ArevaEPRDCPEm Resource

From: WILLIFORD Dennis (AREVA) [Dennis.Williford@areva.com]
Sent: Friday, August 05, 2011 12:24 PM
To: Tesfaye, Getachew
Cc: BENNETT Kathy (AREVA); DELANO Karen (AREVA); ROMINE Judy (AREVA); RYAN Tom (AREVA); KOWALSKI David (AREVA)
Subject: Response to U.S. EPR Design Certification Application RAI No. 337, FSAR Ch. 9, Supplement 17
Attachments: RAI 337 Supplement 17 Response US EPR DC.pdf

Importance: High

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to RAI No. 337 on January 25, 2010. Supplement 1 response to RAI No. 337 was sent on March 1, 2010 to address one of the questions. Supplement 2 response to RAI No. 337 was sent on March 19, 2010 to address seven of the questions. Supplement 3, Supplement 4, Supplement 5, Supplement 6, Supplement 7, Supplement 8, Supplement 9, Supplement 10, Supplement 11, Supplement 12, Supplement 13, Supplement 14, Supplement 15 and Supplement 16 responses to RAI No. 337 were sent on April 23, 2010, May 21, 2010, July 8, 2010, August 17, 2010, September 16, 2010, October 15, 2010, November 17, 2010, December 16, 2010, January 17, 2011, February 18, 2011, March 30, 2011, April 29, 2011, June 8, 2011 and July 7, 2011, respectively, to provide a revised schedule for the remaining question.

The attached file, "RAI 337 Supplement 17 Response US EPR DC.pdf" provides a technically correct and complete final response to the remaining question.

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 337 Question 09.01.04-14.

The following table indicates the respective pages in the response document, "RAI 337 Supplement 17 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 337 — 09.01.04-14	2	9

This concludes the formal AREVA NP response to RAI 337, and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

Dennis Williford, P.E.
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
7207 IBM Drive, Mail Code CLT 2B
Charlotte, NC 28262
Phone: 704-805-2223
Email: Dennis.Williford@areva.com

From: WILLIFORD Dennis (RS/NB)
Sent: Thursday, July 07, 2011 4:12 PM
To: 'Tesfaye, Getachew'

Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); KOWALSKI David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 337, FSAR Ch. 9, Supplement 16
Importance: High

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to RAI No. 337 on January 25, 2010. Supplement 1 response to RAI No. 337 was sent on March 1, 2010 to address one of the questions. Supplement 2 response to RAI No. 337 was sent on March 19, 2010 to address seven of the questions. Supplement 3, Supplement 4, Supplement 5, Supplement 6, Supplement 7, Supplement 8, Supplement 9, Supplement 10, Supplement 11, Supplement 12, Supplement 13, Supplement 14 and Supplement 15 responses to RAI No. 337 were sent on April 23, 2010, May 21, 2010, July 8, 2010, August 17, 2010, September 16, 2010, October 15, 2010, November 17, 2010, December 16, 2010, January 17, 2011, February 18, 2011, March 30, 2011, April 29, 2011 and June 8, 2011, respectively, to provide a revised schedule for the remaining question.

The schedule for a technically correct and complete response to the question has been changed as provided below.

Question #	Response Date
RAI 337 — 09.01.04-14	**August 19, 2011**

Sincerely,

Dennis Williford, P.E.
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
7207 IBM Drive, Mail Code CLT 2B
Charlotte, NC 28262
Phone: 704-805-2223
Email: Dennis.Williford@areva.com

From: WILLIFORD Dennis (RS/NB)
Sent: Wednesday, June 08, 2011 7:44 AM
To: Tesfaye, Getachew
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); KOWALSKI David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 337, FSAR Ch. 9, Supplement 15

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to RAI No. 337 on January 25, 2010. Supplement 1 response to RAI No. 337 was sent on March 1, 2010 to address one of the questions. Supplement 2 response to RAI No. 337 was sent on March 19, 2010 to address seven of the questions. Supplement 3, Supplement 4, Supplement 5, Supplement 6, Supplement 7, Supplement 8, Supplement 9, Supplement 10, Supplement 11, Supplement 12, Supplement 13 and Supplement 14 responses to RAI No. 337 were sent on April 23, 2010, May 21, 2010, July 8, 2010, August 17, 2010, September 16, 2010, October 15, 2010, November 17, 2010, December 16, 2010, January 17, 2011, February 18, 2011, March 30, 2011 and April 29, 2011, respectively, to provide a revised schedule for the remaining question.

The schedule for a technically correct and complete response to the question has been changed and is provided below.

Question #	Response Date

RAI 337 — 09.01.04-14	July 8, 2011

Sincerely,

Dennis Williford, P.E.
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
7207 IBM Drive, Mail Code CLT 2B
Charlotte, NC 28262
Phone: 704-805-2223
Email: Dennis.Williford@areva.com

From: WELLS Russell (RS/NB)
Sent: Friday, April 29, 2011 8:09 AM
To: 'Tesfaye, Getachew'
Cc: KOWALSKI David (RS/NB); BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 337, FSAR Ch. 9, Supplement 14

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to RAI No. 337 on January 25, 2010. Supplement 1 response to RAI No. 337 was sent on March 1, 2010 to address one of the questions. Supplement 2 response to RAI No. 337 was sent on March 19, 2010 to address seven of the questions. Supplement 3, Supplement 4, Supplement 5, Supplement 6, Supplement 7, Supplement 8, Supplement 9, Supplement 10, Supplement 11, Supplement 12 and Supplement 13 responses to RAI No. 337 were sent on April 23, 2010, May 21, 2010, July 8, 2010, August 17, 2010, September 16, 2010, October 15, 2010, November 17, 2010, December 16, 2010, January 17, 2011, February 18, 2011 and March 30, 2011, respectively, to provide a revised schedule for the remaining question.

To provide additional time to interact with the NRC, a revised schedule is provided in this e-mail for the response to Question 09.01.04-14.

The schedule for a technically correct and complete response to the question is provided below.

Question #	Response Date
RAI 337 — 09.01.04-14	June 8, 2011

Sincerely,

Russ Wells
U.S. EPR Design Certification Licensing Manager
AREVA NP, Inc.
3315 Old Forest Road, P.O. Box 10935
Mail Stop OF-57
Lynchburg, VA 24506-0935
Phone: 434-832-3884 (work)
434-942-6375 (cell)
Fax: 434-382-3884
Russell.Wells@Areva.com

From: WELLS Russell (RS/NB)
Sent: Wednesday, March 30, 2011 1:04 PM
To: 'Tesfaye, Getachew'
Cc: KOWALSKI David (RS/NB); BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 337, FSAR Ch. 9, Supplement 13

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to RAI No. 337 on January 25, 2010. Supplement 1 response to RAI No. 337 was sent on March 1, 2010 to address one of the questions. Supplement 2 response to RAI No. 337 was sent on March 19, 2010 to address seven of the questions. Supplement 3, Supplement 4, Supplement 5, Supplement 6, Supplement 7, Supplement 8, Supplement 9, Supplement 10, Supplement 11 and Supplement 12 responses to RAI No. 337 were sent on April 23, 2010, May 21, 2010, July 8, 2010, August 17, 2010, September 16, 2010, October 15, 2010, November 17, 2010, December 16, 2010, January 17, 2011 and February 18, 2011, respectively, to provide a revised schedule for the remaining question.

To provide additional time to interact with the NRC, a revised schedule is provided in this e-mail for the response to Question 09.01.04-14.

