ArevaEPRDCPEm Resource

From: WILLIFORD Dennis (AREVA) [Dennis.Williford@areva.com]
Sent: Thursday, February 28, 2013 1:54 PM
To: Snyder, Amy
Cc: Hearn, Peter; DELANO Karen (AREVA); LEIGHLITER John (AREVA); ROMINE Judy (AREVA); RYAN Tom (AREVA); WILLS Tiffany (AREVA); KOWALSKI David (AREVA)
Subject: Response to U.S. EPR Design Certification Application RAI No. 525 (6194, 6154), FSAR Ch. 9, Supplement 7
Attachments: RAI 525 Supplement 7 Response US EPR DC.pdf

Importance: High

Amy,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the eighteen questions in RAI No. 525 on January 25, 2012. Supplement 1 response was sent on February 24, 2012 to provide a revised schedule. Supplement 2 response was sent on March 16, 2012 to provide a response to Question 09.01.04-28. Supplement 3 response was sent on May 30, 2012 to provide a revised final response to Question 09.01.04-28. Supplement 4 response was sent on December 14, 2012 to provide a revised schedule for 6 of the remaining 17 questions. Supplement 5 response was sent on January 8, 2013 to provide a revised schedule for 11 of the remaining 17 questions. Supplement 6 response was sent on February 25, 2013 to provide technically correct and complete final responses to two questions (Questions 09.01.04-32 and 09.01.04-35).

The attached file, "RAI 525 Supplement 7 Response US EPR DC.pdf," provides a technically correct and complete final response to two questions (Questions 09.01.04-21 and 09.01.04-34). Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the final responses to RAI 525 Questions 09.01.04-21 and 09.01.04-34.

The following table indicates the respective pages in the response document, "RAI 525 Supplement 7 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 525 — 09.01.04-21	2	3
RAI 525 — 09.01.04-34	4	5

The schedule for technically correct and complete responses to the remaining 13 questions has not changed as provided below.

Question #	Response Date
RAI 525 — 09.01.04-22	May 15, 2013
RAI 525 — 09.01.04-23	February 28, 2013
RAI 525 — 09.01.04-24	May 15, 2013
RAI 525 — 09.01.04-25	May 15, 2013
RAI 525 — 09.01.04-26	May 15, 2013
RAI 525 — 09.01.04-27	March 29, 2013
RAI 525 — 09.01.04-29	March 29, 2013

RAI 525 — 09.01.04-30	May 15, 2013
RAI 525 — 09.01.04-31	May 24, 2013
RAI 525 — 09.01.04-33	May 24, 2013
RAI 525 — 09.01.04-36	May 24, 2013
RAI 525 — 09.01.04-37	May 24, 2013
RAI 525 — 09.01.04-38	February 28, 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: Monday, February 25, 2013 10:11 PM
To: Amy.Snyder@nrc.gov
Cc: peter.hearn@nrc.gov; DELANO Karen (RS/NB); LEIGHLITER John (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); WILLS Tiffany (CORP/QP); KOWALSKI David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 525 (6194, 6154), FSAR Ch. 9, Supplement 6
Importance: High

Amy,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the eighteen questions in RAI No. 525 on January 25, 2012. Supplement 1 response was sent on February 24, 2012 to provide a revised schedule. Supplement 2 response was sent on March 16, 2012 to provide a response to Question 09.01.04-28. Supplement 3 response was sent on May 30, 2012 to provide a revised final response to Question 09.01.04-28. Supplement 4 response was sent on December 14, 2012 to provide a revised schedule for 6 of the remaining 17 questions. Supplement 5 response was sent on January 8, 2013 to provide a revised schedule for 11 of the remaining 17 questions.

The attached file, "RAI 525 Supplement 6 Response US EPR DC.pdf" provides a technically correct and complete final response to two questions (Questions 09.01.04-32 and 09.01.04-35).

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 525 Questions 09.01.04-32 and 09.01.04-35.

The following table indicates the respective pages in the response document, "RAI 525 Supplement 6 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 525 — 09.01.04-32	2	2
RAI 525 — 09.01.04-35	3	3

The schedule for a technically correct and complete response to the remaining 15 questions is unchanged as provided below.

