

ArevaEPRDCPEm Resource

From: WILLIFORD Dennis (AREVA) [Dennis.Williford@areva.com]
Sent: Tuesday, March 19, 2013 3:40 PM
To: Snyder, Amy
Cc: Miernicki, Michael; DELANO Karen (AREVA); LEIGHLITER John (AREVA); ROMINE Judy (AREVA); RYAN Tom (AREVA); WILLS Tiffany (AREVA)
Subject: Response to U.S. EPR Design Certification Application RAI No. 370, FSAR Ch. 3, Supplement 23
Attachments: RAI 370 Supplement 23 Response US EPR DC.pdf

Amy,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 and Supplement 2 to the response on June 8, 2010 and June 24, 2010, respectively, to provide a schedule for the remaining 4 questions. AREVA NP submitted Supplement 3 to the response on August 10, 2010, to provide final responses to Questions 03.07.02-64 and 03.07.02-65. AREVA NP submitted Supplement 4 to the response on September 2, 2010, to provide a final response to Question 03.07.03-38. On November 15, 2010, AREVA NP submitted Supplement 5 to provide a supplemental INTERIM response and a FINAL response schedule for Question 03.07.02-64. AREVA NP submitted Supplement 6 to the response on February 11, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On February 25, 2011, AREVA NP submitted Supplement 7 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 8 to the response on May 2, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On May 25, 2011, AREVA NP submitted Supplement 9 to provide a revised INTERIM response to Question 03.07.02-64. On June 17, 2011, AREVA NP submitted Supplement 10 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 11 to the response on June 27, 2011, to provide a revised schedule for Question 03.07.02-64. AREVA NP submitted Supplement 12 to the response on October 26, 2011, to provide a revised schedule for the final response to Question 03.07.02-64 and a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 13 on November 17, 2011, and Supplement 14 on December 14, 2011, to provide a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 15 on January 25, 2012 to provide a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 16 on February 21, 2012 to provide a revised schedule for the two remaining questions. AREVA NP submitted Supplement 17 on March 27, 2012 to provide a revised schedule for the two remaining questions. AREVA NP submitted Supplement 18 on July 3, 2012 to provide a revised schedule for one of the two remaining questions. AREVA NP submitted Supplement 19 on August 23, 2012 to provide a revised schedule for Question 03.07.02-64. AREVA NP submitted Supplement 20 on September 27, 2012 to provide a revised schedule for Question 03.07.01-27. On January 17, 2013 and February 5, 2013, AREVA NP submitted Supplements 21 and 22, respectively, to provide a technically correct and complete response to Question 03.07.01-27.

The attached file, "RAI 370 Supplement 23 Response US EPR DC.pdf" provides a revised technically correct and complete response to Question 03.07.01-27 to incorporate changes discussed with NRC staff on March 19, 2013. Appended to this file are the affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 370 Question 03.07.01-27.

The following table indicates the pages in the response document, "RAI 370 Supplement 23 Response US EPR DC.pdf" that contain AREVA NP's final response to the subject question.

Question #	Start Page	End Page
RAI 370 — 03.07.01-27	2	5

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

Question #	Interim Response Date	Response Date
RAI 370 - 03.07.02-64	November 15, 2010 (Actual) February 25, 2011 (Actual) May 26, 2011 (Actual) June 17, 2011 (Actual)	May 21, 2013

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: Tuesday, February 05, 2013 5:00 PM
To: Amy.Snyder@nrc.gov
Cc: Michael.Miernicki@nrc.gov; DELANO Karen (RS/NB); LEIGHLITER John (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); WILLS Tiffany (CORP/QP)
Subject: Response to U.S. EPR Design Certification Application RAI No. 370, FSAR Ch. 3, Supplement 22

Amy,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 and Supplement 2 to the response on June 8, 2010 and June 24, 2010, respectively, to provide a schedule for the remaining 4 questions. AREVA NP submitted Supplement 3 to the response on August 10, 2010, to provide final responses to Questions 03.07.02-64 and 03.07.02-65. AREVA NP submitted Supplement 4 to the response on September 2, 2010, to provide a final response to Question 03.07.03-38. On November 15, 2010, AREVA NP submitted Supplement 5 to provide a supplemental INTERIM response and a FINAL response schedule for Question 03.07.02-64. AREVA NP submitted Supplement 6 to the response on February 11, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On February 25, 2011, AREVA NP submitted Supplement 7 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 8 to the response on May 2, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On May 25, 2011, AREVA NP submitted Supplement 9 to provide a revised INTERIM response to Question 03.07.02-64. On June 17, 2011, AREVA NP submitted Supplement 10 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 11 to the response on June 27, 2011, to provide a revised schedule for Question 03.07.02-64. AREVA NP submitted Supplement 12 to the response on October 26, 2011, to provide a revised schedule for the final response to Question 03.07.02-64 and a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 13 on November 17, 2011, and Supplement 14 on December 14, 2011, to provide a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 15 on January 25, 2012 to provide a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 16 on February 21, 2012 to provide a revised schedule for the two remaining questions. AREVA NP submitted Supplement 17 on March 27, 2012 to provide a revised schedule for the two remaining questions. AREVA NP submitted Supplement 18 on July 3, 2012 to provide a revised schedule for one of the two remaining questions. AREVA NP submitted Supplement 19 on August 23, 2012 to provide a revised schedule for Question 03.07.02-64. AREVA NP submitted Supplement 20 on

September 27, 2012 to provide a revised schedule for Question 03.07.01-27. On January 17, 2013, AREVA NP submitted Supplement 21 to provide a technically correct and complete response to Question 03.07.01-27.

The attached file, "RAI 370 Supplement 22 Response US EPR DC.pdf" provides a revised technically correct and complete response to Question 03.07.01-27 to incorporate NRC staff comments received during the Civil/Structural Jan 28, 2013 SSI Audit. Appended to this file are the affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 370 Question 03.07.01-27.

The following table indicates the pages in the response document, "RAI 370 Supplement 22 Response US EPR DC.pdf" that contain AREVA NP's final response to the subject question.

Question #	Start Page	End Page
RAI 370 — 03.07.01-27	2	4

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

Question #	Interim Response Date	Response Date
RAI 370 - 03.07.02-64	November 15, 2010 (Actual) February 25, 2011 (Actual) May 26, 2011 (Actual) June 17, 2011 (Actual)	May 21, 2013

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, January 17, 2013 2:56 PM
To: Amy.Snyder@nrc.gov
Cc: Michael.Miernicki@nrc.gov; DELANO Karen (RS/NB); LEIGHLITER John (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); WILLS Tiffany (CORP/QP); RYAN Tom (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 370, FSAR Ch. 3, Supplement 21

Amy,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 and Supplement 2 to the response on June 8, 2010 and June 24, 2010, respectively, to provide a schedule for the remaining 4 questions. AREVA NP submitted Supplement 3 to the response on August 10, 2010, to provide final responses to Questions 03.07.02-64 and 03.07.02-65. AREVA NP submitted Supplement 4 to the response on September 2, 2010, to provide a final response to Question 03.07.03-38. On November 15, 2010, AREVA NP submitted Supplement 5 to provide a supplemental INTERIM response and a FINAL response schedule for Question 03.07.02-64. AREVA NP submitted Supplement 6 to the response on February 11, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On February 25, 2011, AREVA NP submitted Supplement 7 to provide a revised INTERIM response to

Question 03.07.02-64. AREVA NP submitted Supplement 8 to the response on May 2, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On May 25, 2011, AREVA NP submitted Supplement 9 to provide a revised INTERIM response to Question 03.07.02-64. On June 17, 2011, AREVA NP submitted Supplement 10 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 11 to the response on June 27, 2011, to provide a revised schedule for Question 03.07.02-64. AREVA NP submitted Supplement 12 to the response on October 26, 2011, to provide a revised schedule for the final response to Question 03.07.02-64 and a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 13 on November 17, 2011, and Supplement 14 on December 14, 2011, to provide a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 15 on January 25, 2012 to provide a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 16 on February 21, 2012 to provide a revised schedule for the two remaining questions. AREVA NP submitted Supplement 17 on March 27, 2012 to provide a revised schedule for the two remaining questions. AREVA NP submitted Supplement 18 on July 3, 2012 to provide a revised schedule for one of the two remaining questions. AREVA NP submitted Supplement 19 on August 23, 2012 to provide a revised schedule for Question 03.07.02-64. AREVA NP submitted Supplement 20 on September 27, 2012 to provide a revised schedule for Question 03.07.01-27.

The attached file, "RAI 370 Supplement 21 Response US EPR DC.pdf" provides a technically correct and complete response to Question 03.07.01-27. Appended to this file are the affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 370 Question 03.07.01-27.

The following table indicates the pages in the response document, "RAI 370 Supplement 21 Response US EPR DC.pdf" that contain AREVA NP's final response to the subject question.