The schedule for a technically correct and complete response to the question is provided below.

Question #	Response Date
RAI 337 — 09.01.04-14	April 29, 2011

Sincerely,

Russ Wells
U.S. EPR Design Certification Licensing Manager
AREVA NP, Inc.
3315 Old Forest Road, P.O. Box 10935
Mail Stop OF-57
Lynchburg, VA 24506-0935
Phone: 434-832-3884 (work)
434-942-6375 (cell)
Fax: 434-382-3884
Russell.Wells@Areva.com

From: BRYAN Martin (External RS/NB)
Sent: Friday, February 18, 2011 1:22 PM
To: Tesfaye, Getachew
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); KOWALSKI David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 337, FSAR Ch. 9, Supplement 12

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to RAI No. 337 on January 25, 2010. Supplement 1 response to RAI No. 337 was sent on March 1, 2010 to address one of the questions. Supplement 2 response to RAI No. 337 was sent on March 19, 2010 to address seven of the questions. Supplement 3, Supplement 4, Supplement 5, Supplement 6, Supplement 7, Supplement 8, Supplement 9, Supplement 10 and Supplement 11 responses to RAI No. 337 were sent on April 23, 2010, May 21, 2010, July 8, 2010, August 17, 2010, September 16, 2010, October 15, 2010, November 17, 2010,

December 16, 2010 and January 17, 2011, respectively, to provide a revised schedule for the remaining question.

To provide additional time to interact with the NRC, a revised schedule is provided in this e-mail for the response to Question 09.01.04-14.

The schedule for a technically correct and complete response to the question has been revised as provided below.

Question #	Response Date
RAI 337 — 09.01.04-14	March 31, 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 (External RS/NB)
Sent: Monday, January 17, 2011 3:59 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); KOWALSKI David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 337, FSAR Ch. 9, Supplement 11

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to RAI No. 337 on January 25, 2010. Supplement 1 response to RAI No. 337 was sent on March 1, 2010 to address one of the questions. Supplement 2 response to RAI No. 337 was sent on March 19, 2010 to address seven of the questions. Supplement 3, Supplement 4, Supplement 5, Supplement 6, Supplement 7, Supplement 8, Supplement 9 and Supplement 10 responses to RAI No. 337 were sent on April 23, 2010, May 21, 2010, July 8, 2010, August 17, 2010, September 16, 2010, October 15, 2010, November 17, 2010 and December 16, 2010, respectively, to provide a revised schedule for the remaining question. Please note the date communicated in the December 16, 2010 response was intended to be January 19, 2011.

To provide additional time to interact with the NRC, a revised schedule is provided in this e-mail for the response to Question 09.01.04-14.

The schedule for a technically correct and complete response to the question has been revised as provided below.

Question #	Response Date
RAI 337 — 09.01.04-14	February 18, 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 (External RS/NB)
Sent: Thursday, December 16, 2010 11:09 AM
To: Tesfaye, Getachew
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); KOWALSKI David (RS/NB); 'Miernicki, Michael'
Subject: Response to U.S. EPR Design Certification Application RAI No. 337, FSAR Ch. 9, Supplement 10

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to RAI No. 337 on January 25, 2010. Supplement 1 response to RAI No. 337 was sent on March 1, 2010 to address one of the questions. Supplement 2 response to RAI No. 337 was sent on March 19, 2010 to address seven of the questions. Supplement 3, Supplement 4, Supplement 5, Supplement 6, Supplement 7, Supplement 8 and Supplement 9 responses to RAI No. 337 were sent on April 23, 2010, May 21, 2010, July 8, 2010, August 17, 2010, September 16, 2010, October 15, 2010 and November 17, 2010, respectively, to provide a revised schedule for the remaining question.

To provide additional time to interact with the NRC, a revised schedule is provided in this e-mail for the response to Question 09.01.04-14.

The schedule for a technically correct and complete response to the question has been revised as provided below.

Question #	Response Date
RAI 337 — 09.01.04-14	January 19, 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 (External RS/NB)
Sent: Wednesday, November 17, 2010 10:20 AM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); KOWALSKI David (RS/NB); 'Miernicki, Michael'
Subject: Response to U.S. EPR Design Certification Application RAI No. 337, FSAR Ch. 9, Supplement 9

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to RAI No. 337 on January 25, 2010. Supplement 1 response to RAI No. 337 was sent on March 1, 2010 to address one of the questions. Supplement 2 response to RAI No. 337 was sent on March 19, 2010 to address seven of the

questions. Supplement 3, Supplement 4, Supplement 5, Supplement 6, Supplement 7 and Supplement 8 responses to RAI No. 337 were sent on April 23, 2010, May 21, 2010, July 8, 2010, August 17, 2010, September 16, 2010 and October 15, 2010 respectively, to provide a revised schedule for the remaining question.

Since the remaining response is being processed, a revised schedule is provided in this e-mail.

The schedule for a technically correct and complete response to the question has been revised as provided below.

Question #	Response Date
RAI 337 — 09.01.04-14	December 17, 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 (External RS/NB)
Sent: Friday, October 15, 2010 9:47 AM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); KOWALSKI David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 337, FSAR Ch. 9, Supplement 8

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to RAI No. 337 on January 25, 2010. Supplement 1 response to RAI No. 337 was sent on March 1, 2010 to address one of the questions. Supplement 2 response to RAI No. 337 was sent on March 19, 2010 to address seven of the questions. Supplement 3, Supplement 4, Supplement 5 and Supplement 6 responses to RAI No. 337 were sent on April 23, 2010, May 21, 2010, July 8, 2010 and August 17, 2010, respectively, to provide a revised schedule for the remaining question. Supplement 7 response to RAI No. 337 was sent on September 16, 2010, to revise the schedule to allow time for further interaction between AREVA and the NRC staff.

To allow time for further interaction between AREVA and the NRC staff, a revised schedule is provided in this e-mail.

The schedule for a technically correct and complete response to the remaining question has been revised as provided below.

Question #	Response Date
RAI 337 — 09.01.04-14	November 17, 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 (External RS/NB)
Sent: Thursday, September 16, 2010 2:28 PM
To: 'Getachew.Tesfaye@nrc.gov'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); KOWALSKI David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 337, FSAR Ch. 9, Supplement 7

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to RAI No. 337 on January 25, 2010. Supplement 1 response to RAI No. 337 was sent on March 1, 2010 to address one of the questions. Supplement 2 response to RAI No. 337 was sent on March 19, 2010 to address seven of the questions. Supplement 3, Supplement 4, Supplement 5 and Supplement 6 responses to RAI No. 337 were sent on April 23, 2010, May 21, 2010, July 8, 2010 and August 17, 2010, respectively, to provide a revised schedule for the remaining question.

To provide additional time to interact with the NRC, a revised schedule is provided in this e-mail.

The schedule for a technically correct and complete response to the question has been revised as provided below.

Question #	Response Date
RAI 337 — 09.01.04-14	October 15, 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 (External RS/NB)
Sent: Tuesday, August 17, 2010 9:36 AM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); KOWALSKI David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 337, FSAR Ch. 9, Supplement 6

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to RAI No. 337 on January 25, 2010. Supplement 1 response to RAI No. 337 was sent on March 1, 2010 to address one of the questions. Supplement 2 response to RAI No. 337 was sent on March 19, 2010 to address seven of the

questions. Supplement 3, Supplement 4 and Supplement 5 responses to RAI No. 337 were sent on April 23, 2010, May 21, 2010 and July 8, 2010, to provide a revised schedule for the remaining question.

