, Question 03.09.01-1, Accession Number ML091350077) were not considered for the evaluation. Other transients that were redundant for changes in core power were not modeled if proven that the transient condition (i.e., the change in core power) and the frequency of occurrence were bounded by other transients that were considered.

CRDM Steps for a Given Transient

For each relevant transient defined in U.S. EPR FSAR Tier 2, Section 3.9.1.1, there is a change in core power. For example, Normal Transient 10 involves a partial trip (i.e., step decrease in turbine load from full power to 25 percent power). Because the lead control bank moves more than any other group of RCCAs, only the lead control bank (the D-bank) was considered in the evaluation. In order to conservatively estimate the number of CRDM steps for the lead control bank for this power change, the lead control bank was considered to move per the power dependent insertion limits (PDIL) defined in U.S. EPR FSAR Tier 2, Section 4.3.2.1 for control bank D. Further conservatism was added by modeling control rod movement from 411 steps

withdrawn, instead of 321 steps withdrawn, for the PDIL as shown in U.S. EPR FSAR Tier 2, Figure 4.3-2. For example, a change in power from 100 percent to 0 percent results in control bank D moving 411 steps instead of 321 steps, thereby maximizing the number of CRDM steps for a given change in power. Reactor trips were counted as one step. Partial trips were modeled by stepping the RCCAs into the core instead of dropping them into the core in order to maximize the number of steps.

Number of Occurrences of the Transient Over the 60-year Life of the Plant

The number of occurrences for the transients defined in U.S. EPR FSAR Tier 2, Section 3.9.1.1 are provided in U.S. EPR FSAR Tier 2, Table 3.9.1-1. These values were used in the base load CRDM stepping evaluation. For base load the CRDM steps expected during 60 year plant life is approximately 750,000 steps. Therefore, the steps performed during the endurance test (i.e., nine million) bound the conditions expected for the U.S. EPR CRDMs during a 60 year life.

FSAR Impact:

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