Question #	Start Page	End Page
RAI 370 — 03.07.01-27	2	4

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

Question #	Interim Response Date	Response Date
RAI 370 - 03.07.02-64	November 15, 2010 (Actual) February 25, 2011 (Actual) May 26, 2011 (Actual) June 17, 2011 (Actual)	May 21, 2013

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, September 27, 2012 6:30 PM
To: Getachew.Tesfaye@nrc.gov
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); LEIGHLITER John (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 370, FSAR Ch. 3, Supplement 20

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 and Supplement 2 to the response on June 8, 2010 and June 24, 2010, respectively, to provide a schedule for the remaining 4 questions. AREVA NP submitted Supplement 3 to the response on August 10, 2010, to provide final responses to Questions 03.07.02-64 and 03.07.02-65. AREVA NP submitted Supplement 4 to the response on September 2, 2010, to provide a final response to Question 03.07.03-38. On November 15, 2010, AREVA NP submitted Supplement 5 to provide a supplemental INTERIM response and a FINAL response schedule for Question 03.07.02-64. AREVA NP submitted Supplement 6 to the response on February 11, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On February 25, 2011, AREVA NP submitted Supplement 7 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 8 to the response on May 2, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On May 25, 2011, AREVA NP submitted Supplement 9 to provide a revised INTERIM response to Question 03.07.02-64. On June 17, 2011, AREVA NP submitted Supplement 10 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 11 to the response on June 27, 2011, to provide a revised schedule for Question 03.07.02-64. AREVA NP submitted Supplement 12 to the response on October 26, 2011, to provide a revised schedule for the final response to Question 03.07.02-64 and a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 13 on November 17, 2011, and Supplement 14 on December 14, 2011, to provide a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 15 on January 25, 2012 to provide a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 16 on February 21, 2012 to provide a revised schedule for the two remaining questions. AREVA NP submitted Supplement 17 on March 27, 2012 to provide a revised schedule for the two remaining questions. AREVA NP submitted Supplement 18 on July 3, 2012 to provide a revised schedule for one of the two remaining questions. AREVA NP submitted Supplement 19 on August 23, 2012 to provide a revised schedule for Question 03.07.02-64.

The schedule for the final response to Question 03.07.01-27 has been changed as provided below. The schedule for the final response to Question 03.07.02-64 remains unchanged.

Question #	Interim Response Date	Response Date
RAI 370 - 03.07.01-27	NA	January 17, 2013
RAI 370 - 03.07.02-64	November 15, 2010 (Actual) February 25, 2011 (Actual) May 26, 2011 (Actual) June 17, 2011 (Actual)	May 21, 2013

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, August 23, 2012 6:10 PM
To: Getachew.Tesfaye@nrc.gov
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); LEIGHLITER John (RS/NB); ROMINE Judy (RS/NB); RYAN Tom

(RS/NB)

Subject: Response to U.S. EPR Design Certification Application RAI No. 370, FSAR Ch. 3, Supplement 19

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 and Supplement 2 to the response on June 8, 2010 and June 24, 2010, respectively, to provide a schedule for the remaining 4 questions. AREVA NP submitted Supplement 3 to the response on August 10, 2010, to provide final responses to Questions 03.07.02-64 and 03.07.02-65. AREVA NP submitted Supplement 4 to the response on September 2, 2010, to provide a final response to Question 03.07.03-38. On November 15, 2010, AREVA NP submitted Supplement 5 to provide a supplemental INTERIM response and a FINAL response schedule for Question 03.07.02-64. AREVA NP submitted Supplement 6 to the response on February 11, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On February 25, 2011, AREVA NP submitted Supplement 7 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 8 to the response on May 2, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On May 25, 2011, AREVA NP submitted Supplement 9 to provide a revised INTERIM response to Question 03.07.02-64. On June 17, 2011, AREVA NP submitted Supplement 10 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 11 to the response on June 27, 2011, to provide a revised schedule for Question 03.07.02-64. AREVA NP submitted Supplement 12 to the response on October 26, 2011, to provide a revised schedule for the final response to Question 03.07.02-64 and a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 13 on November 17, 2011, and Supplement 14 on December 14, 2011, to provide a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 15 on January 25, 2012 to provide a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 16 on February 21, 2012 to provide a revised schedule for the two remaining questions. AREVA NP submitted Supplement 17 on March 27, 2012 to provide a revised schedule for the two remaining questions. AREVA NP submitted Supplement 18 on July 3, 2012 to provide a revised schedule for one of the two remaining questions.

The schedule for the final response to Question 03.07.02-64 has been changed as provided below. The schedule for the final response to Question 03.07.01-27 remains unchanged.

Question #	Interim Response Date	Response Date
RAI 370 - 03.07.01-27	NA	August 30, 2013
RAI 370 - 03.07.02-64	November 15, 2010 (Actual) February 25, 2011 (Actual) May 26, 2011 (Actual) June 17, 2011 (Actual)	May 21, 2013

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: RYAN Tom (RS/NB)
Sent: Tuesday, July 03, 2012 2:00 PM
To: Getachew.Tesfaye@nrc.gov

Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); Michael.Miernicki@nrc.gov; WILLIFORD Dennis (RS/NB)

Subject: Response to U.S. EPR Design Certification Application RAI No. 370, FSAR Ch. 3, Supplement 18

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 and Supplement 2 to the response on June 8, 2010 and June 24, 2010, respectively, to provide a schedule for the remaining 4 questions. AREVA NP submitted Supplement 3 to the response on August 10, 2010, to provide final responses to Questions 03.07.02-64 and 03.07.02-65. AREVA NP submitted Supplement 4 to the response on September 2, 2010, to provide a final response to Question 03.07.03-38. On November 15, 2010, AREVA NP submitted Supplement 5 to provide a supplemental INTERIM response and a FINAL response schedule for Question 03.07.02-64. AREVA NP submitted Supplement 6 to the response on February 11, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On February 25, 2011, AREVA NP submitted Supplement 7 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 8 to the response on May 2, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On May 25, 2011, AREVA NP submitted Supplement 9 to provide a revised INTERIM response to Question 03.07.02-64. On June 17, 2011, AREVA NP submitted Supplement 10 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 11 to the response on June 27, 2011, to provide a revised schedule for Question 03.07.02-64. AREVA NP submitted Supplement 12 to the response on October 26, 2011, to provide a revised schedule for the final response to Question 03.07.02-64 and a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 13 on November 17, 2011, and Supplement 14 on December 14, 2011, to provide a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 15 on January 25, 2012 to provide a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 16 on February 21, 2012 to provide a revised schedule for the two remaining questions. AREVA NP submitted Supplement 17 on March 27, 2012 to provide a revised schedule for the two remaining questions.

Based on additional comments and discussions with NRC staff, the schedule for the final response to question 03.07.02-64 has been changed as provided below. The schedule for the final response to Question 03.07.01-27 remains unchanged.

Question #	Interim Response Date	Response Date
RAI 370 - 03.07.01-27	NA	August 30, 2013
RAI 370 - 03.07.02-64	November 15, 2010 (Actual) February 25, 2011 (Actual) May 26, 2011 (Actual) June 17, 2011 (Actual)	November 14, 2012

Sincerely,

Tom Ryan
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: Tuesday, March 27, 2012 1:57 PM
To: Getachew.Tesfaye@nrc.gov
Cc: 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. 370, FSAR Ch. 3, Supplement 17

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 and Supplement 2 to the response on June 8, 2010 and June 24, 2010, respectively, to provide a schedule for the remaining 4 questions. AREVA NP submitted Supplement 3 to the response on August 10, 2010, to provide final responses to Questions 03.07.02-64 and 03.07.02-65. AREVA NP submitted Supplement 4 to the response on September 2, 2010, to provide a final response to Question 03.07.03-38. On November 15, 2010, AREVA NP submitted Supplement 5 to provide a supplemental INTERIM response and a FINAL response schedule for Question 03.07.02-64. AREVA NP submitted Supplement 6 to the response on February 11, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On February 25, 2011, AREVA NP submitted Supplement 7 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 8 to the response on May 2, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On May 25, 2011, AREVA NP submitted Supplement 9 to provide a revised INTERIM response to Question 03.07.02-64. On June 17, 2011, AREVA NP submitted Supplement 10 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 11 to the response on June 27, 2011, to provide a revised schedule for Question 03.07.02-64. AREVA NP submitted Supplement 12 to the response on October 26, 2011, to provide a revised schedule for the final response to Question 03.07.02-64 and a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 13 on November 17, 2011, and Supplement 14 on December 14, 2011, to provide a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 15 on January 25, 2012 to provide a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 16 on February 21, 2012 to provide a revised schedule for the two remaining questions.

Based on additional comments and discussions with NRC staff, the schedule for the final response to question 03.07.02-64 has been changed as provided below. The schedule for the final response to Question 03.07.01-27 remains unchanged.