To allow time for interaction between AREVA and the NRC staff, a revised schedule is provided in this e-mail.

The schedule for a technically correct and complete response to the remaining question has been revised and is provided below:

Question #	Response Date
RAI 337 — 09.01.04-14	September 16, 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: Thursday, July 08, 2010 2:53 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); KOWALSKI David J (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 337, FSAR Ch. 9, Supplement 5

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to RAI No. 337 on January 25, 2010. Supplement 1 response to RAI No. 337 was sent on March 1, 2010 to address one of the questions. Supplement 2 response to RAI No. 337 was sent on March 19, 2010 to address seven of the questions. Supplement 3 and Supplement 4 responses to RAI No. 337 were sent on April 23, 2010 and May 21, 2010, to provide a revised schedule for the remaining question.

To allow time for continued interaction between AREVA and the NRC staff, a revised schedule is provided in this e-mail.

The schedule for a technically correct and complete response to the remaining question has been revised and is provided below:

Question #	Response Date
RAI 337 — 09.01.04-14	August 17, 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, May 21, 2010 3:21 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); KOWALSKI David J (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 337, FSAR Ch. 9, Supplement 4

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to RAI No. 337 on January 25, 2010. Supplement 1 response to RAI No. 337 was sent on March 1, 2010 to address one of the questions. Supplement 2 response to RAI No. 337 was sent on March 19, 2010 to address seven of the questions. Supplement 3 response to RAI No. 337 was sent on April 23, 2010 to provide a revised schedule for the remaining question.

A draft response to the remaining question was shared with the NRC staff on May 12, 2010. To address comments on the draft response, and also support interaction with the NRC staff to review the revised response prior to a formal submittal, the schedule for a technically correct and complete response to the remaining question has been changed and is provided below:

Question #	Response Date
RAI 337 — 09.01.04-14	July 8, 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 23, 2010 4:09 PM
To: 'Getachew.Tesfaye@nrc.gov'
Cc: DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); KOWALSKI David J (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 337, FSAR Ch. 9, Supplement 3

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to RAI No. 337 on January 25, 2010. Supplement 1 response to RAI No. 337 was sent on March 1, 2010 to address one of the questions. Supplement 2 response to RAI No. 337 was sent on March 19, 2010 to address seven of the questions and provide a revised schedule for the remaining question.

As agreed with the NRC, additional time is needed for AREVA to interact with the NRC on the proposed response to RAI Question 09.01.04-14, and a revised response schedule is provided below.

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

Question #	Response Date
RAI 337 — 09.01.04-14	May 21, 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, March 19, 2010 4:35 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); KOWALSKI David J (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 337, FSAR Ch. 9, Supplement 2

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to RAI No. 337 on January 25, 2010. Supplement 1 response to RAI No. 337 was sent on March 1, 2010 to address one of the 9 questions.

The attached file, “RAI 337 Supplement 2 Response US EPR DC.pdf” provides technically correct and complete responses to seven of the remaining eight 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 337 Questions 09.02.02-79, 09.02.02-80, 09.02.02-81, 09.02.02-82, 09.02.02-83.

The following table indicates the respective pages in the response document, “RAI 337 Supplement 2 Response US EPR DC.pdf,” that contain AREVA NP’s response to the subject questions.

Question #	Start Page	End Page
RAI 337 — 09.02.02-79	2	4
RAI 337 — 09.02.02-80	5	6
RAI 337 — 09.02.02-81	7	8
RAI 337 — 09.02.02-82	9	10
RAI 337 — 09.02.02-83	11	11
RAI 337 — 09.02.02-84	12	12
RAI 337 — 09.02.02-85	13	13

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

Question #	Response Date
RAI 337 — 09.01.04-14	April 23, 2010

Sincerely,

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

From: BRYAN Martin (EXT)
Sent: Monday, March 01, 2010 12:57 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen V (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); ROMINE Judy (AREVA NP INC); KOWALSKI David J (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 337, FSAR Ch. 9, Supplement 1

Getachew,

AREVA NP Inc. provided responses to RAI No. 337 on January 25, 2010 stating that a complete answer could not be provided for any of the questions. The attached file, "RAI 337 Supplement 1 Response US EPR DC.pdf" provides a technically correct and complete response to 1 of the remaining 9 questions, as committed.

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 337 Question 09.05.01-74.

The following table indicates the respective pages in the response document, "RAI 337 Supplement 1 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 337 — 09.05.01-74	2	5

The schedule for a technically correct and complete response to the remaining questions is unchanged and provided below.

Question #	Response Date
RAI 337 — 09.01.04-14	March 19, 2010
RAI 337 — 09.02.02-79	March 19, 2010
RAI 337 — 09.02.02-80	March 19, 2010
RAI 337 — 09.02.02-81	March 19, 2010
RAI 337 — 09.02.02-82	March 19, 2010
RAI 337 — 09.02.02-83	March 19, 2010
RAI 337 — 09.02.02-84	March 19, 2010
RAI 337 — 09.02.02-85	March 19, 2010

Sincerely,

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

From: DUNCAN Leslie E (AREVA NP INC)
Sent: Monday, January 25, 2010 2:54 PM
To: 'Tesfaye, Getachew'
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); KOWALSKI David J (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 337, FSAR Ch. 9

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 337 Response US EPR DC," provides a schedule since technically correct and complete responses to the nine questions are not provided.

The following table indicates the respective pages in the response document, "RAI 337 Response US EPR DC," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 337 — 09.01.04-14	2	3
RAI 337 — 09.02.02-79	4	5
RAI 337 — 09.02.02-80	6	7
RAI 337 — 09.02.02-81	8	9
RAI 337 — 09.02.02-82	10	11
RAI 337 — 09.02.02-83	12	12
RAI 337 — 09.02.02-84	13	13
RAI 337 — 09.02.02-85	14	14
RAI 337 — 09.05.01-74	15	16

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

Question #	Response Date
RAI 337 — 09.01.04-14	March 19, 2010
RAI 337 — 09.02.02-79	March 19, 2010
RAI 337 — 09.02.02-80	March 19, 2010
RAI 337 — 09.02.02-81	March 19, 2010
RAI 337 — 09.02.02-82	March 19, 2010
RAI 337 — 09.02.02-83	March 19, 2010
RAI 337 — 09.02.02-84	March 19, 2010
RAI 337 — 09.02.02-85	March 19, 2010
RAI 337 — 09.05.01-74	March 1, 2010

Sincerely,

Les Duncan
Licensing Engineer
AREVA NP Inc.
An AREVA and Siemens Company

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From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Tuesday, December 15, 2009 7:26 AM
To: ZZ-DL-A-USEPR-DL
Cc: Wheeler, Larry; Tatum, James; McCann, Edward; Segala, John; Lee, Samuel; Hearn, Peter; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 337 (3992, 4018,4110, 4079), FSAR Ch. 9

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on December 6, 2009, and on December 14, 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, excluding the time period of **December 25, 2009 thru January 3, 2010, to account for the holiday season** as discussed with AREVA NP Inc. For any RAIs that cannot be answered **within 40 days**, it is expected that a date for receipt of this information will be provided to the staff within the 40-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: 3306

Mail Envelope Properties (2FBE1051AEB2E748A0F98DF9EEE5A5D482D2B3)

Subject: Response to U.S. EPR Design Certification Application RAI No. 337, FSAR Ch. 9, Supplement 17
Sent Date: 8/5/2011 12:23:56 PM
Received Date: 8/5/2011 12:24:39 PM
From: WILLIFORD Dennis (AREVA)