Question #	Response Date
RAI 525 — 09.01.04-21	February 28, 2013
RAI 525 — 09.01.04-22	May 15, 2013
RAI 525 — 09.01.04-23	February 28, 2013
RAI 525 — 09.01.04-24	May 15, 2013
RAI 525 — 09.01.04-25	May 15, 2013
RAI 525 — 09.01.04-26	May 15, 2013
RAI 525 — 09.01.04-27	March 29, 2013
RAI 525 — 09.01.04-29	March 29, 2013
RAI 525 — 09.01.04-30	May 15, 2013
RAI 525 — 09.01.04-31	May 24, 2013
RAI 525 — 09.01.04-33	May 24, 2013
RAI 525 — 09.01.04-34	February 28, 2013
RAI 525 — 09.01.04-36	May 24, 2013
RAI 525 — 09.01.04-37	May 24, 2013
RAI 525 — 09.01.04-38	February 28, 2013

Sincerely,

Dennis Williford, P.E.
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
7207 IBM Drive, Mail Code CLT 2B
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From: WILLIFORD Dennis (RS/NB)
Sent: Tuesday, January 08, 2013 3:40 PM
To: Amy.Snyder@nrc.gov
Cc: peter.hearn@nrc.gov; DELANO Karen (RS/NB); LEIGHLITER John (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); WILLS Tiffany (CORP/QP); KOWALSKI David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 525 (6194, 6154), FSAR Ch. 9, Supplement 5
Importance: High

Amy,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the eighteen questions in RAI No. 525 on January 25, 2012. Supplement 1 response was sent on February 24, 2012 to provide a revised schedule. Supplement 2 response was sent on March 16, 2012 to provide a response to Question 09.01.04-28. Supplement 3 response was sent on May 30, 2012 to provide a revised final response to Question 09.01.04-28. Supplement 4 response was sent on December 14, 2012 to provide a revised schedule for 6 of the remaining 17 questions.

The schedule for a technically correct and complete response to 11 of the remaining 17 questions has been revised as provided below.

Question #	Response Date
RAI 525 — 09.01.04-21	February 28, 2013
RAI 525 — 09.01.04-22	**May 15, 2013**
RAI 525 — 09.01.04-23	February 28, 2013
RAI 525 — 09.01.04-24	**May 15, 2013**
RAI 525 — 09.01.04-25	**May 15, 2013**
RAI 525 — 09.01.04-26	**May 15, 2013**
RAI 525 — 09.01.04-27	**March 29, 2013**
RAI 525 — 09.01.04-29	**March 29, 2013**
RAI 525 — 09.01.04-30	**May 15, 2013**
RAI 525 — 09.01.04-31	**May 24, 2013**
RAI 525 — 09.01.04-32	February 28, 2013
RAI 525 — 09.01.04-33	**May 24, 2013**
RAI 525 — 09.01.04-34	February 28, 2013
RAI 525 — 09.01.04-35	February 28, 2013
RAI 525 — 09.01.04-36	**May 24, 2013**
RAI 525 — 09.01.04-37	**May 24, 2013**
RAI 525 — 09.01.04-38	February 28, 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
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Email: Dennis.Williford@areva.com

From: WILLIFORD Dennis (RS/NB)
Sent: Friday, December 14, 2012 4:58 PM
To: Amy.Snyder@nrc.gov
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); LEIGHLITER John (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); peter.hearn@nrc.gov; KOWALSKI David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 525 (6194, 6154), FSAR Ch. 9, Supplement 4
Importance: High

Amy,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the eighteen questions in RAI No. 525 on January 25, 2012. Supplement 1 response was sent on February 24, 2012 to provide a revised schedule. Supplement 2 response was sent on March 16, 2012 to provide a response to Question 09.01.04-28. Supplement 3 response was sent on May 30, 2012 to provide a revised final response to Question 09.01.04-28.

The schedule for a technically correct and complete response to 6 of the remaining 17 questions has been revised as provided below.