Question #	Interim Response Date	Response Date
RAI 370 - 03.07.01-27	NA	August 30, 2013
RAI 370 - 03.07.02-64	November 15, 2010 (Actual) February 25, 2011 (Actual) May 26, 2011 (Actual) June 17, 2011 (Actual)	July 5, 2012

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: Tuesday, February 21, 2012 9:20 PM
To: Getachew.Tesfaye@nrc.gov
Cc: 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. 370, FSAR Ch. 3, Supplement 16

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 and Supplement 2 to the response on June 8, 2010 and June 24, 2010, respectively, to provide a schedule for the remaining 4 questions. AREVA NP submitted Supplement 3 to the response on August 10, 2010, to provide final responses to Questions 03.07.02-64 and 03.07.02-65. AREVA NP submitted Supplement 4 to the response on September 2, 2010, to provide a final response to Question 03.07.03-38. On November 15, 2010, AREVA NP submitted Supplement 5 to provide a supplemental INTERIM response and a FINAL response schedule for Question 03.07.02-64. AREVA NP submitted Supplement 6 to the response on February 11, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On February 25, 2011, AREVA NP submitted Supplement 7 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 8 to the response on May 2, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On May 25, 2011, AREVA NP submitted Supplement 9 to provide a revised INTERIM response to Question 03.07.02-64. On June 17, 2011, AREVA NP submitted Supplement 10 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 11 to the response on June 27, 2011, to provide a revised schedule for Question 03.07.02-64. AREVA NP submitted Supplement 12 to the response on October 26, 2011, to provide a revised schedule for the final response to Question 03.07.02-64 and a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 13 on November 17, 2011, and Supplement 14 on December 14, 2011, to provide a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 15 on January 25, 2012, to provide a preliminary revised schedule to Question 03.07.01-27.

The schedule for the final response to the remaining two questions has been changed as provided below. This schedule was transmitted to the NRC in AREVA NP letter 12:008 dated February 21, 2012.

Question #	Interim Response Date	Response Date
RAI 370 - 03.07.01-27	NA	August 30, 2013
RAI 370 - 03.07.02-64	November 15, 2010 (Actual) February 25, 2011 (Actual) May 26, 2011 (Actual) June 17, 2011 (Actual)	March 29, 2012

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, January 25, 2012 10:05 AM
To: Getachew.Tesfaye@nrc.gov
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB);

Michael.Miernicki@nrc.gov

Subject: Response to U.S. EPR Design Certification Application RAI No. 370, FSAR Ch. 3, Supplement 15

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 and Supplement 2 to the response on June 8, 2010 and June 24, 2010, respectively, to provide a schedule for the remaining 4 questions. AREVA NP submitted Supplement 3 to the response on August 10, 2010, to provide final responses to Questions 03.07.02-64 and 03.07.02-65. AREVA NP submitted Supplement 4 to the response on September 2, 2010, to provide a final response to Question 03.07.03-38. On November 15, 2010, AREVA NP submitted Supplement 5 to provide a supplemental INTERIM response and a FINAL response schedule for Question 03.07.02-64. AREVA NP submitted Supplement 6 to the response on February 11, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On February 25, 2011, AREVA NP submitted Supplement 7 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 8 to the response on May 2, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On May 25, 2011, AREVA NP submitted Supplement 9 to provide a revised INTERIM response to Question 03.07.02-64. On June 17, 2011, AREVA NP submitted Supplement 10 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 11 to the response on June 27, 2011, to provide a revised schedule for Question 03.07.02-64. AREVA NP submitted Supplement 12 to the response on October 26, 2011, to provide a revised schedule for the final response to Question 03.07.02-64 and a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 13 on November 17, 2011, and Supplement 14 on December 14, 2011, to provide a preliminary revised schedule to Question 03.07.01-27.

The preliminary revised schedule for a technically correct and complete response to Question 03.07.01-27 has been changed as provided below. This schedule is being reevaluated and a new supplement with a revised schedule will be transmitted by February 21, 2012. The schedule for the final response to Question 03.07.02-64 remains unchanged.

Question #	Interim Response Date	Response Date
RAI 370 - 03.07.01-27	NA	February 21, 2012
RAI 370 - 03.07.02-64	November 15, 2010 (Actual) February 25, 2011 (Actual) May 26, 2011 (Actual) June 17, 2011 (Actual)	February 28, 2012

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, December 14, 2011 10:23 AM
To: Getachew.Tesfaye@nrc.gov
Cc: 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. 370, FSAR Ch. 3, Supplement 14

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 and Supplement 2 to the response on June 8, 2010 and June 24, 2010, respectively, to provide a schedule for the remaining 4 questions. AREVA NP submitted Supplement 3 to the response on August 10, 2010, to provide final responses to Questions 03.07.02-64 and 03.07.02-65. AREVA NP submitted Supplement 4 to the response on September 2, 2010, to provide a final response to Question 03.07.03-38. On November 15, 2010, AREVA NP submitted Supplement 5 to provide a supplemental INTERIM response and a FINAL response schedule for Question 03.07.02-64. AREVA NP submitted Supplement 6 to the response on February 11, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On February 25, 2011, AREVA NP submitted Supplement 7 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 8 to the response on May 2, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On May 25, 2011, AREVA NP submitted Supplement 9 to provide a revised INTERIM response to Question 03.07.02-64. On June 17, 2011, AREVA NP submitted Supplement 10 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 11 to the response on June 27, 2011, to provide a revised schedule for Question 03.07.02-64. AREVA NP submitted Supplement 12 to the response on October 26, 2011, to provide a revised schedule for the final response to Question 03.07.02-64 and a preliminary revised schedule to Question 03.07.01-27. AREVA NP submitted Supplement 13 to the response on November 17, 2011 to provide a preliminary revised schedule to Question 03.07.01-27.

The preliminary revised schedule for a technically correct and complete response to Question 03.07.01-27 has been changed as provided below. This schedule is being reevaluated and a new supplement with a revised schedule will be transmitted by January 25, 2012. The schedule for the final response to Question 03.07.02-64 remains unchanged.

Question #	Interim Response Date	Response Date
RAI 370 - 03.07.01-27	NA	January 25, 2012
RAI 370 - 03.07.02-64	November 15, 2010 (Actual) February 25, 2011 (Actual) May 26, 2011 (Actual) June 17, 2011 (Actual)	February 28, 2012

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, November 17, 2011 6:10 PM
To: Getachew.Tesfaye@nrc.gov
Cc: 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. 370, FSAR Ch. 3, Supplement 13

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 and Supplement 2 to the response on June 8, 2010 and June 24, 2010, respectively, to provide a schedule for the remaining 4 questions.

AREVA NP submitted Supplement 3 to the response on August 10, 2010, to provide final responses to Questions 03.07.02-64 and 03.07.02-65. AREVA NP submitted Supplement 4 to the response on September 2, 2010, to provide a final response to Question 03.07.03-38. On November 15, 2010, AREVA NP submitted Supplement 5 to provide a supplemental INTERIM response and a FINAL response schedule for Question 03.07.02-64. AREVA NP submitted Supplement 6 to the response on February 11, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On February 25, 2011, AREVA NP submitted Supplement 7 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 8 to the response on May 2, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On May 25, 2011, AREVA NP submitted Supplement 9 to provide a revised INTERIM response to Question 03.07.02-64. On June 17, 2011, AREVA NP submitted Supplement 10 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 11 to the response on June 27, 2011, to provide a revised schedule for Question 03.07.02-64. AREVA NP submitted Supplement 12 to the response on October 26, 2011, to provide a revised schedule for the final response to Question 03.07.02-64 and a preliminary revised schedule to Question 03.07.01-27.

The preliminary revised schedule for a technically correct and complete response to Question 03.07.01-27 has been revised as provided below. This schedule is being reevaluated and a new supplement with a revised schedule will be transmitted by December 14, 2011.

Question #	Interim Response Date	Response Date
RAI 370 - 03.07.01-27	NA	December 14, 2011
RAI 370 - 03.07.02-64	November 15, 2010 (Actual) February 25, 2011 (Actual) May 26, 2011 (Actual) June 17, 2011 (Actual)	February 28, 2012

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, October 26, 2011 4:53 PM
To: Getachew.Tesfaye@nrc.gov
Cc: 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. 370, FSAR Ch. 3, Supplement 12

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 and Supplement 2 to the response on June 8, 2010 and June 24, 2010, respectively, to provide a schedule for the remaining 4 questions. AREVA NP submitted Supplement 3 to the response on August 10, 2010, to provide final responses to Questions 03.07.02-64 and 03.07.02-65. AREVA NP submitted Supplement 4 to the response on September 2, 2010, to provide a final response to Question 03.07.03-38. On November 15, 2010, AREVA NP submitted Supplement 5 to provide a supplemental INTERIM response and a FINAL response schedule for Question 03.07.02-64. AREVA NP submitted Supplement 6 to the response on

February 11, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On February 25, 2011, AREVA NP submitted Supplement 7 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 8 to the response on May 2, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On May 25, 2011, AREVA NP submitted Supplement 9 to provide a revised INTERIM response to Question 03.07.02-64. On June 17, 2011, AREVA NP submitted Supplement 10 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 11 to the response on June 27, 2011, to provide a revised schedule for Question 03.07.02-64.

The schedule for the final response to Question 03.07.02-64 has been revised, as indicated in bold below. In addition, a preliminary revised schedule for a technically correct and complete response to Question 03.07.01-27 is provided below. This schedule is being reevaluated and a new supplement with a revised schedule will be transmitted by November 17, 2011.