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Reply Requested: No
Sensitivity: Normal
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Response to

Request for Additional Information No. 337, Supplement 17

12/15/2009

U.S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 09.01.04 - Light Load Handling System (Related to Refueling)
SRP Section: 09.02.02 - Reactor Auxiliary Cooling Water Systems
SRP Section: 09.05.01 - Fire Protection Program

Application Section: FSAR Chapter 9

QUESTIONS for Balance of Plant Branch 1 (AP1000/EPR Projects) (SBPA)

Question 09.01.04-14:

Applicants for standard design certifications are required by 10 CFR 52.47(a)(22) to address operating experience insights. Inspection and Enforcement (IE) Bulletin 84-03, "Refueling Cavity Water Seal," was issued to address the potential failure of refueling cavity seals to assure that fuel uncovery during refueling remains an unlikely event. The bulletin required licensees to evaluate the potential for and consequences of a refueling cavity water seal failure. Additional information concerning refueling cavity seal failures was provided by Information Notice (IN) 84-93, Potential for Loss of Water from the Refueling Cavity." IN 84-93 also noted that refueling cavities can be drained due to failures associated with other seals and as a consequence of valve misalignments. Therefore, in order to adequately address operating experience considerations and in accordance with the requirement specified by 10 CFR 52.47(a)(22), the following additional information is required:

a. Describe the design and installation of the refueling cavity seal and any other seals that will be used and whose failure could cause the refueling cavity to drain.

b. For each of the seals identified in (a), describe measures that will be implemented to ensure that the seals remain intact and do not become degraded over time.

c. For each of the seals identified in (a), evaluate the potential for and consequences of seal failure. These evaluations should address the following considerations:

    1. seal failure modes (including impact by dropped fuel bundles and weld failures) and the maximum leak rate that can occur;

    2. the refueling cavity makeup capability that is assured by Technical Specifications while in Mode 6;

    3. operator actions that are credited, including indication and alarms that are available to alert operators of the problem, and the time needed for operators to complete the required actions assuming that actions are not initiated until ten minutes after an alarm is sounded;

    4. the impact on stored fuel, fuel in transit or otherwise located in the refueling cavity for other reasons, and fuel in the reactor vessel, including the minimum height of water that will remain above the fuel and the basis for this determination; and

    5. the capability to isolate the fuel transfer tube with the maximum radiation level and flow rate of water through the transfer tube that are anticipated as a result of the seal failure.

d. Other than the seals that are referred to in (a), identify all of the paths that are capable of inadvertently draining the refueling cavity, describe controls that will be established to prevent inadvertently draining the refueling cavity through these paths, and evaluate the potential for and consequences of the refueling cavity to drain through these paths (similar to the evaluation referred to in (c).

e. Describe actions that must be taken to restore containment integrity when in Mode 6, the time required to complete these actions, the capability to implement these actions during and/or following situations that cause the refueling cavity to drain, and controls that will be established to ensure that containment integrity can be restored as described.

f. Revise the Final Safety Analysis Report (FSAR) to adequately describe the licensing basis for the certified plant design with respect to the above considerations. Establish

inspections, tests, analyses, and acceptance criteria (ITAAC), interface requirements, and combined license (COL) action items as appropriate for design features, procedures and controls that are important to ensure that occupational exposures and the release of radioactive material will not exceed NRC requirements as a consequence of inadvertently draining the refueling cavity.

Response to Question 09.01.04-14:

IE Bulletin 84-03, "Refueling Cavity Water Seal," was issued on August 24, 1984 to address an incident where the refueling cavity water seal failed and rapidly drained the refueling cavity. The bulletin requested evaluations of the potential for and consequences of a refueling cavity seal failure to establish that fuel uncovery during refueling remains an unlikely event. The 1984 incident involved the gross failure of a pneumatic seal that resulted in the loss of approximately 200,000 gallons of water from the refueling cavity in 20 minutes. If the fuel was in transfer, it might have been partially or completely uncovered. If the fuel transfer tube was open, the spent fuel pool (SFP) might have drained to a level that uncovered the top of the fuel.

IN 84-93, "Potential for Loss of Water from the Refueling Cavity," was issued on December 17, 1984 and identified additional failure modes for the refueling cavity seal and noted that refueling cavities can be drained because of other seal failures and as a consequence of valve misalignments.

The three preventive measures identified by GSI 137, "Refueling Cavity Seal Failure," to resolve the issue of cavity seal failure leading to refueling cavity drainage, are addressed by the U.S. EPR design:

1. Installation of improved design seals at plants with single inflatable seals: The U.S. EPR design uses a Seismic Category I permanent steel cavity ring, which is an improved design compared to single inflatable seals.
2. Replacement of double inflatable seals with permanent steel seals: The U.S. EPR design uses a permanent steel cavity ring.
3. Installation of a coffer dam to prevent SFP draining through the refueling cavity at plants where this is possible: The U.S. EPR pool design includes weirs that prevent drainage of the SFP below the top of the stored fuel assemblies. Above these weirs are leaktight gates that are closed to further mitigate a loss of pool water. The pool gates do not rely on pneumatic seals for leak tightness.

Part a:

The U.S. EPR design does not use a refueling cavity seal. The reactor vessel (RV) cavity ring is a permanently installed stainless steel assembly welded to the RV and a support structure embedded in the Reactor Building (RB) concrete. The cavity ring is designed to accommodate the expansion and contraction of the reactor pressure vessel (RPV) during normal operating transients, including heatup and cooldown. The cavity ring does not rely on pneumatic/flexible seals to maintain its leaktight barrier, and is not subject to the failure modes identified in IE Bulletin 84-03 and IN 84-93. Leakage is possible only if there is a through wall defect. The support structure design allows for field adjustments during installation to accommodate small variations in dimensions between the RV seal ledge and refueling cavity. Figure 09.01.04-14-1

shows the reactor cavity ring arrangement. The design is consistent with the criteria described in this response.

The cavity ring is a mechanical component designed in accordance with Seismic Category I requirements and the stress limits of ASME BPVC, Section III, Subsection ND. ASME Code seal plate certification is not required. The design loading when the refueling cavity is filled includes the weight of the cavity ring plus the hydrostatic load. Service level D loadings include the safe shutdown earthquake (SSE) and loads resulting from the drop of one fuel assembly. The cavity ring is designed to withstand the impact of one fuel assembly, with resultant leakage less than the capacity of the makeup flow to the refueling cavity.

Base metal and weld materials are consistent with specifications in ASME BPVC Section II. Welding procedures and welders are qualified in accordance with ASME BPVC Section IX. Welds are examined in accordance with ASME BPVC, Section V.

The cavity ring is classified as Seismic Category I with a safety classification of Supplemented Grade (NS-AQ). The seismic classification requires that the cavity ring is designed to remain functional during and following an SSE. U.S. EPR safety classification is based on the dependent safety-related functions in the design basis accident (DBA) analyses. A cavity ring failure is not postulated concurrent with a design basis fuel handling accident (refer to U.S. EPR FSAR Tier 2, Section 15.0.3.10 for a description of a fuel handling accident). The cavity ring is designed for loads associated with a fuel assembly drop.

The supplemented grade classification and seismic classification dictate that quality standards are applied. Quality group classification does not apply to the cavity ring because it is not a pressure-retaining component.