Question #	Response Date
RAI 525 — 09.01.04-21	**February 28, 2013**
RAI 525 — 09.01.04-22	June 28, 2013
RAI 525 — 09.01.04-23	**February 28, 2013**
RAI 525 — 09.01.04-24	June 28, 2013
RAI 525 — 09.01.04-25	June 28, 2013
RAI 525 — 09.01.04-26	June 28, 2013
RAI 525 — 09.01.04-27	June 28, 2013
RAI 525 — 09.01.04-29	June 28, 2013
RAI 525 — 09.01.04-30	June 28, 2013
RAI 525 — 09.01.04-31	June 28, 2013
RAI 525 — 09.01.04-32	**February 28, 2013**
RAI 525 — 09.01.04-33	June 28, 2013
RAI 525 — 09.01.04-34	**February 28, 2013**
RAI 525 — 09.01.04-35	**February 28, 2013**
RAI 525 — 09.01.04-36	June 28, 2013
RAI 525 — 09.01.04-37	June 28, 2013
RAI 525 — 09.01.04-38	**February 28, 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: Wednesday, May 30, 2012 11:38 AM
To: Getachew.Tesfaye@nrc.gov
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); KOWALSKI David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 525 (6194, 6154), FSAR Ch. 9, Supplement 3
Importance: High

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the eighteen questions in RAI No. 525 on January 25, 2012. Supplement 1 response to RAI No. 525 was sent on February 24, 2012 to provide a revised schedule. Supplement 2 response to RAI No. 525 was sent on March 16, 2012 to provide a complete final response to Question 09.01.04-28.

The attached file, “RAI 525 Supplement 3 Response US EPR DC.pdf” provides a technically correct and complete revised final response to Question 09.01.04-28, which supersedes in its entirety the response to this question provided in Supplement 2.

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 525 Question 09.01.04-28.

The following table indicates the respective pages in the response document, “RAI 525 Supplement 3 Response US EPR DC.pdf,” that contain AREVA NP’s response to the subject question.

Question #	Start Page	End Page
RAI 525 — 09.01.04-28	2	2

The schedule for a technically correct and complete response to the remaining 17 questions has not changed as provided below.

Question #	Response Date
RAI 525 — 09.01.04-21	June 28, 2013
RAI 525 — 09.01.04-22	June 28, 2013
RAI 525 — 09.01.04-23	June 28, 2013
RAI 525 — 09.01.04-24	June 28, 2013
RAI 525 — 09.01.04-25	June 28, 2013
RAI 525 — 09.01.04-26	June 28, 2013
RAI 525 — 09.01.04-27	June 28, 2013
RAI 525 — 09.01.04-29	June 28, 2013
RAI 525 — 09.01.04-30	June 28, 2013
RAI 525 — 09.01.04-31	June 28, 2013
RAI 525 — 09.01.04-32	June 28, 2013
RAI 525 — 09.01.04-33	June 28, 2013
RAI 525 — 09.01.04-34	June 28, 2013
RAI 525 — 09.01.04-35	June 28, 2013
RAI 525 — 09.01.04-36	June 28, 2013
RAI 525 — 09.01.04-37	June 28, 2013
RAI 525 — 09.01.04-38	June 28, 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
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From: WILLIFORD Dennis (RS/NB)
Sent: Friday, March 16, 2012 3:05 PM
To: Getachew.Tesfaye@nrc.gov
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); KOWALSKI David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 525 (6194, 6154), FSAR Ch. 9, Supplement 2

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the eighteen questions in RAI No. 525 on January 25, 2012. Supplement 1 response to RAI No. 525 was sent on February 24, 2012 to provide a revised schedule.

The attached file, "RAI 525 Supplement 2 Response US EPR DC.pdf" provides a technically correct and complete final response to Question 09.01.04-28.

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 525 Question 09.01.04-28.

The following table indicates the respective pages in the response document, "RAI 525 Supplement 2 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 525 — 09.01.04-28	2	2

The schedule for technically correct and complete responses to the remaining seventeen questions has not changed and is provided below.

Question #	Response Date
RAI 525 — 09.01.04-21	June 28, 2013
RAI 525 — 09.01.04-22	June 28, 2013
RAI 525 — 09.01.04-23	June 28, 2013
RAI 525 — 09.01.04-24	June 28, 2013
RAI 525 — 09.01.04-25	June 28, 2013
RAI 525 — 09.01.04-26	June 28, 2013
RAI 525 — 09.01.04-27	June 28, 2013
RAI 525 — 09.01.04-29	June 28, 2013
RAI 525 — 09.01.04-30	June 28, 2013
RAI 525 — 09.01.04-31	June 28, 2013
RAI 525 — 09.01.04-32	June 28, 2013
RAI 525 — 09.01.04-33	June 28, 2013
RAI 525 — 09.01.04-34	June 28, 2013
RAI 525 — 09.01.04-35	June 28, 2013
RAI 525 — 09.01.04-36	June 28, 2013
RAI 525 — 09.01.04-37	June 28, 2013
RAI 525 — 09.01.04-38	June 28, 2013