Question #	Interim Response Date	Response Date
RAI 370 - 03.07.01-27	NA	November 17, 2011
RAI 370 - 03.07.02-64	November 15, 2010 (Actual) February 25, 2011 (Actual) May 26, 2011 (Actual) June 17, 2011 (Actual)	February 28, 2012

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: Monday, June 27, 2011 2:02 PM
To: Tesfaye, Getachew
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); CORNELL Veronica (External RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 370, FSAR Ch. 3, Supplement 11

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 and Supplement 2 to the response on June 8, 2010 and June 24, 2010, respectively, to provide a schedule for the remaining 4 questions. AREVA NP submitted Supplement 3 to the response on August 10, 2010, to provide final responses to Questions 03.07.02-64 and 03.07.02-65. AREVA NP submitted Supplement 4 to the response on September 2, 2010, to provide a final response to Question 03.07.03-38. On November 15, 2010, AREVA NP submitted Supplement 5 to provide a supplemental INTERIM response and a FINAL response schedule for Question 03.07.02-64. AREVA NP submitted Supplement 6 to the response on February 11, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On February 25, 2011, AREVA NP submitted Supplement 7 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 8 to the response on May 2, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On May 25, 2011, AREVA NP submitted Supplement 9 to provide a revised INTERIM response to Question 03.07.02-64.

On June 17, 2011, AREVA NP submitted Supplement 10 to provide a revised INTERIM response to Question 03.07.02-64.

The schedule for the final response to Question 03.07.02-64 is being revised, as indicated in bold below. The schedule for the remaining question is unchanged.

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

Question #	Interim Response Date	Response Date
RAI 370 - 03.07.01-27	NA	December 28, 2011
RAI 370 - 03.07.02-64	November 15, 2010 (Actual) February 25, 2011 (Actual) May 26, 2011 (Actual) June 17, 2011 (Actual)	October 26, 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: RYAN Tom (RS/NB)
Sent: Friday, June 17, 2011 2:38 PM
To: 'Tesfaye, Getachew'
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); CORNELL Veronica (External RS/NB); WILLIFORD Dennis (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 370, FSAR Ch. 3, Supplement 10

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 and Supplement 2 to the response on June 8, 2010 and June 24, 2010, respectively, to provide a schedule for the remaining 4 questions. AREVA NP submitted Supplement 3 to the response on August 10, 2010, to provide final responses to Questions 03.07.02-64 and 03.07.02-65. AREVA NP submitted Supplement 4 to the response on September 2, 2010, to provide a final response to Question 03.07.03-38. On November 15, 2010, AREVA NP submitted Supplement 5 to provide a supplemental INTERIM response and a FINAL response schedule for Question 03.07.02-64. AREVA NP submitted Supplement 6 to the response on February 11, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On February 25, 2011, AREVA NP submitted Supplement 7 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 8 to the response on May 2, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On May 25, 2011, AREVA NP submitted Supplement 9 to provide a revised INTERIM response to Question 03.07.02-64.

The attached file, "RAI 370 Supplement 10 Response US EPR DC-INTERIM.pdf" provides a technically correct and revised INTERIM response to Question 03.07.02-64. Appended to this file are the affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 370 Question 03.07.02-64.

The following table indicates the pages in the response document, "RAI 370 Supplement 10 Response US EPR DC-INTERIM.pdf" that contains AREVA NP's revised INTERIM response to the subject question.

Question #	Start Page	End Page
RAI 370 — 03.07.02-64	2	4

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

Question #	Interim Response Date	Response Date
RAI 370 - 03.07.01-27	NA	December 28, 2011
RAI 370 - 03.07.02-64	November 15, 2010 (Actual) February 25, 2011 (Actual) May 26, 2011 (Actual) June 17, 2011 (Actual)	September 23, 2011

Sincerely,

**Tom Ryan for
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, May 26, 2011 3:30 PM
To: Tesfaye, Getachew
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); CORNELL Veronica (External RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 370, FSAR Ch. 3, Supplement 9

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 and Supplement 2 to the response on June 8, 2010 and June 24, 2010, respectively, to provide a schedule for the remaining 4 questions. AREVA NP submitted Supplement 3 to the response on August 10, 2010, to provide final responses to Questions 03.07.02-64 and 03.07.02-65. AREVA NP submitted Supplement 4 to the response on September 2, 2010, to provide a final response to Question 03.07.03-38. On November 15, 2010, AREVA NP submitted Supplement 5 to provide a supplemental INTERIM response and a FINAL response schedule for Question 03.07.02-64. AREVA NP submitted Supplement 6 to the response on February 11, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On February 25, 2011, AREVA NP submitted Supplement 7 to provide a revised INTERIM response to Question 03.07.02-64. AREVA NP submitted Supplement 8 to the response on May 2, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64.

The attached file, "RAI 370 Supplement 9 Response US EPR DC-INTERIM.pdf" provides a technically correct and revised INTERIM response to Question 03.07.02-64. The following table indicates the pages in the response document, "RAI 370 Supplement 9 Response US EPR DC-INTERIM.pdf" that contains AREVA NP's revised INTERIM response to the subject question.

Question #	Start Page	End Page
RAI 370 — 03.07.02-64	2	4

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

Question #	Interim Response Date	Response Date
RAI 370 - 03.07.01-27	NA	December 28, 2011
RAI 370 - 03.07.02-64	November 15, 2010 (Actual) February 25, 2011 (Actual) May 25, 2011 (Actual)	September 23, 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: Monday, May 02, 2011 10:30 AM
To: Tesfaye, Getachew
Cc: CORNELL Veronica (External 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. 370, FSAR Ch. 3, Supplement 8

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 and Supplement 2 to the response on June 8, 2010 and June 24, 2010, respectively, to provide a schedule for the remaining 4 questions. AREVA NP submitted Supplement 3 to the response on August 10, 2010, to provide final responses to Questions 03.07.02-64 and 03.07.02-65. AREVA NP submitted Supplement 4 to the response on September 2, 2010, to provide a final response to Question 03.07.03-38. On November 15, 2010, AREVA NP submitted Supplement 5 to provide a supplemental INTERIM response and a FINAL response schedule for Question 03.07.02-64. AREVA NP submitted Supplement 6 to the response on February 11, 2011, to provide a revised schedule for Question 03.07.01-27 and Question 03.07.02-64. On February 25, 2011, AREVA NP submitted Supplement 7 to provide a revised INTERIM response to Question 03.07.02-64.

Due to changes in the schedule for FSAR Sections 3.7 and 3.8 as discussed with NRC, the schedule for Questions 03.07.01-27 and 03.07.02-64 is being revised.

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

Question #	Interim Response Date	Response Date
RAI 370 - 03.07.01-27	NA	December 28, 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: Friday, February 25, 2011 5:24 PM

To: Tesfaye, Getachew

Cc: BRYAN Martin (External RS/NB); BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); CORNELL Veronica (External RS/NB)

Subject: Response to U.S. EPR Design Certification Application RAI No. 370, Supplement 7, FSAR Ch. 3

Getachew,

AREVA NP Inc. letter NRC 11:018 dated February 25, 2011 provides a provides a revised supplemental INTERIM response to question 03.07.02-64. AREVA NP considers some of the material contained in the response to be proprietary information. As required by 10 CFR 2.390(b), an affidavit is provided to support the withholding of the proprietary information from public disclosure. Proprietary and non-proprietary versions of the enclosure to this letter are provided separately.

The following table indicates the page in the response document, "RAI 370 Supplement 7 Response US EPR DC-INTERIM.pdf" that contains AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 370 — 03.07.02-64	2	36

The response schedule for the remaining questions is unchanged and is shown below.

Question #	Interim Response Date	Response Date
RAI 370 - 03.07.02-64	November 15, 2010 (Actual) February 25, 2011 (Actual)	May 13, 2011
RAI 370 - 03.07.01-27	NA	July 22, 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 11, 2011 1:37 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); CORNELL Veronica (External RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 370, FSAR Ch. 3, Supplement 6

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 and Supplement 2 to the response on June 8, 2010 and June 24, 2010, respectively, to provide a schedule for the remaining 4 questions. AREVA NP submitted Supplement 3 to the response on August 10, 2010, to provide final responses to Questions 03.07.02-64 and 03.07.02-65. AREVA NP submitted Supplement 4 to the response on September 2, 2010, to provide a final response to Question 03.07.03-38. On November 15, 2010, AREVA NP submitted Supplement 5 to provide a new schedule for a supplemental INTERIM response and FINAL response to Question 03.07.02-64.

The schedule for the revised INTERIM response and FINAL response to Question 03.07.02-64 has changed. In addition, the schedule for Question 03.07.01-27 has changed.

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

Question #	Interim Response Date	Response Date
RAI 370 - 03.07.02-64	November 15, 2010 (Actual) February 25, 2011	May 13, 2011
RAI 370 - 03.07.01-27	NA	July 22, 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, November 15, 2010 4:36 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); CORNELL Veronica (External RS/NB);

'Miernicki, Michael'

Subject: Response to U.S. EPR Design Certification Application RAI No. 370, FSAR Ch. 3, Supplement 5, Part 2 of 2

Getachew,

Attached is Part 2 of 2 for the INTERIM response to RAI 370 Question 03.07.02-64.