U.S. EPR FSAR Tier 1, Table 2.2.1-1—RCS Equipment Mechanical Design, U.S. EPR FSAR Tier 2, Table 3.2.2-1—Classification Summary, and U.S. EPR FSAR Tier 2, Section 3.8.3.1.1 will be revised to include this information about the cavity ring.

Personnel access doors are located at the bottom of the refueling cavity near the RV in the RB and Fuel Building (FB) transfer pits. The Response to RAI 280, Supplement 6, Question 12.03-12.04-17 describes the design of these doors and their seals. The doors have passive double seals with inter-seal leakage testing capability. Locking mechanisms and hydrostatic pressure of the refueling water keep the doors closed against their frames and maintain seal leaktightness.

The refueling cavity contains openings for cavity ventilation and for instrumentation and power supply connections to the RV closure head equipment. These openings are at high elevations in the refueling cavity, above the top of a fuel assembly in its highest position during movement, and are closed with double sealed watertight covers.

The fuel transfer tube allows transfer of fuel assemblies between the RB and FB pools during refueling operations. Expansion joints on both sides of the fuel transfer tube provide a leaktight connection between the fuel transfer tube and pools. The expansion joints are designed in accordance with ASME Code Section III, Subsection ND requirements. U.S. EPR FSAR Tier 2, Figure 3.8-31—Fuel Transfer Tube Penetration (Conceptual View) shows the expansion joints.

The Response to RAI 26, Supplement 1, Question 19-174 addresses the use of steam generator (SG) nozzle dams for the U.S. EPR.

Part b:

The RV cavity ring is designed for 60 years of plant operation. Welds that contribute to leaktightness or that perform a structural function necessary to maintain leaktightness are accessible for inspection before filling the refueling cavity. Significant leakage is detected in the reactor pit after filling the refueling cavity. Because the cavity ring does not rely on seals, leakage is only possible from a through wall defect.

The personnel access doors have double seals with inter-seal leakage testing capability to verify leak tightness before moving fuel. The ventilation and instrumentation and controls (I&C) openings at high elevations also have double seal arrangements.

As noted in U.S. EPR FSAR Tier 2, Section 9.1.4.3.1, the fuel transfer tube expansion joints are equipped with sensors for detecting leaks. The sensors alarm in the main control room (MCR) on detection of a leak.

Part c:

1. Potential reactor cavity ring failure modes include weld failures resulting from cyclic loadings, seismic events, or fuel assembly drops. The cavity ring is designed for anticipated cyclic thermal and hydrostatic loads during plant operation, and weld failure is not expected. Based on the arrangement and weld locations in Figure 09.01.04-14-1, even if a weld cracked, catastrophic failure of the cavity ring as a fluid barrier between the refueling cavity and reactor pit is not possible. The cavity ring is designed as a Seismic Category I component so that it retains its leaktight function during and following an SSE. The cavity ring is also designed for the dropped fuel assembly impact with resultant leakage less than the capacity of the makeup flow to the refueling cavity. Makeup flow using a fuel pool purification system pump is 400 gpm.

   The personnel access doors are positioned so that they are not susceptible to overhead fuel assembly drops. The damage risk from other drops is addressed by the heavy load handling program. The doors are held closed by locking devices and hydrostatic pressure. Redundant seals provide protection against leakage if a seal leaked following a successful leak test. A maximum leakage rate is not calculated, but based on the rate of pool level drop for a given leakage rate calculated in this response, a credible maximum leakage rate through the double seals does not prevent fuel assembly movement to a safe location.

   The ventilation and I&C openings are negligible because of their high elevation in the cavity. They have redundant seal designs similar to the personnel access doors to protect against a single seal leak.

   The fuel transfer tube expansion joints are protected from drops by the transfer compartments design. The expansion joints have welded joints and leakage detection capability. Because of the applied quality standards, a catastrophic failure of an expansion joint is not postulated.

   To determine the time available to place a fuel assembly in transit in a safe location, a maximum identified leak of 400 gpm is assumed. If fuel movement is in progress, the volume of water draining through the cavity ring would include the refueling cavity and the

internals storage area (surface area approximately 1300 ft^2 (120 m^2)), the RB transfer compartment (surface area approximately 130 ft^2 (12 m^2)), the FB transfer compartment (surface area approximately 140 ft^2 (13 m^2)), and the SFP (surface area approximately 1240 ft^2 (115 m^2)), or a total surface area of 2810 ft^2. A leakage rate of 400 gpm would equate to a drop in cavity level of approximately one ft/hr. Assuming that the RB is isolated from the FB, the drainage rate would be approximately two ft/hr, allowing sufficient time to place the handled fuel assembly in a safe location and to commence cavity refill, if necessary.

2. As stated in Part c.1, sufficient time is available to move a fuel assembly to a safe location once a drop in water level is detected before potential seal failures can drain the cavity to an unsafe level. Cavity makeup is not credited in response to seal failures. Therefore, the U.S. EPR FSAR Tier 2, Chapter 16, Technical Specifications do not specifically require a source of makeup water to be available during Mode 6. Although not credited, makeup water to the refueling cavity can be provided by three different sources:

   - The RB purification pump can be aligned to take suction from the in-containment refueling water storage tank (IRWST) to provide makeup to the refueling cavity at 400 gpm (refer to U.S. EPR FSAR Tier 2, Table 9.1.3-1—Fuel Pool Cooling and Purification System Component Design Data).
   - If available, the residual heat removal (RHR)/low head safety injection (LHSI) trains that are not used for RHR can be actuated to provide makeup to the refueling cavity at over 2200 gpm (refer to U.S. EPR FSAR Tier 2, Table 6.3.2—Low Head Safety Injection Pumps Design and Operating Parameters).
   - If a medium head safety injection (MHSI) train is available, the MHSI pump can be actuated to provide makeup to the refueling cavity at over 600 gpm (refer to U.S. EPR FSAR Tier 2, Table 6.3.3—Medium Head Safety Injection Pumps Design and Operating Parameters).

   All three sources take suction from the IRWST. The IRWST inventory is the refueling cavity during refueling. A loss of water from the refueling cavity large enough to significantly lower the pool level would drain to the IRWST and be available for recirculation.

3. U.S. EPR FSAR Tier 2, Chapter 16, Technical Specification 3.9.6 requires a minimum water level of 23 ft. above the top of the RV flange. Water level is verified every 24 hours. A decrease in pool level is visually detected during refueling or by level instrumentation installed in the pool (refer to U.S. EPR FSAR Tier 2, Figure 9.1.3-2—Fuel Pool Purification System). Additionally, a dose rate measurement device on the refueling machine detects an excessive dose rate, indicating a reduction in water shielding above a handled fuel assembly. In the unlikely event of a leak, the operator places the handled fuel assembly in the reactor core or in the fuel transfer facility where it can be positioned horizontally to increase water shielding and/or be transferred to the FB. Transfer to the FB would be necessary in case of a leak affecting the RB transfer compartment where the fuel assembly could not be placed back in the reactor core. Given an average refueling rate of six fuel assemblies per hour, acceptable time exists to detect the loss of water, initiate action, and place a fuel assembly in a safe location. A concurrent failure of the refueling machine is not postulated.

