ArevaEPRDCPEm Resource

From: BRYAN Martin (EXTERNAL AREVA) [Martin.Bryan.ext@areva.com]
Sent: Tuesday, June 29, 2010 5:11 PM
To: Tesfaye, Getachew
Cc: DELANO Karen (AREVA); ROMINE Judy (AREVA); BENNETT Kathy (AREVA); SLAY Lysa (AREVA); HOLM Jerald (EXTERNAL AREVA)
Subject: Response to U.S. EPR Design Certification Application RAI No. 366, FSARCh. 4 OPEN ITEM, Supplement 3
Attachments: RAI 366 Supplement 3 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 366 Supplement 3 Response US EPR DC.pdf" provides technically correct and complete responses to all of the 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 366 Question 04.06-13.

The following table indicates the respective pages in the response document, "RAI 366 Supplement 3 Response US EPR DC.pdf" that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 366 — 04.06-13	2	2

This concludes the formal AREVA NP response to RAI 366, and there are no questions from this RAI for which AREVA NP has not provided responses.

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: Friday, June 18, 2010 1:59 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); HOLM Jerald S (EXT)
Subject: Response to U.S. EPR Design Certification Application RAI No. 366, FSARCh. 4 OPEN ITEM, Supplement 2

Getachew,

AREVA NP provided a revised schedule for responding to RAI 366 in an email on April 30, 2010. This schedule was intended to allow for further discussion between the NRC and AREVA NP on the final response prior to providing it to the NRC. Further discussions took place on May 27 and June 17, 2010. As agreed with the NRC, a revised date is being provided to finalize the response based on feedback during these discussions.

AREVA NP's schedule for providing a technically correct and complete response to the question in RAI 366 is provided below.

Question #	Response Date
RAI 366 — 04.06-13	July 9, 2010

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: Friday, April 30, 2010 3:32 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); HOLM Jerald S (EXT)
Subject: Response to U.S. EPR Design Certification Application RAI No. 366, FSARCh. 4 OPEN ITEM, Supplement 1

Getachew,

AREVA NP provided a schedule for responding to RAI 366 in an email on March 1, 2010. This schedule was intended to allow for a discussion between the NRC and AREVA NP of the final response prior to providing it to the NRC. A discussion was scheduled to take place on April 29, 2010 on the final response, but had to be rescheduled due to personnel availability. As agreed with the NRC, a revised date is being provided.

AREVA NP's schedule for providing a technically correct and complete response to the question in RAI 366 is provided below.

Question #	Response Date
RAI 366 — 04.06-13	June 18, 2010

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: Monday, March 01, 2010 5:58 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen V (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); ROMINE Judy (AREVA NP INC); HOLM Jerald S (EXT)
Subject: Response to U.S. EPR Design Certification Application RAI No. 366, FSARCh. 4 OPEN ITEM

Getachew,

AREVA NP's schedule for providing a technically correct and complete response to thequestion in RAI 366 is provided below.

Question #	Response Date
RAI 366 — 04.06-13	April 30, 2010

Sincerely,

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

From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Thursday, February 25, 2010 6:12 AM
To: ZZ-DL-A-USEPR-DL
Cc: Budzynski, John; Lu, Shanlai; Donoghue, Joseph; Carneal, Jason; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 366 (4366), FSARCh. 4 OPEN ITEM

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on February 3, 2010, and on February 16, 2010, 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 question in this RAI is an OPEN ITEM in the safety evaluation report for Chapter 4 for Phases 2 and 3 reviews. As such, the schedule we have established for your application assumes technically correct and complete responses prior to the start of Phase 4 review. For any RAI that cannot be answered prior to the start of Phase 4 review, it is expected that a date for receipt of this information will be provided 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: 1626

Mail Envelope Properties (BC417D9255991046A37DD56CF597DB7106B3DFC6)

Subject: Response to U.S. EPR Design Certification Application RAI No. 366, FSARCh. 4 OPEN ITEM, Supplement 3
Sent Date: 6/29/2010 5:10:48 PM
Received Date: 6/29/2010 5:10:51 PM
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>
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Tracking Status: None
"SLAY Lysa (AREVA)" <Lysa.Slay@areva.com>
Tracking Status: None
"HOLM Jerald (EXTERNAL AREVA)" <jerald.holm.ext@areva.com>
Tracking Status: None
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Tracking Status: None

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Files	**Size**	**Date & Time**
MESSAGE	5500	6/29/2010 5:10:51 PM
RAI 366 Supplement 3 Response US EPR DC.pdf	44590	

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

Response to

Request for Additional Information No. 366, Supplement 3

6/21/2010

U.S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 04.06 - Functional Design of Control Rod Drive System
Application Section: 04.06

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

Question 04.06-13:

OPEN ITEM:

FSAR Tier 2, Section 4.6.4 states that in the safety analyses in FSAR Tier 2, Chapter 15, except for the large break loss of coolant accident, no credit is taken for reactivity control systems other than reactor trip to mitigate the events to achieve a stable plant condition. The staff notes that in FSAR Tier 2, Section 15.1.5 appears to indicate that boron addition via the SIS is credited to mitigate large steam line breaks from hot zero power conditions. Please clarify this apparent discrepancy.