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, November 15, 2010 4:32 PM

To: 'Tesfaye, Getachew'

Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); CORNELL Veronica (External RS/NB); 'Miernicki, Michael'

Subject: Response to U.S. EPR Design Certification Application RAI No. 370, FSAR Ch. 3, Supplement 5, Part 1 of 2

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 and Supplement 2 to the response on June 8, 2010 and June 24, 2010, respectively, to provide a schedule for the remaining 4 questions. AREVA NP submitted Supplement 3 to the response on August 10, 2010, to provide final responses to Questions 03.07.02-64 and 03.07.02-65. AREVA NP submitted Supplement 4 to the response on September 2, 2010, to provide a final response to Question 03.07.03-38.

The schedule for Supplemental INTERIM and FINAL responses to Question 03.07.02-64 is added to provide additional information on the potential for seismic interaction between the Nuclear Auxiliary Building and Seismic Category I structures. The attached file, "RAI 370 Supplement5 Response US EPR DC-INTERIM.pdf" provides a technically correct and complete INTERIM response to Question 03.07.02-64. Because of the file size, this response is being transmitted in two parts. The schedule for the remaining question is unchanged.

Appended to "part 2 of 2" of this file (transmitted separately) is the affected page of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which supports the response to RAI 370 Supplement 5.

The following table indicates the respective pages in the response document, "RAI 370 Supplement 5 Response US EPR DC-INTERIM," that contain the AREVA NP response to the subject question.

Question #	Start Page	End Page
RAI 370 - 03.07.02-64	2	19

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

Question #	Interim Response Date	Response Date
RAI 370 - 03.07.02-64	November 15, 2010 (Actual)	February 15, 2011
RAI 370 - 03.07.01-27	NA	May 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, September 02, 2010 5:41 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); CORNELL Veronica (External RS/NB); Miernicki, Michael
Subject: Response to U.S. EPR Design Certification Application RAI No. 370, FSAR Ch. 3, Supplement 4

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 and Supplement 2 to the response on June 8, 2010 and June 24, 2010, respectively, to provide a schedule for the remaining 4 questions. AREVA NP submitted Supplement 3 to the response on August 10, 2010, to provide final responses to Questions 03.07.02-64 and 03.07.02-65.

The attached file, "RAI 370 Supplement 4 Response US EPR DC.pdf" provides a technically correct and complete response to Question 03.07.03-38, as committed. The schedule for the remaining question is unchanged.

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 370 Supplement 4.

The following table indicates the respective pages in the response document, "RAI 370 Supplement 4 Response US EPR DC," that contain the AREVA NP response to the subject question.

Question #	Start Page	End Page
RAI 370 - 03.07.03-38	2	3

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

Question #	Response Date
RAI 370-03.07.01-27	May 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 (EXT)
Sent: Tuesday, August 10, 2010 6:44 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); CORNELL Veronica (EXT)
Subject: Response to U.S. EPR Design Certification Application RAI No. 370, FSAR Ch. 3, Supplement 3

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 and Supplement 2 to the response on June 8, 2010 and June 24, 2010, respectively, to provide a schedule for the remaining 4 questions.

Because the response file contains security-related sensitive information that should be withheld from public disclosure in accordance with 10 CFR 2.390, a public version is provided with the security-related sensitive information redacted. This email and attached file do not contain any security-related information. An unredacted security-related version is provided under separate email.

The attached file, "RAI 370 Supplement 3 Response US EPR DC-PUBLIC.pdf" provides technically correct and complete responses to Questions 03.07.02-64 and 03.07.02-65, as committed.

The schedule for Question 03.07.03-38 is being revised to allow additional time for AREVA NP to address NRC comments. The schedule for Question 03.07.01-27 question is unchanged.

The following table indicates the respective pages in the response document, "RAI 370 Supplement 3 Response US EPR DC -PUBLIC," that contain the AREVA NP response to the subject questions.

Question #	Start Page	End Page
RAI 370 - 03.07.02-64	2	3
RAI 370 - 03.07.02-65	4	7

The revised schedule for the technically correct and complete response to these questions is provided below.

Question #	Response Date
RAI 370-03.07.01-27	May 18, 2011
RAI 370-03.07.03-38	September 2, 2010

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
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702 561-3528 cell
Martin.Bryan.ext@areva.com

From: BRYAN Martin (EXT)
Sent: Thursday, June 24, 2010 12:31 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); CORNELL Veronica (EXT); VAN NOY Mark (EXT); RYAN Tom (AREVA NP INC); GARDNER George Darrell (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 370, FSAR Ch. 3, Supplement 2

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010. AREVA NP submitted Supplement 1 to the response on June 8, 2010, to provide a schedule for the remaining 4 questions, which were affected by the work underway to address NRC comments from the April 26, 2010, audit.

Based upon the civil/structural re-planning activities and revised RAI response schedule presented to the NRC during the June 9, 2010, Public Meeting, and to allow time to interact with the NRC on the responses, the schedule has been changed.

The revised schedule for the technically correct and complete response to these questions is provided below.

Question #	Response Date
RAI 370-03.07.01-27	May 18, 2011
RAI 370-03.07.02-64	August 10, 2010
RAI 370-03.07.02-65	August 10, 2010
RAI 370-03.07.03-38	August 10, 2010

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
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From: BRYAN Martin (EXT)
Sent: Tuesday, June 08, 2010 3:57 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); VAN

NOY Mark (EXT); CORNELL Veronica (EXT)

Subject: Response to U.S. EPR Design Certification Application RAI No. 370, FSAR Ch. 3, Supplement 1

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI No. 370 on April 26, 2010.

The schedule for question 03.07.01-27 is not being changed by this supplement. The schedule for Questions 03.07.02-64, 03.07.02-65 and 03.07.03-38 has been changed. The dates for the 4 remaining questions will be evaluated and revised, as necessary, based on the information that will be presented at the June 9, 2010, public meeting and subsequent NRC feedback.

Question #	Response Date
RAI 370-03.07.01-27	August 3, 2010
RAI 370-03.07.02-64	July 8, 2010
RAI 370-03.07.02-65	July 8, 2010
RAI 370-03.07.03-38	July 8, 2010

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
Tel: (434) 832-3016
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Martin.Bryan.ext@areva.com

From: BRYAN Martin (EXT)
Sent: Monday, April 26, 2010 1:18 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); RYAN Tom (AREVA NP INC); VAN NOY Mark (EXT)
Subject: Response to U.S. EPR Design Certification Application RAI No. 370, FSAR Ch. 3

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 370 Response US EPR DC.pdf" provides technically correct and complete responses to 1 of the 5 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 370 Question 03.07.03-39.

The following table indicates the respective pages in the response document, "RAI 370 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 370 - 03.07.01-27	2	2
RAI 370 -03.07.02-64	3	3
RAI 370 -03.07.02-65	4	5
RAI 370 -03.07.03-38	6	6

A complete answer is not provided for 4 of the 5 questions. The schedule for a technically correct and complete response to these questions is provided below.

Question #	Response Date
RAI 370 - 03.07.01-27	August 3, 2010
RAI 370 -03.07.02-64	June 10, 2010
RAI 370 -03.07.02-65	June 10, 2010
RAI 370 -03.07.03-38	June 10, 2010

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
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From: Tesfaye, Getachew [<mailto:Getachew.Tesfaye@nrc.gov>]
Sent: Thursday, March 25, 2010 2:00 PM
To: ZZ-DL-A-USEPR-DL
Cc: Chakravorty, Manas; Hawkins, Kimberly; Miernicki, Michael; Patel, Jay; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 370 (4292,4272,4275), FSAR Ch. 3

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on February 18, 2010, and on March 24, 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 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: 4292

Mail Envelope Properties (554210743EFE354B8D5741BEB695E6560F52AE)

Subject: Response to U.S. EPR Design Certification Application RAI No. 370, FSAR Ch. 3, Supplement 23
Sent Date: 3/19/2013 3:40:23 PM
Received Date: 3/19/2013 3:40:34 PM
From: WILLIFORD Dennis (AREVA)

Created By: Dennis.Williford@areva.com

Recipients:

"Miernicki, Michael" <Michael.Miernicki@nrc.gov>
Tracking Status: None
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Tracking Status: None
"ROMINE Judy (AREVA)" <Judy.Romine@areva.com>
Tracking Status: None
"RYAN Tom (AREVA)" <Tom.Ryan@areva.com>
Tracking Status: None
"WILLS Tiffany (AREVA)" <Tiffany.Wills@areva.com>
Tracking Status: None
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Tracking Status: None

Post Office: FUSLYNCMX03.fdom.ad.corp

Files	Size	Date & Time
MESSAGE	68712	3/19/2013 3:40:34 PM
RAI 370 Supplement 23 Response US EPR DC.pdf		204390

Options

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

Response to

Request for Additional Information No. 370, Supplement No. 23

3/25/2010

U.S. EPR Standard Design Certification

AREVA NP Inc.