4. In case of a loss of cavity water, the operator acts to place a fuel assembly in transit in a safe location in either the RV, if an acceptable location is available, or the fuel transfer

facility. In the reactor core, approximately 13 ft. of water remains above the active fuel if the refueling cavity were drained to the RV flange level. In the fuel transfer facility, approximately 12 ft. of water remains above the horizontal fuel assembly if the pool is drained to the top of the weir separating the transfer pit from the refueling cavity. U.S. EPR FSAR Tier 2, Figure 3.8-13—Reactor Building Section C-C shows the general arrangement of the refueling cavity and weir, RV, and fuel transfer facility. The RB pools do not contain additional storage locations for fuel assemblies, and only one fuel assembly can be out of the reactor core in the RB at a time. Storage racks to handle thimble plug assemblies during shuffling are located in the refueling cavity.

5. Weirs prevent SFP drainage through the fuel transfer tube. Isolation of the fuel transfer tube is not required in the event of a cavity seal failure to prevent drainage of the SFP below the top of the fuel assemblies. This is in accordance with the recommendations in GI 137, “Refueling Cavity Seal Failure.” If a leak occurs in the RB transfer pit and the fuel assembly could not be placed in the RV, the fuel assembly is transferred to the FB and the fuel transfer tube isolation valve is closed. The maximum credible leakage through the transfer pit door does not result in radiation levels or flow rates through the fuel transfer tube that affect the ability to close the isolation valve.

Part d:

The residual heat removal system (RHRS) and fuel pool cooling and purification system (FPCPS) are potential paths for inadvertently draining the refueling cavity.

U.S. EPR FSAR Tier 2, Chapter 16, Technical Specifications, LCO 3.9.4 requires one RHR train to be in operation when the refueling cavity is filled. In the RHR mode, the IRWST suction line for LHSI (30JNGx0 AA001) is closed and the pump miniflow line valves (30JNGx0 AA003 and 30JNGx0 AA004) are closed, isolating the reactor coolant system (RCS) and refueling cavity from the IRWST. If one of these valves is inadvertently opened, an alarm will alert the MCR to the misalignment so that corrective action can be taken, including isolating the drainage path and refilling the refueling cavity, if necessary, from the IRWST. For an RHR train that is not in service, multiple closed valves in the hot leg suction line prevent inadvertent draindown to the IRWST as a result of a single inadvertent action.

The RHRS may be aligned with the chemical and volume control system (CVCS) for coolant purification during shutdown conditions. With a system misalignment, approximately 320 gpm could be diverted to the coolant storage tanks. This diversion is less than the amount assumed in c.1 above and would be detected by the CVCS, because of low level in the volume control tank or operation of the water makeup pumps, allowing the operator to take the appropriate action before the refueling cavity reaches an unacceptable level.

The FPCPS suction lines exiting the bottom of the reactor cavity have the potential to drain the refueling cavity through two paths. The cavity water can be pumped to the IRWST with an FPCPS pump at 400 gpm, or potentially with both FPCPS pumps operating in fast draining mode. Based on assumption stated in c.1 of this response, this flow rate allows sufficient time for detecting and correcting the misalignment before the refueling cavity reaches an unacceptable level.

If the 8 in., post-accident cavity drain line valve (30FAL16 AA003) is inadvertently opened, the cavity water gravity drains to the IRWST. With an estimated drain rate of approximately 5170

gpm, the refueling cavity drains approximately 5 ft. in 20 minutes. The low water level is visually detected and/or by the dose rate measurement device on the refueling machine. Valve position indication in the MCR indicates the open drain valve, which is closed to stop the drain down. Because the water drains to the IRWST, it might be pumped from the IRWST to refill the refueling cavity.

U.S. EPR FSAR Tier 2, Section 9.1.4.3.3 will be revised to include this information about draining the refueling cavity.

Operating procedures described by the COL applicant in U.S. EPR FSAR Tier 2, Section 13.5.2 govern administrative control of systems with the potential for draining the refueling cavity.

Part e:

The need to restore containment integrity is not considered following a postulated refueling cavity draindown event because sufficient time is available to place a fuel assembly in transit in a safe location.

Part f:

U.S. EPR FSAR Tier 2, Section 9.1.4.4 will be revised to state:

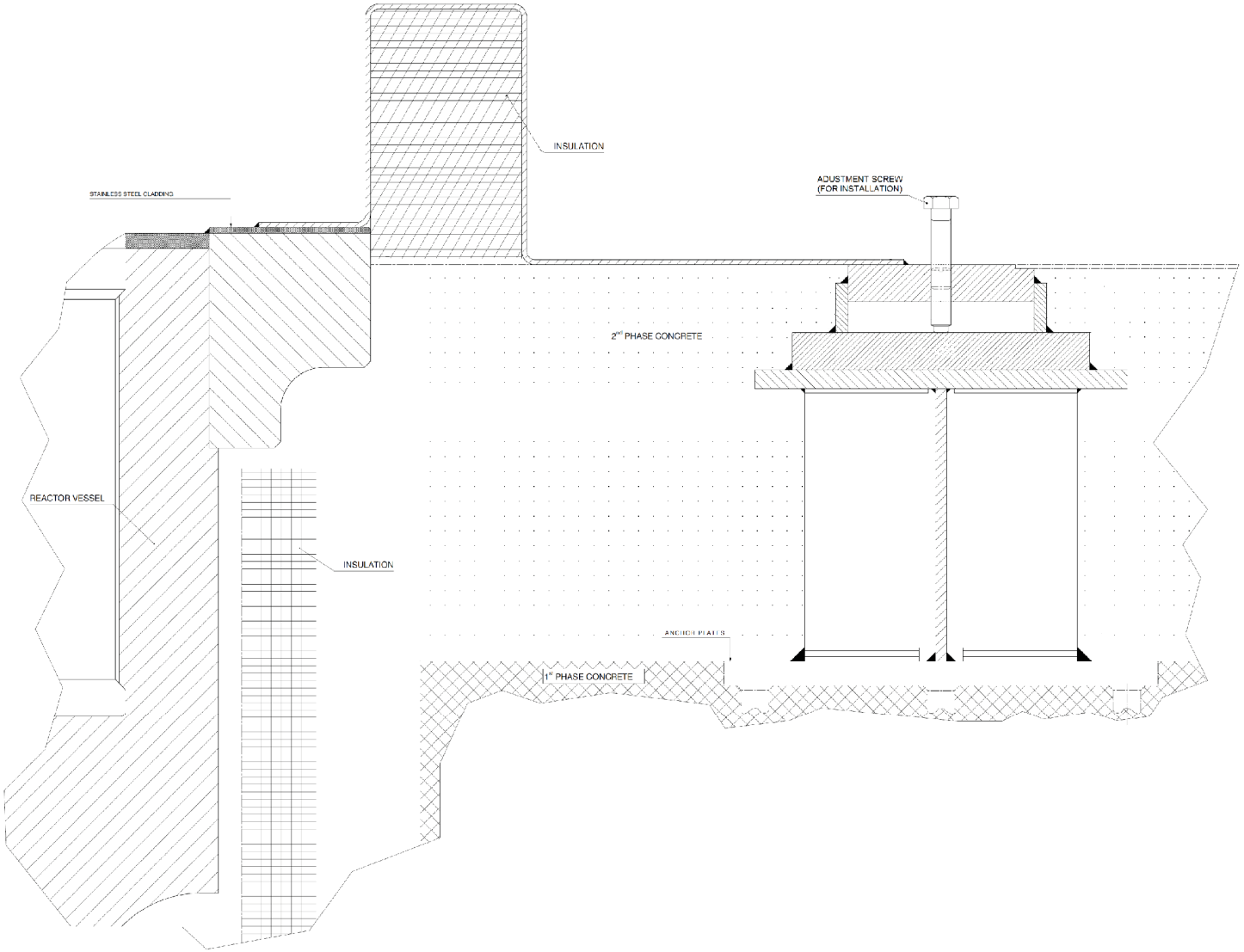
> "Refueling cavity ring and refueling cavity door seals will be inspected for leakage after filling the refueling cavity and before moving fuel to detect potential loss of refueling cavity water through passive barriers."

