ArevaEPRDCPEm Resource

From: WELLS Russell D (AREVA NP INC) [Russell.Wells@areva.com]
Sent: Monday, September 21, 2009 4:42 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. 270, FSAR Ch 4
Attachments: RAI 270 Response US EPR DC.pdf

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 270 Response US EPR DC.pdf," provides technically correct and complete responses to all 4 questions.

The following table indicates the respective pages in the response document, "RAI 270 Response US EPR DC.pdf," that contains AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 270 — 04.03-23	2	2
RAI 270 — 04.03-24	3	3
RAI 270 — 04.03-25	4	4
RAI 270 — 04.03-26	5	5

This concludes the formal AREVA NP response to RAI 270, and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

(Russ Wells on behalf of)

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From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Friday, August 21, 2009 2:05 PM
To: ZZ-DL-A-USEPR-DL
Cc: Forsaty, Fred; Lu, Shanlai; Donoghue, Joseph; Carneal, Jason; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 270 (3430), FSARCh. 4

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on August 6, 2009, and on August 20, 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: 828

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Subject: Response to U.S. EPR Design Certification Application RAI No. 270, FSAR Ch 4
Sent Date: 9/21/2009 4:41:59 PM
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From: WELLS Russell D (AREVA NP INC)

Created By: Russell.Wells@areva.com

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MESSAGE	2258	9/21/2009 4:42:04 PM
RAI 270 Response US EPR DC.pdf	86925	

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

Response to

Request for Additional Information No. 270 (3430), Revision 0

8/21/2009

U.S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 04.03 - Nuclear Design
Application Section: 04.03

QUESTIONS for Reactor System, Nuclear Performance and Code Review (SRSB)

Question 04.03-23:

The application of the BAW-2241P-A methodology assumes the existence of a data base for its benchmarking on each reactor type. Explain how BAW-2241P-A accounts for the heavy reflector with azimuthaly variable thickness.

Response to Question 04.03-23:

AREVA NP Topical Report BAW-2241P-A, “Fluence and Uncertainty Methodologies” includes two detailed benchmark experiments that support uncertainties in the fluence methodology: the Davis Besse benchmark and the pool critical assembly (PCA) test reactor benchmark. Acceptable calculation-to-measurement uncertainties were obtained in both the cavity dosimetry holders, which are located outside the reactor pressure vessel (RPV), and capsule dosimetry holders, which are the located inside the RPV. The Davis Besse benchmark had azimuthally variable thickness throughout the former region, and the PCA benchmarks had variable thickness in the water and steel regions during the various experiments. Thus, the AREVA NP methodology has been verified for various thicknesses of water and steel. Because the U.S. EPR internal components are composed of similar materials as Davis Besse and PCA (i.e., water and steel), the database of benchmarks in BAW-2241P-A applies to the U.S. EPR. To account for unforeseen effects of the heavy reflector in the analytical model, a database of U.S. EPR benchmarks will be generated per the schedule provided in U.S. EPR FSAR Tier 2, Table 5.3-6. This updated benchmark database will be developed when there is a lead factor of 10 or more in the embrittlement – fluence margin. When these data become available, the database in BAW-2241P-A will be updated to include U.S. EPR results. The material surveillance program complies with the requirements of 10 CFR Part 50, Appendix H as described in U.S. EPR FSAR Tier 2, Section 5.3.1.6.

FSAR Impact:

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

Question 04.03-24:

Explain, how RG 1.190 has been accounted for in regards to benchmarking of the available database for each reactor type. Explain why the existing benchmark is considered adequate for the U.S. EPR design.

Response to Question 04.03-24:

There are 154 benchmarks included in BAW-2241P-A. These benchmarks include cavity dosimetry and capsule dosimetry for Westinghouse, CE, GE, and B&W reactors, as well as the PCA test reactor. The neutron physics and material compositions in the U.S. EPR are not significantly different from these benchmarks. The analytical model supporting the calculation uncertainty required no changes to support the U.S. EPR. Thus, the existing benchmarks are adequate for the U.S. EPR design. To account for unforeseen effects of the heavy reflector in the analytical model, a database of U.S. EPR benchmarks will be generated per the schedule provided in U.S. EPR FSAR Tier 2, Table 5.3-6. The material surveillance program complies with the requirements of 10 CFR Part 50, Appendix H as described in U.S. EPR FSAR Tier 2, Section 5.3.1.6.