Docket No. 52-020

SRP Section: 03.07.01 - Seismic Design Parameters

SRP Section: 03.07.02 - Seismic System Analysis

SRP Section: 03.07.03 - Seismic Subsystem Analysis

Application Section: 03.07

QUESTIONS for Structural Engineering Branch 2 (ESBWR/ABWR Projects) (SEB2)

Question 03.07.01-27**Follow Up to RAI 248, Question 03.07.01-25**

In NUREG/CR6919 "Recommendations for Revision of Seismic Damping Values in Regulatory Guide 1.61" it states on page 6 "If significant stresses due to load combinations that include SSE are less than 80 percent of the applicable code stress limits, then using SSE damping values may under-predict the structure's response to seismic loads. In this case structural evaluation and development of in-structure response spectra should be based on a seismic analysis utilizing the OBE damping values specified in Table 2." The OBE damping value in Table 2 recommended for reinforced concrete is 4 percent. In the tables provided in the applicant's response there are only 14 instances where one of the load components results in a stress that exceeds 80 percent of the allowable stress. In addition the locations in the table are at critical sections of the NI common basemat structures. Other locations may have stress levels lower than those presented in the applicant's response. Thus the staff believes it does not have sufficient information to justify the use of SSE damping for the generation of ISRS. The staff is requesting that the applicant provide additional information on the state of stress within the NI common basemat structures (such as stress contours from the GT STRUDL model) to support its position on the use of SSE structural damping values. Justification for the use of SSE damping values for the generation of ISRS should also be provided in the FSAR.

Response to Question 03.07.01-27:

In the RAI 370 Supplement 22 Response to Question 03.07.01-27, AREVA NP indicated that OBE structural damping would be used for the Essential Service Water Building (ESWB) structural analysis and generation of in-structure response spectra (ISRS). Although RG 1.61 allows SSE damping for structural analysis of Seismic Category I structures, AREVA NP conservatively selected OBE damping for the structural analysis and design of the ESWB for both European Utility Requirements (EUR) and high frequency (HF) control motions. AREVA NP performed a preliminary review of the ESWB stability analysis using OBE damping for cases 2sn4u and 1n5a. The stability check of the specified SSI analysis cases using OBE damping did not meet the minimum factor of safety for sliding and overturning described in SRP 3.8.5. The ESWB stability analysis was re-run using SSE structural damping for the EUR control motions and OBE damping for the HF control motions. The stability checks of the SSI analysis cases indicate that the minimum factor of safety for sliding and overturning is met. In lieu of redesigning the ESWB, the U.S. EPR seismic analysis structural damping for the ESWB is being changed to be the same as the Nuclear Island (NI). The change is consistent with the guidance in RG 1.61. The NI and Emergency Power Generating Building (EPGB) are unaffected by this change. The U.S. EPR seismic analysis methodology for the NI, EPGB and ESWB is described below.

The U.S. EPR seismic analysis methodology includes OBE damping results for the generation of ISRS, per Regulatory Guide 1.61, Revision 1, "Damping Values for Seismic Design of Nuclear Power Plants." The ISRS for the NI and ESWB include results from the following seismic analysis cases:

1. OBE damping (per RG 1.61, Table 2) with un-cracked concrete section properties.
2. SSE damping (per RG 1.61, Table 1) with out-of-plane cracked section properties.
3. OBE damping with out-of-plane cracked section properties for the HF motions.

For the NI and ESWB structural designs, including stability evaluations, the analysis results based on SSE damping with out-of-plane cracking will be used for the EUR-based ground motions. The analysis results, based on OBE damping with out-of-plane cracking, will be used for the high-frequency ground motions.

U.S. EPR FSAR Tier 2, Table 03.07.01-27-1, provides a summary of the U.S. EPR seismic analysis structural damping used in the seismic analyses and designs of the NI, ESWB, and EPGB.

Table 03.07.01-27-1–U.S. EPR Seismic Analysis Structural Damping

Structure	Stiffness (Note 1)	Ground Motion	Damping	ISRS	Structural Analysis and Design
NI Common Basemat and ESWB	Un-Cracked	EUR-S, M, H, HF	OBE	X	N/A (Note 2)
	Out-of-Plane Cracked	EUR-S, M, H	SSE	X	X
	Out-of-Plane Cracked	HF	OBE	X	X
EPGB	Un-Cracked	EUR-S, M, H, HF	OBE	X	X
	Out-of-Plane Cracked	EUR-S, M, H, HF	OBE	X	X

Note 1: Out-of-plane bending stiffness reduced 50%.

Note 2: Damping compatible response not a concern for structural evaluations per RG 1.61.

U.S. EPR FSAR Tier 2, Section 2.5.2.6 - Step 8, will be revised to require the applicant to reconcile with the ZPAs in Tables 3.7.2-10, 3.7.2-28, and 3.7.2-29 in addition to reconciliation with the U.S. EPR ISRS as indicated on the enclosed markup. Clarification will be added to ensure the COL applicant recognizes that structural design is performed with individual soil case results and reconciliation is to be based on individual soil case results.

U.S. EPR FSAR Tier 2, Section 2.5.2.6 - Step 8, will be revised to add a statement describing how “key locations” are determined. Key locations are selected based on the location of major equipment and at high elevations in the structure where the ISRS is expected to be amplified.

U.S. EPR FSAR Tier 2, Section 2.5.2.6 - Step 8, will be revised to add an additional location for comparison of ISRS. Fuel building crane rail support elevation +88 ft, 7 in will be added with a pointer to the ISRS envelope figures to be added with the Supplemental Response to RAI 320, Question 03.07.02-63, to be submitted with revised soil structure interaction analysis results. U.S. EPR FSAR Tier 2, Section 3.7.1.2, will be revised to include OBE damping results in the generation of ISRS and further describe the application of damping to structural design and ISRS generation as indicated on the enclosed markup. A description is added for the RCS analysis to indicate that the RBIS wall model will consider OBE damping. This change will require a revision to U.S. EPR FSAR Tier 2, Appendix 3C. This revision will be provided in a Supplemental Response to RAI 371, Question 03.07.01-29. The RCS components in the RCS analysis will continue to use the SSE damping values in Table 3.7.1-1 consistent with R.G. 1.61.

U.S. EPR FSAR Tier 2, Section 3.7.2.4.2, will be revised to include OBE structural damping for reinforced concrete, pre-stressed concrete, and the RCS model in the soil structure interaction seismic analysis for the generation of ISRS, as indicated on the enclosed markup. This section describes the structural damping used in the SSI analysis models including the reinforced concrete structures (NI common basemat structures including RBIS, and the NAB), Pre-stressed concrete containment, and the RCS.

U.S. EPR FSAR Tier 2, Section 3.7.2.4.2, will be revised to include SSE and OBE structural damping for the generation of ISRS and structural analysis for the ESWB as indicated on the enclosed markup.

U.S. EPR FSAR Tier 2, Section 3.7.2.4.6, will be revised to reflect the eight SSI analysis cases where ZPAs are calculated for NI structural design as indicated on the enclosed markup.

U.S. EPR FSAR Tier 2, Section 3.7.2.5, will be revised to add an additional figure for the Fuel Building ISRS locations and three additional figures for the Fuel Building X, Y, and Z response spectrum. These figures will be included in a Supplemental Response to RAI 320, Question 03.07.02-63.

U.S. EPR FSAR Tier 2, Table 3.7.1-1 - Note 4, will be revised to indicate that OBE damping, as well as SSE damping, is used for generation of ISRS for the NI common basemat structures and ESWB. OBE damping is used for ISRS and structural analysis for the EPGB. Also, a pointer to U.S. EPR FSAR Tier 2, Sections 3.7.1.2 and 3.7.2.4, for additional description of the application of damping was added to Note 4 as indicated on the enclosed markup.

U.S. EPR FSAR Tier 2, Section 3.7.1.2, includes a statement that OBE damping is used for the concrete walls in all of the RCS analysis cases. U.S. EPR FSAR Tier 2, Section 3.7.1.2, also identifies the damping method used in RCS seismic analysis to determine the stress in the RCS components. U.S. EPR FSAR Tier 2, Section 3.7.2.4.2, describes the structural damping used in the SSI analysis, including the reinforced concrete structures (NI common basemat structures including RBIS, and the NAB), pre-stressed concrete containment, the RCS, EPGB and ESWB. For the NI and ESWB, both SSE and OBE structural damping is used for generation of ISRS. OBE structural damping is used for generation of the ISRS for the EPGB.

U.S. EPR FSAR Tier 2, Table 3.7.2-10, will be revised as indicated on the enclosed markup to include the ZPAs only for the cracked concrete cases, which will be used for structural design of the NI common basemat structures. The last column, which has the ZPA envelopes of the soil cases, will be deleted and an elevation will be added for fuel building ZPAs. Table 3.7.2-28–Maximum Accelerations in EPGB, and Table 3.7.2-29–Maximum Accelerations in ESWB, will be renamed and revised to include the ZPAs for all soil cases. The ZPA results will be included in a Supplemental Response to RAI 320, Question 03.07.02-63 and RAI 376, Question 03.08.05-31.