No new COL information item or ITAAC is needed since U.S. EPR FSAR Tier 2, Section 14.2.12.3.15, Fuel Handling System (Test #038), would identify significant leakage through passive barriers.

FSAR Impact:

U.S. EPR FSAR Tier 1, Table 2.2.1-1 and U.S. EPR FSAR Tier 2, Table 3.2.2-1, Section 3.8.3.1.1, Section 9.1.4.3.3, and Section 9.1.4.4 will be revised as described in the response and indicated on the enclosed markup.

Figure 09.01.04-14-1—Permanent RPV Refueling Cavity Ring – General Configuration



U.S. EPR Final Safety Analysis Report Markups

Table 2.2.1-1—RCS Equipment Mechanical Design (9 Sheets)

Description	Tag Number(1)	Location	ASME Code Section III	LBB Eval	Function	Seismic Category
RPV Internals – Heavy Reflector Tie Rods	N/A	Reactor Building	Yes	N/A	Support	I
RPV Internals – Upper Support Plate	N/A	Reactor Building	Yes	N/A	Support	I
RPV Internals – Upper Core Plate	N/A	Reactor Building	Yes	N/A	Support	I
RPV Internals – Normal Support Columns	N/A	Reactor Building	Yes	N/A	Support	I
RPV Internals – Control Rod Guide Assembly Columns	N/A	Reactor Building	Yes	N/A	Support	I
RPV Refueling Cavity Ring	30JAB	Reactor Building	~~Yes~~No	N/A	Leak Tightness	I

1) Equipment tag numbers are provided for information only and are not part of the certified design.

2) Leak-before-break (LBB) analysis is applicable to piping and interconnected component nozzles.

09.01.04-04

Table 3.2.2-1—Classification Summary
Sheet 8 of 190

KKS System or Component Code	SSC Description	Safety Classification (Note 15)	Quality Group Classification	Seismic Category (Note 16)	10 CFR 50 Appendix B Program (Note 5)	Location (Note 17)	Comments/ Commercial Code
30JAH10 BU	Reactor Coolant System Insulation	NS-AQ	N/A	II	Yes	UJA	
30JAA10 BB001	Reactor Pressure Vessel Pressure Boundary	S	A	I	Yes	UJA	ASME Class 1[1]
30JAA10BB001	Reactor Pressure Vessel (Radial Keys)	S	B	I	Yes	UJA	ASME Class CS[4]
30JAA10	RPV High Point Vent Piping & Valves (downstream of Valve 30JAA10 AA502)	NS-AQ	D	II	Yes	UJA	ANSI/ASME B31.1[6], ANSI/ASME B16.34[7]
30JAA10	RPV High Point Vent Piping (upstream of Valve 30JAA10 AA501)	S	A	I	Yes	UJA	ASME Class 1[1]
30JAA10 AA501/502	RPV High Point Vent Valves	S	A	I	Yes	UJA	ASME Class 1[1]
JAC	RPV Internals - Control Rod Drive Mechanism Adaptor Thermal Sleeves	NS-AQ	~~D~~N/A	II	Yes	UJA	ASME Class CS[4] (Internal Structure)
30JAB	RPV Refueling Cavity ~~Seal~~Ring	NS-AQ	N/A~~D~~	I	Yes	UJA	

09.01.04-14

- Secondary shield walls.
- Refueling canal walls.
- Polar crane support structure.
- The RB internal structures basemat.
- IRWST.
- Core melt retention area.
- Convection and rupture foils.
- Reactor containment building doors.

These major RB internal structures are further described in Section 5.4, which contains descriptions of steel supports for the RV, four SGs, four RCPs, and the PZR.

Supports are also provided for distribution systems as part of the RB internal structures, which include pipe supports; equipment supports; cable tray and conduit supports; and heating, ventilation and air conditioning (HVAC) duct supports. Platforms, ladders, stairs, guard rails, and other miscellaneous structures are provided for equipment access and maintenance.

3.8.3.1.1 Reactor Vessel Support Structure and Reactor Cavity

The RV support structure is comprised of a reinforced circular concrete wall that extends from the top of the RB internal structures basemat at elevation -20 feet, 2 inches to the steel supports for the RV piping at approximately elevation +20 feet. This circular wall also serves as the interior wall for the IRWST, and provides radiation shielding for the RV and RCP. A narrow chamber extends through the circular wall just above the internal structures basemat to provide an outlet from the bottom of the RV cavity to the core melt retention area. The top, inside edge of the circular concrete wall supports eight steel RV support assemblies that are located under the RCP nozzles. Section 5.4.14 describes the design of the RV steel supports. The circular concrete wall also functions as the primary radiation shield wall around the RV. The wall is approximately 8 feet, 11 inches thick. The reactor refueling cavity begins at the top of the circular wall at elevation +24 feet, 5 inches.

09.01.04-14

Large penetrations in the circular RV support concrete wall are provided for the primary loop piping and the cavity ventilation system. A permanently installed cavity ~~seal~~ ring and neutron shield assembly rests on an embedded ring at the top of the wall. This cavity ring~~seal~~ and shield assembly is fabricated of stainless steel and radiation shielding material that bridges the annular gap between the RV and vessel cavity concrete wall. This ring seals the lower RV cavity to prevent water leakage from the refueling canal located above.

09.01.04-14

~~This seal~~The cavity ring is designed to accommodate the expansion and contraction of the RPV during heatup and cooldown. The cavity ~~seal~~ring is designed to Seismic Category I requirements and to meet the stress limits of ASME BPVC, Section III, Subsection ND. Base metal and weld materials are consistent with specifications in ASME BPVC Section II. Welding procedures and welders will be qualified in accordance with ASME BPVC Section IX. Welds will be examined in accordance with ASME BPVC Section V. ~~Seal and structural welds are made in accordance with ASME BPVC, Section IX and are examined in accordance with ASME BPVC, Section V.~~ The cavity ~~seal~~ring does not rely on inflated seals, gaskets, o-rings, or other active components. The cavity ~~seal~~ring is also designed to withstand the impact of one fuel assembly with resultant leakage less than the capacity of the makeup flow to the refueling cavity.

The RV supports and cavity concrete wall resists normal operating loads, seismic loads, and loads induced by postulated pipe rupture events, including a LOCA (GDC 4 and GDC 5). The supports limit the movement of the RV within allowable limits under the applicable combinations of loadings, and minimize resistance to thermal movements during plant operations.

Refer to Figure 3.8-2, Figure 3.8-3, Figure 3.8-4, Figure 3.8-11, Figure 3.8-12, and Figure 3.8-13 for general arrangement layouts of the RV support structure.

3.8.3.1.2 Steam Generator Support Structures

The SGs are supported and restrained to resist normal operating loads, seismic loads, and loads induced by pipe rupture. The supports prevent the rupture of the primary reactor coolant pipes due to a postulated rupture in the main steam (MS) or feedwater lines. The supports minimize resistance to thermal movements during operation.

The 6 feet, 7 inches thick heavily reinforced concrete floor at elevation +4 feet, 11 inches supports the four SGs. Four steel columns with pinned joints are provided under each SG to support the vessels vertically from the concrete floor. Keyed joints at the top of the steel support columns interface with lower lateral steel supports that connect to steel embedments in the concrete cubicle walls for each SG. Section 5.4.14 describes the design of these steel component supports.