U.S. EPR FSAR Tier 2, Section 5.3 states that when material samples are tested in the U.S. EPR environment, dosimetry data will also be benchmarked. The initial dosimetry data for the updated benchmark database will have a lead factor of 10 or more to the embrittlement – fluence limits. When these data become available, the database in BAW-2241P-A will be updated to include U.S. EPR results. This allows RG 1.190 methodology and uncertainty requirements to be appropriately accounted for when monitoring the U.S. EPR vessel fluence.

FSAR Impact:

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

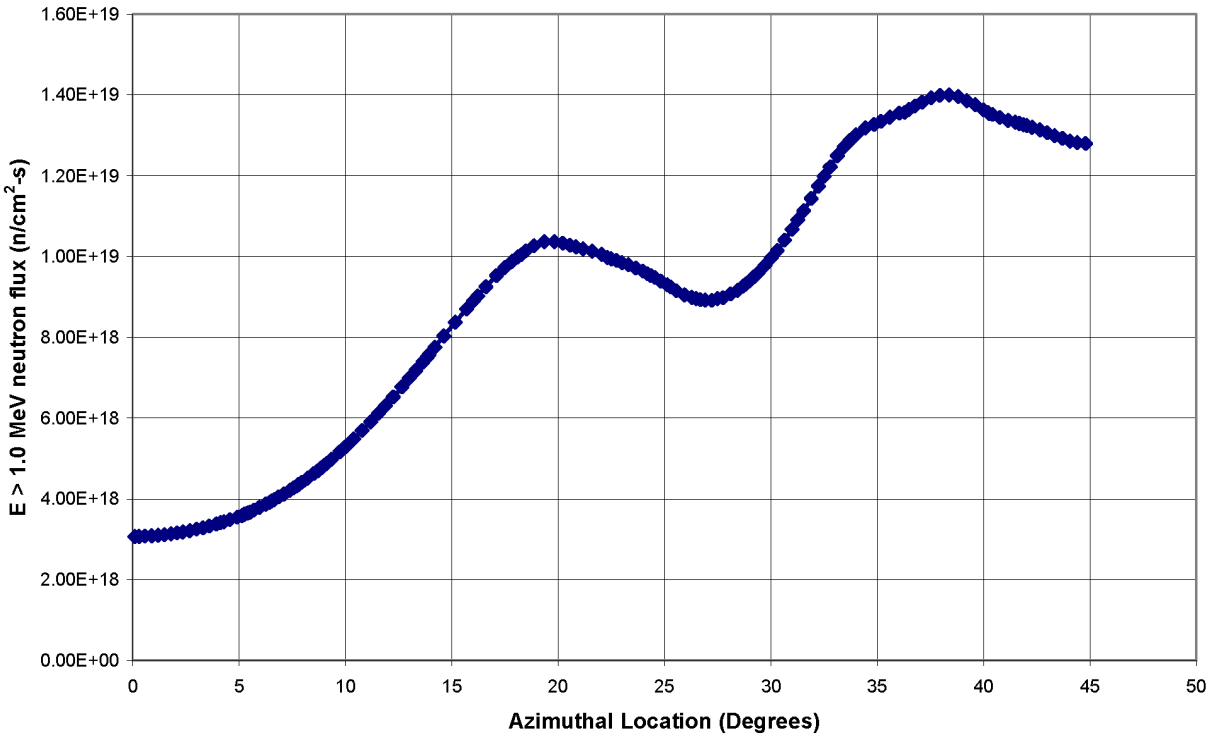
Question 04.03-25:

Provide a 90 degree wetted ID at end of life (EOL) azimuthal fluence distribution, at the level of circumferential weld #2, that includes the effect of the heavy metal reflector.

Response to Question 04.03-25:

Figure 04.03-25-1 shows the 45° wetted ID at end of life azimuthal fluence profile at Weld #2. The profile is representative of 1/8 core symmetry.

Figure 04.03-25-1—Azimuthal Fluence Profile at Weld #2



FSAR Impact:

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

Question 04.03-26:

Table 5.3-4 indicates that the maximum inside surface peak fluence at EOL is 2.1×10^{17} n/cm^2 and it occurs at circumferential weld #1. NRC staff conclude that the EOL fluence value in all nozzles is less than 1.0×10^{17} n/cm^2. Verify that this conclusion is correct. If this conclusion is incorrect, provide an explanation of the discrepancy.

Response to Question 04.03-26:

This conclusion is correct. The attenuation in the fluence between Weld #1 and the nozzles enable the fluence of $2.1 \mathrm{X} 10^{17}$ n/cm^2 to reduce to values less than $1.0 \mathrm{X} 10^{17}$ n/cm^2 in 60 effective full power years. Thus, the EOL fluence in each nozzle is less than 1.0×10^{17} n/cm^2.

FSAR Impact:

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