Sincerely,

Dennis Williford, P.E.
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AREVA NP Inc.
7207 IBM Drive, Mail Code CLT 2B
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Email: Dennis.Williford@areva.com

From: WILLIFORD Dennis (RS/NB)
Sent: Friday, February 24, 2012 5:21 PM
To: Getachew.Tesfaye@nrc.gov
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); KOWALSKI David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 525 (6194, 6154), FSAR Ch. 9, Supplement 1

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the eighteen questions in RAI No. 525 on January 25, 2012.

The schedule for technically correct and complete responses to the eighteen questions has been changed as provided below. This schedule was transmitted to the NRC in AREVA NP letter NRC:12:008 dated February 21, 2012.

Question #	Response Date
RAI 525 — 09.01.04-21	**June 28, 2013**
RAI 525 — 09.01.04-22	**June 28, 2013**
RAI 525 — 09.01.04-23	**June 28, 2013**
RAI 525 — 09.01.04-24	**June 28, 2013**
RAI 525 — 09.01.04-25	**June 28, 2013**
RAI 525 — 09.01.04-26	**June 28, 2013**
RAI 525 — 09.01.04-27	**June 28, 2013**
RAI 525 — 09.01.04-28	**June 28, 2013**
RAI 525 — 09.01.04-29	**June 28, 2013**
RAI 525 — 09.01.04-30	**June 28, 2013**
RAI 525 — 09.01.04-31	**June 28, 2013**
RAI 525 — 09.01.04-32	**June 28, 2013**
RAI 525 — 09.01.04-33	**June 28, 2013**
RAI 525 — 09.01.04-34	**June 28, 2013**
RAI 525 — 09.01.04-35	**June 28, 2013**
RAI 525 — 09.01.04-36	**June 28, 2013**
RAI 525 — 09.01.04-37	**June 28, 2013**
RAI 525 — 09.01.04-38	**June 28, 2013**

Sincerely,

Dennis Williford, P.E.
U.S. EPR Design Certification Licensing Manager
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Email: Dennis.Williford@areva.com

From: WILLIFORD Dennis (RS/NB)
Sent: Wednesday, January 25, 2012 4:06 PM
To: 'Tesfaye, Getachew'
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); KOWALSKI David (RS/NB); Michael.Miernicki@nrc.gov; peter.hearn@nrc.gov
Subject: Response to U.S. EPR Design Certification Application RAI No. 525 (6194, 6154), FSAR Ch. 9

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 525 Response US EPR DC.pdf," provides a preliminary schedule since a technically correct and complete response to these eighteen questions cannot be provided at this time.

The following table indicates the respective pages in the response document, "RAI 525 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 525 — 09.01.04-21	2	2
RAI 525 — 09.01.04-22	3	3
RAI 525 — 09.01.04-23	4	4
RAI 525 — 09.01.04-24	5	5
RAI 525 — 09.01.04-25	6	6
RAI 525 — 09.01.04-26	7	7
RAI 525 — 09.01.04-27	8	8
RAI 525 — 09.01.04-28	9	9
RAI 525 — 09.01.04-29	10	10
RAI 525 — 09.01.04-30	11	11
RAI 525 — 09.01.04-31	12	12
RAI 525 — 09.01.04-32	13	13
RAI 525 — 09.01.04-33	14	14
RAI 525 — 09.01.04-34	15	15
RAI 525 — 09.01.04-35	16	16
RAI 525 — 09.01.04-36	17	17
RAI 525 — 09.01.04-37	18	18
RAI 525 — 09.01.04-38	19	19

A preliminary schedule for technically correct and complete responses to these questions is provided below. This schedule is being reevaluated and a new supplement with a revised schedule will be transmitted by February 21, 2012.