The RB internal structure concrete walls form individual cubicles for each of the SGs. These walls isolate the SGs to protect other plant SSC in the event of a pipe rupture in one of the piping reactor coolant loops (RCL). The SG cubicle outer walls also serve as secondary shield walls for protection against radiation from the reactor piping and coolant, as described in Section 3.8.3.1.6.

Steel supports within each of the cubicles, which are mounted to the concrete slab at approximately elevation +64 feet, provide upper lateral support for the SGs. Connection of the upper lateral supports to the concrete includes steel subassemblies

9.1.4.3.2 Safety Provisions for the Fuel Handling Tools

The new fuel handling tool is equipped with the ability to indicate proper resting of the tool on the fuel assembly top nozzle and the latched or unlatched status of the gripper. The new fuel handling tool is equipped with a mechanical locking system, which prevents unlatching of the gripper under load.

The spent fuel handling manual tool is equipped with means to indicate proper resting of the tool on the fuel assembly top nozzle and the latched or unlatched status of the gripper. The spent fuel handling manual tool is equipped with a mechanical locking system, which prevents unlatching of the gripper under load. The spent fuel handling manual tool is suspended from the crane by means of an extension piece, which confirms an acceptable amount of water shielding is present when the crane hook is in the upper position.

The fuel assembly insert handling manual tool is equipped with a mechanical locking system, which prevents unlatching of the gripper under load. The fuel assembly insert handling manual tool has an arrangement for guiding the fuel assembly insert during handling to avoid potential damage. The fuel assembly insert handling manual tool is equipped with means to indicate proper resting of the tool on the fuel assembly top nozzle. The fuel assembly insert handling manual tool is suspended from the auxiliary crane by means of an extension piece, which confirms an acceptable amount of water shielding is present when the crane hook is in the upper position.

Refer to Section 9.1.5 for safety provisions incorporated in the design of the auxiliary crane and polar crane for fuel handling.

9.1.4.3.3 Refueling Cavity Draindown Events

Rapid draindown of the refueling cavity resulting in fuel uncovery during refueling is not a credible event. The reactor vessel cavity ring is a permanently installed stainless steel assembly welded to the reactor vessel and the refueling cavity liner to prevent water leakage from the refueling cavity. The passive cavity ring design does not rely on active components such as pneumatic seals and is not susceptible to gross failure. Seals for openings in the refueling cavity liner do not rely on active components and do not pose a risk for rapid cavity draining.

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The residual heat removal system and fuel pool cooling and purification system are potential paths for inadvertently draining the refueling cavity. For credible system misalignments, sufficient time is available to detect and isolate the drain path and to place a handled fuel assembly, if necessary, in a safe storage location.

Inadvertent draining of the refueling cavity is addressed by plant procedures. Refer to Section 13.5 for plant procedure information.

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Any credible drainage from the refueling cavity will be detected visually or by installed instrumentation in adequate time to place a handled fuel assembly, if necessary, in a safe storage location. The safe storage location is either in the reactor core if an acceptable location is available or in the fuel transfer facility, where it can be positioned horizontally to increase shielding depth or can be transferred to the ~~Fuel Building~~FB. Weirs in the ~~Reactor Building~~RB and ~~Fuel Building~~FB pools limit the loss of water in pool areas separated from the drain path by the weirs.

9.1.4.3.4 Cask Loading Pit Draindown Events

Draindown Events During Non-Cask Loading Operations

The two gates separating the spent fuel pool from the cask loading pit are described in Section 9.1.2.2.2. The gates do not rely on active equipment, such as inflatable seals, to maintain leak-tightness. The slot gate seals are compressed by the weight of the gate to create a leak tight barrier. The swivel gate has a locking mechanism which equally distributes pressure on the seal to create a leak tight barrier. The swivel gate is locked in both the open and closed positions. The gates are shown in Figure 9.2.1-9 - Cask Loading Pit Gates. Unless spent fuel is being moved to the cask loading pit, both gates are closed. Failure of a single gate does not impact the water inventory in the spent fuel pool. During cask loading operations, the slot gate is removed, and the swivel gate is open to allow fuel movement into the cask loading pit.

The penetration assembly between the cask loading pit and the loading hall beneath the pit remains closed when cask handling operations are not occurring. The penetration assembly is closed by an upper cover at the bottom of the cask loading pit and a lower cover below the leak-tightness flange. The upper cover is a thick plate with a pressurization mechanism that pressurizes the cover uniformly and locks it closed for maintaining a leak tight seal. Two seals are provided to maintain leak-tightness between the upper cover and the supporting structure and compressed air is supplied between the two seals to monitor leak-tightness. A seismic locking device holds the upper cover in the closed position during an SSE. The lower cover is a thick disk bolted to the leak-tightness flange of the penetration assembly with two seals providing leak-tightness. It is designed to support the weight of the water in the cask loading pit without the upper cover, which is an abnormal condition. In this condition, mechanical stops on the spring mounted devices shown in Figure 9.4.1-8, Cask Loading Pit Penetration Assembly, limit the displacement of the bottom cover.

Draindown Events During Cask Loading Operations

During cask loading operations, the cask loading pit is flooded, the slot gate is removed and the swivel gate is open to allow fuel movement into the cask loading pit. In this case, the spent fuel pool and cask loading pit are connected volumes. The cask loading pit is filled prior to opening the penetration assembly upper cover. The upper cover is prevented, by design, from opening if there is a pressure difference across the cover,

The biological lid lifting station and the penetration upper cover hoist are load-tested to 125 percent of the rated load prior to their initial use.

Tests of the SFCTF equipment are performed before each cask loading campaign and include functional tests, overload protection tests, and leak tests. The tests include the following:

- The upper cover of the loading penetration assembly is tested for leak-tightness.
- Check of the geometry of the various components and functional clearances:
  - Straightness and alignment of the different components.
  - Position of guiding rails.
- Check of the motive parts (motors, brakes).
- Check of overload thresholds.
- Check of limit switches, overtravel switches, and speed and position sensors.

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Refueling cavity ring and refueling cavity door seals will be inspected for leakage after filling the refueling cavity and before moving fuel to detect potential loss of refueling cavity water through passive barriers.

9.1.4.5 Instrumentation Requirements

In general, mechanical or electrical interlocks are provided, when required, to provide reasonable assurance of the proper and safe operation of the fuel handling equipment. The intent is to prevent a situation which could endanger the operator or damage the fuel assemblies and control components. The interlocks, setpoints, rules for handling fuel assemblies, and other devices that restrict undesired or uncontrolled movement are incorporated in the design. ~~The RM, SFM and NFE are provided with an arrangement, on the respective control desk, for an emergency shutdown of movements.~~ As a minimum, the interlocks specified in Table 1 of Reference 1 will be provided.

The spent fuel machine and new fuel elevator are remotely operated from their respective control desk on the FB floor. The refueling machine is remotely operated from a control desk located on the RB operating floor. The fuel transfer tube facility is provided with two control desks, one on the FB side and the other on the RB side. The refueling machine, spent fuel machine, new fuel elevator, and fuel transfer tube facility are provided with a safety feature, on their respective control desk, for an emergency shutdown of fuel movements. The spent fuel machine and refueling machine are equipped with an emergency stop provision on the equipment. The fuel transfer tube facility on the FB side has, on the fuel pool operating floor, a safety