ArevaEPRDCPEm Resource

From: Pederson Ronda M (AREVA NP INC) [Ronda.Pederson@areva.com]
Sent: Friday, May 15, 2009 6:02 PM
To: Getachew Tesfaye
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); NOXON David B (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 197, FSAR Ch 19, Supplement 1
Attachments: RAI 197 Supplement 1 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. provided responses to 9 of the 10 questions of RAI No. 197 on April 10, 2009. The attached file, "RAI 197 Supplement 1 Response US EPR DC.pdf" provides a technically correct and complete response to the one remaining question, as committed.

The following table indicates the pages in the response document, "RAI 197 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 197 — 19-275	2	4

This concludes the formal AREVA NP response to RAI 197, and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

Ronda Pederson
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Licensing Manager, U.S. EPR Design Certification
AREVA NP Inc.
An AREVA and Siemens company
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From: WELLS Russell D (AREVA NP INC)
Sent: Friday, April 10, 2009 5:36 PM
To: 'Getachew Tesfaye'
Cc: Pederson Ronda M (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); DUNCAN Leslie E (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 197, FSAR Ch 19

Getachew,

The proprietary and non-proprietary versions of the response to RAI No. 197 are submitted via AREVA NP Inc. letter, "Response to U.S. EPR Design Certification Application RAI No. 197" NRC 09:039, dated April 10, 2009. The enclosure to that letter provides technically correct and complete responses to 9 of the 10

questions in RAI No. 197. An affidavit to support withholding of information from public disclosure, per 10CFR2.390(b), is provided as an enclosure to that letter.

The following table indicates the respective pages in the response document, "RAI 197 Response US EPR DC.pdf" that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 197 — 19-274	2	4
RAI 197 — 19-275	5	5
RAI 197 — 19-276	6	6
RAI 197 — 19-277	7	10
RAI 197 — 19-278	11	13
RAI 197 — 19-279	14	15
RAI 197 — 19-280	16	18
RAI 197 — 19-281	19	19
RAI 197 — 19-282	20	20
RAI 197 — 19-283	21	21

The schedule for the technically correct and complete response to the remaining question in RAI No. 197 is provided below:

Question #	Response Date
RAI 197 — 19-275	May 15, 2009

Sincerely,

(Russ Wells on behalf of)

Ronda Pederson
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From: Getachew Tesfaye [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Wednesday, March 11, 2009 6:56 PM
To: ZZ-DL-A-USEPR-DL
Cc: Theresa Clark; Hanh Phan; Edward Fuller; Lynn Mrowca; John Rycyna; Joseph Colaccino; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 197 (2202), FSARCh. 19

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on February 27, 2009, and discussed with your staff on March 11, 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: 487

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Subject: Response to U.S. EPR Design Certification Application RAI No. 197, FSAR Ch 19, Supplement 1
Sent Date: 5/15/2009 6:01:50 PM
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From: Pederson Ronda M (AREVA NP INC)

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Options
Priority: Standard
Return Notification: No
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Recipients Received:

Response to

Request for Additional Information No. 197 (2202), Supplement 1, Revision 0

05/15/2009

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 19 - Probabilistic Risk Assessment and Severe Accident Evaluation
Application Section: 19

QUESTIONS for PRA Licensing, Operations Support and Maintenance Branch 1
(AP1000/EPR Projects) (SPLA)

Question 19-275:

(Follow-up to Question 19-158) The new FSAR Section 19.1.6.3.1.4 provided with the response to Question 19-158 states that "the ability to close the hatch is credited" and that "the habitability of the containment (i.e., local temperature no higher than 122°F) is considered to be the most limiting criterion in determining the time available to close the hatch." This assumption is inconsistent with the outage guidelines in NUMARC 91-06, guideline 4.1.1(3), and item 15 in FSAR Table 19.1-8, which state that containment should be closed prior to steaming. The staff requests additional information to clarify the containment closure assumptions.

a. In FSAR Section 19.1.6.3.1.4, document the time to core boiling for plant operating state (POS) CA and CB (based on the outage schedule assumed in the shutdown PRA).

b. Revise and document in the FSAR the probabilities of the operator failing to close containment based on the time available for closure prior to steaming inside containment.