U.S. EPR FSAR Tier 2, Appendix 3C, will be revised to include OBE damping for the RBIS concrete wall model. This revision will be provided in a Supplemental Response to RAI 371, Question 03.07.01-29.

FSAR Impact:

U.S. EPR FSAR Tier 2, Sections 2.5.2.6, 3.7.1.2, 3.7.2.4.2, 3.7.2.4.6, and Tables 3.7.1-1 and 3.7.2-10, will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

proposed site. The applicant may perform intermediate-level additional studies to demonstrate that the particular site is bounded by the design of the U.S. EPR. An example of such studies is to show that the site-specific motion at top-of-basemat level, with consideration of the range of structural frequencies involved, is bounded by the U.S. EPR design.

RAI 370,
Q. 03.07.01-27

8. If the evaluations of step 7 are not sufficient, the applicant will perform detailed site-specific SSI analyses with the soil column properties for the particular site. This site-specific evaluation will include dynamic seismic analyses and development of in-structure response spectra (ISRS) for comparison with ISRS and zero period accelerations (ZPAs) for the U.S. EPR at key locations in the U.S. EPR structure where important equipment can be found (reactor pressure vessel supports, steam generator supports, emergency diesel generator foundation) and at high elevations in the structure. These analyses will be performed in accordance with the methodologies described in Section 3.7.1 and Section 3.7.2. Results from this comparison will be acceptable if the amplitude of the site-specific ISRS do not exceed the ISRS for the U.S. EPR as shown in the figures indicated for each location below and the site-specific ZPAs do not exceed the ZPAs for the U.S. EPR in Tables 3.7.2-10, 3.7.2-28, and 3.7.2-29. Comparisons will be made at the following key locations, defined in Section 3.7.2:

- Reactor Building Internal Structures (RBIS)—Reactor Vessel Support at elevation +16 ft, 10-3/4 in (Figures 3.7.2-74, 3.7.2-75, and 3.7.2-76) and steam generator supports at elevation +63 ft, 11-3/4 in (Figures 3.7.2-77, 3.7.2-78, and 3.7.2-79).
- Safeguard Building (SB) 1—elevation +26 ft, 7 in (Figures 3.7.2-80, 3.7.2-81, and 3.7.2-82) and +68 ft, 11 in (Figures 3.7.2-83, 3.7.2-84, and 3.7.2-85).
- SBs 2/3—elevation +26 ft, 7 in (Figures 3.7.2-86, 3.7.2-87, and 3.7.2-88) and +53 ft, 6 in (Figures 3.7.2-89, 3.7.2-90, and 3.7.2-91).
- SB 4—elevation +68 ft, 11 in (Figures 3.7.2-92, 3.7.2-93, and 3.7.2-94).
- Reactor Containment Building (RCB)—Polar crane support at elevation +123 ft, 4-1/4 in (Figures 3.7.2-95, 3.7.2-96, and 3.7.2-97) and top-of-dome at elevation +190 ft, 3-1/2 in (Figures 3.7.2-98, 3.7.2-99, and 3.7.2-100).
- Fuel Building (FB)—elevation + 12 ft, 1-2/3 in. (Figures 3.7.2-110, 3.7.2-111, and 3.7.2-112).
- Emergency Power Generator Building (EPGB)—center of basemat (Figures 3.7.2-101, 3.7.2-102, and 3.7.2-103) and +51 ft, 6 in. (Figures 3.7.2-148, 3.7.2-149, and 3.7.2-150).
- Essential Service Water Building (ESWB)—Node 10385 on elevation +14 ft, 0 in (Figures 3.7.2-107, 3.7.2-108, and 3.7.2-109) and Node 12733 on elevation +63 ft, 0 in (Figures 3.7.2-104, 3.7.2-105, and 3.7.2-106).

The three components of synthetic time history are statistically independent of each other because the cross-correlation coefficients between them, as listed in Table 3.7.1-5—Cross-Correlation Coefficients Among Synthetic Time Histories, are well within the limit value of 0.16.

3.7.1.2 Percentage of Critical Damping Values

Structural systems or materials that experience seismic excitation exhibit energy dissipation through viscous damping. Viscous damping is a form of damping in which the damping force is proportional to the velocity. The mathematical modeling techniques described in Section 3.7.2 and Section 3.7.3 for elastic seismic analysis account for the damping of SSC by including terms to represent equivalent viscous modal damping as a percentage of critical damping.

The equivalent modal damping values for SSE used in the seismic dynamic analysis of U.S. EPR Seismic Category I structures are presented in Table 3.7.1-1—Damping

Values for Safe Shutdown Earthquake. SSE damping values are used for the seismic analysis of the NI and ESWB with EUR control motion cases and the OBE damping values are used with the HF control motion cases. OBE damping values are used for all seismic analysis of the EPGB. In addition, OBE structural damping is included for generation of ISRS for the NI and ESWB with EUR control motion cases. The damping values are based primarily on the guidance in RG_1.61, Rev. 1 ~~and ASCE Std-43-05 (Reference 2).~~

Piping analyzed for the U.S. EPR uses damping in accordance with RG 1.61, Revision_1. A damping ratio of four percent of critical is used when the USM response spectrum method is used to analyze piping systems that are susceptible to stress corrosion cracking or that contain supports that are designed to dissipate energy by yielding.

Values of critical damping in Table 3.7.1-1 for the seismic analysis of the RCS are consistent with RG 1.61. Seismic analysis of the reactor pressure vessel (RPV) Isolated Model is by direct step-by-step integration time history analysis techniques, owing to the non-linear nature of the pressure vessel internals. As such, Rayleigh damping is applied. The Rayleigh mass and stiffness weighted damping coefficients are selected to provide generally conservative damping across the frequency range of interest relative to the values in Table 3.7.1-1. The elements representing the fuel assemblies are damped at a maximum value of 30 percent, as described in Framatome Technologies Topical Report BAW-10133NP-A (Reference 7). For high energy line break analyses more conservative values of Rayleigh mass and stiffness weighted damping coefficients are used. This is addressed further in Section 3C.4.2.1.1. The RCS analysis includes a simplified model of the reactor building interior concrete walls as described in Appendix 3C. OBE damping is used for the concrete walls in all of the RCS analysis cases.

RAI 370,
Q. 03.07.01-27

In-structure response spectra (ISRS) for the NI Common Basemat Structures and ESWB are generated using SSE damping for uncracked concrete and SSE damping for out-of-plane cracking of walls and slabs for EUR-based ground motions. ISRS are generated using OBE damping for uncracked concrete and out-of-plane cracking of walls and slabs for HF ground motions. ~~values rather than the OBE damping values suggested in Table 2 of RG 1.61. It is appropriate to use SSE structural damping for the NI Common Basemat Structures to generate ISRS. This approach is used because the standard plant seismic design basis (see Section 3.7.1.1) coupled with a representative set of soil cases (see Section 3.7.1.3) results in structural loads on both walls and floor diaphragms of NI Common Basemat Structures that are expected to produce cross-section demands greater than 50 percent of design strength.~~

The structural analysis of the NI common basemat structures and ESWB use the out of plane cracking results from the EUR control motion cases with SSE damping and out of plane cracking results from the HF control motion cases with OBE damping.

The ISRS for the Emergency Power Generating Building ~~is and the Essential Service Water Buildings are~~ based on both cracked and uncracked section properties with OBE structural damping.

The structural analysis of the EPGB use both the out of plane cracking and un-cracked results from the EUR and HF control motion cases, all with OBE damping.

RAI 370,
Q. 03.07.01-27

The damping values for conduits and cable tray systems are presented in Table 3.7.1-1. Several test programs and studies have demonstrated that higher damping values may be utilized for certain cable tray systems (References 3 through 5). For cable tray systems that meet the criteria in Table 3.7.1-7 for similarity to the Bechtel-ANCO test program and satisfy tray loading criteria of RG 1.61, the damping values in Figure 3.7.1-16—Damping Values for Cable Tray Systems, may be used on a case-by-case basis. These systems are limited to a maximum damping value of 15 percent in the transverse direction (horizontal direction perpendicular to direction of tray run) and limited to damping values of RG 1.61 in the other directions. For cable tray systems that do not meet the criteria in Table 3.7.1-7 for similarity to the Bechtel-ANCO test program, the damping values of RG 1.61 shall be used for each of the three orthogonal directions. See Appendix 3A for additional discussion on cable tray and conduit system damping.

Heating, ventilation, and air conditioning duct systems use damping values of 10 percent for pocket-lock construction, seven percent for companion-angle construction, and four percent for welded construction. The damping values provided in Table 3.7.1-1 are applicable to time history, response spectra and equivalent static analysis procedures for structural qualification as discussed in regulatory position C.4 of RG 1.61.