Response to Question 04.06-13:

U.S. EPR FSAR Tier 2, Table 15.1-15 indicates that medium head safety injection (MHSI) is actuated for the most limiting main steam line break (MSLB) event. Although boron tracking is activated in the S-RELAP5 analysis of this event, the reactivity contribution of the boron (shown in U.S. EPR FSAR Tier 2, Figure 15.1-54) is not necessary for the event mitigation. U.S. EPR FSAR Tier 2, Table 15.1-15 shows that the peak return to power for the limiting MSLB event occurs at 273.2 seconds with a value of approximately 23 percent of rated power (see U.S. EPR FSAR Tier 2, Figure 15.1-55). Borated MHSI fluid does not begin entering the reactor coolant system (RCS) until after 720 seconds (see U.S. EPR FSAR Tier 2, Table 15.1-15), which is beyond the return to power peak. At this point in the transient, reactor power is approximately three percent of rated power (see U.S. EPR FSAR Tier 2, Figure 15.1-55). The power excursion is caused by moderator reactivity feedback resulting from the reduction incore inlet temperature due to secondary side overcooling. The power excursion is terminated when the affected steam generator dries out (see U.S. EPR FSAR Tier 2, Figure 15.1-49) and significant primary-to-secondary heat transfer ceases (see U.S. EPR FSAR Tier 2, Figure 15.1-48).

Boration resulting from MHSI actuation does not contribute to the mitigation of this event and the statement in U.S. EPR FSAR Tier 2, Section 4.6.4 is accurate. A discussion of the impact of boration on this event will be added to U.S. EPR FSAR Tier 2 Section 15.1.5.3.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 15.1.5.3 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

Equipment Status for Limiting Case presents the status of key plant equipment and systems. Table 15.1-15—MSLB - Sequence of Events presents the sequence of events for the limiting case. Figure 15.1-44—MSLB - Break Flow Rate through Figure 15.1-56—MSLB - Longer-Term Reactor Power present plots of key system variables. Figure 15.1-61—MSLB (small break, pre-scram) - Representative Plot of Normalized Minimum DNBR and Maximum LPD to SAFDL presents a representative case of DNB and LPD normalized to their respective SAFDLs.

The MSLB rapidly reduces pressure in the four SGs generating an SG high pressure drop signal that closes the MSIVs. This closure isolates the three unaffected SGs from the break. As the inventory of the affected SG flashes and is discharged through the break, the RCS cools down, adding positive reactivity. The RCS cooldown is exacerbated once the MSRIVs on the unaffected SGs open, permitting uncontrolled steam release from the unaffected SG, whose MSRCV is assumed to fail in the fully open position. The resultant RCS cooldown and associated reactivity addition causes the reactor to return to critical. As the affected SG approaches dry out, reactor power peaks at approximately 23 percent RTP and begins to decrease. The limiting conditions with respect to SAFDL acceptance criteria occur at the time of peak reactor power.

04.06-13

Following the power peak, reactor power stabilizes at approximately three percent RTP due to the stabilization of the core inlet temperature of the affected core region. Upon the injection of MHSI that results from the RCS depressurization, the core power decreases and again stabilizes at approximately 2.5 percent RTP. The power decrease is the result of the increased boron concentration in the core region from the MHSI flow. RCS pressure begins to recover after the MSRIV of the failed open MSRCV SG closes, halting the additional primary system overcooling. MHSI injection begins decreasing at this point due to the approach to the MHSI shutoff head. The boron injected by the MHSI does not contribute to the mitigation of the event.

The event is terminated when the operator stops EFW delivery to the affected SG and it dries out. The RCS gradually reheats, reactor shutdown margin recovers and the plant enters a stable controlled condition with heat removal via the unaffected SGs.

The analysis results indicate that the fuel cladding strain limits for AOOs are exceeded for this PA, causing a small number of fuel failures. Table 15.1-16—MSLB - Calculated Fuel Parameters provides the calculated fuel parameters for the limiting case.

15.1.5.4 Radiological Consequences

Radiological consequences for the MSLB event are described in Section 15.0.3.7.