Response to Question 19-275:

a. Table 19-275-1 summarizes the times to core boiling and times to fuel uncovery (shown as time to active fuel (TAF) in the table) for POS CAd and CBd. CAd and CBd were selected because they have higher decay heat than CAu and CBu. These times were calculated using the reactor coolant system (RCS) conditions assumed in the shutdown probabilistic risk assessment (PRA) as reported in the U.S. EPR FSAR, Tier 2, Table 19.1-87, and using realistic assumptions for:

   - The times after trip for selecting the decay heat
   - The number of available steam generators (SG)
   - The number of reactor coolant pumps (RCP) running.

   Table 19-275-1 shows the times to (core) boiling (TTB) and times to fuel uncovery (TAF) calculated for loss of residual heat removal (RHR) and loss of coolant accident (LOCA) scenarios, using differing assumptions for the above three parameters.

   Note that the decay heat at 24 hours is used in state CA because the hatch opening is only possible for RCS temperatures below 200°F, as defined in U.S. EPR FSAR, Tier 2, Section 19.1.6.3.1.4. Based on the average shutdown duration modeled in the low power shutdown PRA and discussed in the responses to RAI 2 Question 19-19, RAI 14 Question 19-131 and RAI 142 Question 19-267, this temperature is reached approximately 24 hours after the reactor trip.

   The times credited for hatch closure are also summarized in Table 19-275-1. As presented in the U.S. EPR FSAR, Tier 2, Section 19.1.6.3.1.4, these times are calculated based on containment habitability considerations, and accounting for radiological and environmental conditions inside the containment. The most limiting criterion resulting from this habitability analysis is a temperature increase of 18°F (corresponding to a maximum temperature of 122°F).

   Table 19-275-1 shows that:

- For transient sequences, the current times credited to close the hatch are shorter than the times to boil and the times to fuel uncovery in both POS.
- For LOCA sequences, the current times credited to close the hatch are slightly shorter in POS CAd and slightly longer in POS CBd than the times to boil and to fuel uncovery, however the human error probability (HEP) calculation is not sensitive to these small differences.

b. No change to the U.S. EPR FSAR is required, based on the following rationale:

- Based on the comparison with the time to boil (and the time to uncover the core), presented in part a above, the available time used in the hatch closure HEP calculation is conservative for transient sequences and is representative for LOCA sequences. Therefore, no modification of the current human reliability analysis (HRA) for equipment hatch closure is warranted.
- The statement that “the habitability of the containment (i.e., local temperature no higher than 122°F) to be the limiting criterion” in the HRA is not inconsistent with the statement that “the ability to close containment hatches and penetrations during Modes 5 & 6 prior to steaming to containment is important,” as stated in Item 15 in U.S. EPR FSAR, Tier 2, Table 19.1-108. Human action, as credited in the Level 2 PRA, could be performed and credited under more limiting conditions than strictly the onset of steaming. The hatch closing sequence is assumed to require 20 minutes to complete when power is available, and therefore an ability to close containment hatches prior to steaming can be demonstrated.
- The habitability of the containment is suggested as the criterion for performing hatch closure in NUREG-1449. The habitability is based on the ambient temperature and radioactivity level in the containment up to the time of core uncovery. The temperature limit for containment habitability is not explicitly defined, however 160°F is discussed as a temperature above which personnel inside containment would require self-contained breathing apparatuses. Thus, the maximum temperature of 122°F used in the shutdown Level 2 PRA is conservative.

Table 19-275-1—Times to Boil (TTB), Times to Active Fuel (TAF), and Times Credited for Equipment Hatch Closure in POS CAd and CBd

POS	Number of SGs Available	Number of RCPs Running	Time After Plant Trip (hrs)	Event Sequence	TTB (hrs)	TAF (hrs)	Time Credited for Hatch Closure (hrs)
CAd	2	2	24	Loss of RHR	2.1	5.2	2
	0	0		LOCA	0.7	0.9	1
CBd	2	0	44	Loss of RHR	2.6	3.7	2
	0	0		LOCA	1.0	1.2	1

FSAR Impact:

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