Question #	Response Date
RAI 525 — 09.01.04-21	February 21, 2012
RAI 525 — 09.01.04-22	February 21, 2012
RAI 525 — 09.01.04-23	February 21, 2012
RAI 525 — 09.01.04-24	February 21, 2012
RAI 525 — 09.01.04-25	February 21, 2012
RAI 525 — 09.01.04-26	February 21, 2012
RAI 525 — 09.01.04-27	February 21, 2012
RAI 525 — 09.01.04-28	February 21, 2012
RAI 525 — 09.01.04-29	February 21, 2012
RAI 525 — 09.01.04-30	February 21, 2012
RAI 525 — 09.01.04-31	February 21, 2012
RAI 525 — 09.01.04-32	February 21, 2012
RAI 525 — 09.01.04-33	February 21, 2012
RAI 525 — 09.01.04-34	February 21, 2012
RAI 525 — 09.01.04-35	February 21, 2012
RAI 525 — 09.01.04-36	February 21, 2012
RAI 525 — 09.01.04-37	February 21, 2012
RAI 525 — 09.01.04-38	February 21, 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: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Monday, December 19, 2011 4:19 PM
To: ZZ-DL-A-USEPR-DL
Cc: Curran, Gordon; McKenna, Eileen; Xu, Jim; Thomas, Brian; Hearn, Peter; Segala, John; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 525 (6194, 6154), FSAR Ch. 9

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on November 11, 2011, and discussed with your staff on December 2, 2011. Draft RAI Questions 09.01.04-24, 09.01.04-31, and 09.01.04-33 were modified as a result of that discussion. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs, excluding the time period of **December 24, 2011 thru January 2, 2012, to account for the holiday season** as discussed with AREVA NP Inc. For any RAIs that cannot be answered **within 40 days**, it is expected that a date for receipt of this information will be provided to the staff within the 40-day period so that the staff can assess how this information will impact the published schedule.

Thanks,
Getachew Tesfaye

Sr. Project Manager
NRO/DNRL/NARP
(301) 415-3361

Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 4243

Mail Envelope Properties (554210743EFE354B8D5741BEB695E6560E8C7D)

Subject: Response to U.S. EPR Design Certification Application RAI No. 525 (6194, 6154), FSAR Ch. 9, Supplement 7
Sent Date: 2/28/2013 1:53:31 PM
Received Date: 2/28/2013 1:53:48 PM
From: WILLIFORD Dennis (AREVA)

Created By: Dennis.Williford@areva.com

Recipients:
"Hearn, Peter" <Peter.Hearn@nrc.gov>
Tracking Status: None
"DELANO Karen (AREVA)" <Karen.Delano@areva.com>
Tracking Status: None
"LEIGHLITER John (AREVA)" <John.Leighliter@areva.com>
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
"KOWALSKI David (AREVA)" <David.Kowalski@areva.com>
Tracking Status: None
"Snyder, Amy" <Amy.Snyder@nrc.gov>
Tracking Status: None

Post Office: FUSLYNCMX03.fdom.ad.corp

Files	**Size**	**Date & Time**
MESSAGE	21069	2/28/2013 1:53:48 PM
RAI 525 Supplement 7 Response US EPR DC.pdf	556627	

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

Response to

Request for Additional Information No. 525, Supplement 7

12/19/2011

U.S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 09.01.04 - Light Load Handling System (Related to Refueling)
Application Section: 09.01.04

QUESTIONS for Balance of Plant Branch 1 (SBPA)
QUESTIONS for Structural Engineering Branch 2 (ESBWR/ABWR Projects) (SEB2)

Question 09.01.04-21:

OPEN ITEM

While it is clear that the biological lid handling station is designed in accordance with NOG-1, it was not clear to the staff whether the hoists of the SFCTF are single failure proof and designed with redundant components. The applicant should define which SFCTF components are designed to NOG-1 as a single failure proof hoist. In addition, the applicant indicates that the anti-seismic devices are engaged at every station, prior to any cask handling operations. However, it is not clear to the staff whether the SFCTM brakes are also applied at every station or whether the SFCTM is held in place with just the anti-seismic device. The staff requests the applicant to clearly define which components are designed to NOG-1 as a single failure proof hoist.

Response to Question 09.01.04-21:

The components of the spent fuel cask transfer facility (SFCTF), which are involved in the lifting and lowering of the load, are provided with single failure-proof features, as described below:

In order to open or close the loading penetration, a hoist is used to maneuver the upper cover of the loading penetration. The hoist for the upper cover is a stationary lifting device. The hoist for the upper cover is designed as a single failure-proof hoist, per the relevant requirements of ASME NOG-1, to provide assurance that any credible failure of a single component in the hoist mechanism would not result in the loss of capability to stop and hold the load.