**Table 3.7.1-1—Damping Values for Safe Shutdown Earthquake
Sheet 2 of 2**

Item	Percent Critical Damping, SSE ⁴
HVAC Duct Systems	
• Pocket lock	10
• Companion angle	7
• Welded	4
Metal Atmospheric Storage Tanks	
• Impulsive Mode	3
• Sloshing mode	0.5

Notes:

1. For steel structures with a combination of different connection types, use the lowest specified damping value, or as an alternative, use a “weighted average” damping value based on the number of each type present in the structure.
2. As specified in RG 1.61, Revision 1 and ANP-10264NP-A.
3. The following clarifications are applicable.
 - A. Deleted
 - B. Spare and initially empty cable trays and conduits, are analyzed with zero cable load and a maximum of seven percent damping for cable trays and five percent damping for conduits. (Note: Reanalysis is performed when put into service.)
 - C. Deleted
 - D. The selected damping value shall be in accordance with Figure 3.7.1-16.
 - E. Damping values beyond RG 1.61 and as shown in Figure 3.7.1-16 apply solely to the transverse direction (horizontal direction perpendicular to direction of tray run) of cable tray systems meeting the criteria in Table 3.7.1-7 for similarity to Bechtel-ANCO test program (Reference 3) and having 50 percent to fully loaded tray.

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4. SSE and OBE structural damping values per RG 1.61 are used for generation of ISRS for the NI Common Basemat Structures and ESWB. ~~A OBE structural~~ damping ~~value of four percent~~ per RG 1.61 is used for generation of the ISRS and structural analysis for the EPGB ~~and ESWB~~. See description of application of damping for generation of ISRS and structural design in Sections 3.7.1.2 and 3.7.2.4.

Structural damping values used in the SSI analysis are based on Table 3.7.1-1:

- Reinforced concrete (RBIS, balance-of-NI Common Basemat Structures and NAB) – 7 percent. (4 percent structural damping is also used for generation of ISRS)
- Prestressed concrete (containment) – 5 percent. (3 percent damping is also used for generation of ISRS)
- RCS components – 4 percent. (3 percent damping is also used for generation of ISRS)

(2) EPGB and ESWB

Section 3.7.2.3.2 describes the development of the GTSTRU DL code 3D FEM of the structure, the translation of the FEM to that suitable for the MTR/SASSI code, and the development of the cracked FEM with reduced flexural stiffness in the out-of-plane direction of walls and slabs. Table 3.7.2-7, Table 3.7.2-8, and Table 3.7.2-32 show the frequencies computed by GTSTRU DL for the 3D FEM of the EPGB, ESWB (EUR motions), and ESWB (HF motion), respectively.

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Both EPGB and ESWB are reinforced concrete structures. A structural damping equal to 4 percent is ~~conservatively~~ used in the EPGB SSI analysis with EUR and HF control motions for structural analysis and generation of ISRS. However for EUR control motions, a structural damping of 7 percent is used in the ESWB SSI analysis for structural analysis and generation of ISRS. Four percent structural damping is also used with EUR control motions for generation of the ESWB ISRS. For HF control motions, four percent structural damping is used for structural analysis and generation of ISRS for the ESWB.

3.7.2.4.3 Step 3 - Development of Soil Model

To develop the soil model for use in the SSI analysis with the SASSI code, each of the soil profiles is discretized into a sufficient number of sub-layers, followed by a uniform half space beneath the lowest sub-layer. The passing frequency f_p , which is the maximum frequency that can be represented by the soil model, is based on $f_p = V_s / (5L_e)$, where V_s is the soil shear wave velocity and L_e is the element size for discretizing the soil. Both the excavated soil element size and soil layer thickness are considered for L_e to assess the high-frequency transmission capability of the model in both the horizontal and vertical directions. The soil cases subjected to EUR soft input motions govern the design response spectra up to a frequency that is well below the calculated passing frequency of the subgrade. The medium and hard soil cases transmit frequencies up to the input motion frequency of interest. The upper bound HF (hsub) soil case bounds the ISRS responses in the high frequency range. The analysis models used in the seismic analyses, thus, adequately develop the seismic demand. The soil

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At key elevations of the FEM for the individual structure, the envelope of ZPAs at the building corners is taken to be the ZPA representative of the particular SSI analysis case. The ZPAs are shown in Table 3.7.2-10—NI Common Basemat Structures ZPAs, which presents the floor elevation individual envelope of ZPAs from the ~~sixteen cases~~ (eight SSI analysis cases ~~times two uncracked and with~~ cracked analysis models) ~~as well as the envelope of all sixteen cases~~. The structural design is performed for individual soil cases.

The time history of the displacement at the NI Common Basemat relative to the input ground motion is determined by double integrating the acceleration response time history at the basemat, applying a linear baseline correction, and subtracting from it the displacement time history of the free field ground motion for each SSI analysis case. The maximum relative displacement at a given structural location in the NI Common Basemat Structures with respect to the basemat is conservatively taken from the equivalent static analysis of the FEM of the NI Common Basemat Structures described in Section 3.8.4.

(2) EPGB and ESWB

Similarly, the SSI analysis of the EPGB and ESWB generate total floor acceleration response time histories in the three global directions. ZPAs and ISRS at specified locations are computed using SASSIEXT, Version 1.0.

Table 3.7.2-28—Maximum Accelerations in EPGB and Table 3.7.2-29—Maximum Accelerations in ESWB show the maximum ZPAs at different elevations of the EPGB and ESWB, respectively.

As discussed in Section 3.8.4.4.3, subsequent analyses will incorporate certain design details for the EPGBs and ESWBs that are not reflected in the existing respective SASSI models used for the SSI analyses described in Section 3.7.2. The subsequent analyses will determine the impact of these design details on the seismic responses and ISRS presented in Section 3.7.2.

3.7.2.4.7 Step 7 – Determining Amplified Seismic Responses for Flexible Slabs and Walls

(1) NI Common Basemat Structures

The out-of-plane seismic responses of flexible slabs and walls are directly available from the SSI analysis because the meshing of the dynamic 3D FEM of the NI Common Basemat Structure is sufficient to represent the flexible slabs and walls. The seismic responses accounting for the fully cracked and uncracked conditions for walls and slabs are simulated, respectively, by the dynamic FEMs with cracked and uncracked section properties for the concrete walls and floors. Generation of response spectra for the flexible slabs and walls are discussed in Section 3.7.2.5.

Table 3.7.2-10—NI Common Basemat Structures ZPAs

Nuclear Island Key Locations										
Zero Period Accelerations at Each Floor Level [g]										
		Motion =>	EURS	EURH	EURM	EURM	EURH	HF	HF	HF
Designation	Elevation [m]	Direction	Cracked							
			Case 1n2ue	Case 1n5ae	Case 2sn4ue	Case 4ue	Case 5ae	Case hflb	Case hfbe	Case hfub
Containment Building	37.60	X	0.32	0.68	0.65	0.76	0.76	0.19	0.31	0.35
		Y	0.31	0.74	0.72	0.95	0.92	0.21	0.22	0.37
		Z	0.35	0.69	0.50	0.65	0.89	0.24	0.25	0.33
	58.00	X	0.41	1.05	0.83	0.95	1.02	0.28	0.32	0.38
		Y	0.38	0.91	0.93	1.27	1.00	0.36	0.40	0.47
		Z	0.34	1.11	0.58	0.95	1.35	0.49	0.69	1.04
Reactor Building Internal Structure	5.15	X	0.20	0.36	0.36	0.45	0.37	0.16	0.24	0.21
		Y	0.22	0.37	0.32	0.40	0.40	0.14	0.17	0.19
		Z	0.29	0.49	0.46	0.50	0.54	0.18	0.23	0.25
	19.50	X	0.22	0.55	0.57	0.66	0.61	0.23	0.24	0.23
		Y	0.26	0.53	0.44	0.54	0.60	0.16	0.18	0.22
Safeguard Building 1	8.10	X	0.22	0.41	0.34	0.37	0.45	0.14	0.18	0.40
		Y	0.22	0.40	0.31	0.42	0.37	0.17	0.19	0.46
		Z	0.32	0.49	0.40	0.50	0.42	0.16	0.17	0.25
	21.00	X	0.24	0.49	0.44	0.51	0.60	0.18	0.22	0.29
		Y	0.26	0.44	0.37	0.51	0.59	0.19	0.21	0.32
Safeguard Building 2 & 3	8.10	X	0.23	0.74	0.37	0.59	0.92	0.31	0.40	0.38
		Y	0.23	0.51	0.34	0.59	0.62	0.22	0.27	0.26
		Z	0.37	0.48	0.43	0.49	0.52	0.18	0.20	0.24
	16.30	X	0.24	0.71	0.42	0.77	1.08	0.25	0.26	0.34
		Y	0.25	0.68	0.43	0.69	0.81	0.28	0.27	0.32
Safeguard Building 4	21.00	X	0.22	0.49	0.35	0.47	0.51	0.20	0.20	0.27
		Y	0.27	0.41	0.37	0.53	0.56	0.17	0.19	0.25
		Z	0.33	0.55	0.47	0.44	0.51	0.26	0.31	0.39
	Fuel Building Shield Structure	X	0.17	0.39	0.30	0.34	0.45	0.19	0.19	0.25
		Y	0.22	0.40	0.35	0.39	0.46	0.18	0.19	0.23
3.70	Z	0.32	0.47	0.50	0.44	0.46	0.21	0.23	0.25	

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