The biological lid handling station is used for lifting and lowering the biological lid. The biological lid handling station is a stationary lifting device. The biological lid handling station uses a screw jack mechanism for lifting and lowering the load. The screw jack and gripper are designed per guidance of ANSI N14.6. The screw jack movement is not possible without an external action. The biological lid handling station vertical motorization for moving the screw jack is designed per guidance of ASME NOG-1, and it includes single failure-proof features to provide assurance that any credible failure of a single component would not result in the loss of capability to stop and hold the biological lid.

The spent fuel cask transfer machine (SFCTM) is equipped with an elevator for lifting and lowering the lower cover of the loading penetration. The elevator is fixed on the SFCTM. The elevator uses a screw/nut system for lifting and lowering the lower cover. The screw/nut system is designed per guidance of ANSI N14.6. The screw movement is not possible without an external action. The elevator vertical motorization for moving the screw is designed per guidance of ASME NOG-1, and it includes single failure-proof features to provide assurance that any credible failure of a single component would not result in the loss of capability to stop and hold the lower cover.

The SFCTM anti-seismic locks are engaged and the SFCTM traveling motor brake is applied at every station prior to initiating cask handling activities at the respective station.

U.S. EPR FSAR Tier 2, Section 9.1.4.2.2 will be revised to incorporate this additional information.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 9.1.4.2.2 will be revised as described in the response and indicated on the enclosed markup.

Question 09.01.04-34:

OPEN ITEM

Section 9.1.4.2 of US EPR FSAR Revision 4 Interim (August 31, 2011, Response to RAI 385) described that the SFCTM and the penetration assembly are designed as seismic Category I equipment. The SFCTM is designed in accordance with the applicable portions of ASME NOG-1-2004 while the design for the penetration assembly follows the ANSI/ANS-57.2-1983. However, no description of the analysis methods and associated analysis results is provided in the FSAR section to support the designs of the SFCTM and the penetration assembly. Therefore, the applicant is requested to provide the following:

a. Description of the design/analysis procedures and results used for the SFCTM and penetration assembly.

b. Description of the computer models used to establish that the design of the SFCTM and the penetration assembly meet the seismic Category I requirements.

c. Description of how various connections are modeled such as the lateral supports to the SFCTM with concrete walls through the anti-seismic locking devices and the vertical support at the base, as well as the interfaces between the SFCTM and the penetration assembly to ensure the leaktightness during an SSE event.

d. Description of the design/analysis procedures and results used for the loading hall and cast loading pit structures.

Response to Question 09.01.04-34:

a. – c. Items (a) through (c) of the question are addressed collectively in the response below:

- The spent fuel cask transfer machine (SFCTM) and penetration assembly are procured components. Specific design details of the components, analysis procedures, and computer models for analysis will be performed by the vendor during the procurement phase and are not needed for design certification.
- The application of codes and standards, including ASME Section III, Division 1, Subsection NF, for the structural design of parts of the SFCTM will be described in the response to RAI 525, Question 09.01.04-30.
- The application of codes and standards, including ASME Section III, Division 1, Subsection NF, for the structural design of parts of the penetration assembly will be described in the response to RAI 525, Question 09.01.04-31.

d. The loading hall and cask loading pit are integral to the Fuel Building (FB) concrete structure. U.S. EPR FSAR Tier 2, Section 3.8.4.1 identifies the FB as an “Other Seismic Category I Structure”. That is, the FB is a Seismic Category I structure other than the Reactor Containment Building and Reactor Building. U.S. EPR FSAR Tier 2, Section 3.8.4.4.1 lists the general design procedures applicable to other Seismic Category I structures.

Seismic analysis results for Seismic Category I structures are included in U.S. EPR FSAR Tier 2, Section 3.7. The loading hall and cask loading pit areas of the FB did not meet the selection criterion for analysis of "critical sections" in U.S. EPR FSAR Tier 2, Appendix 3E. Therefore, design results for the loading hall and cask loading pit structural elements will be performed during execution of the detailed design phase.

U.S. EPR FSAR Tier 2, Section 9.1.4.2 will be revised to reflect this information and include references to U.S. EPR FSAR Tier 2, Sections 3.8.4.4.1 and 3.7.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 9.1.4.2 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

This equipment consists of fuel assembly handling devices such as the refueling machine, FTTF, new fuel elevator, spent fuel machine, auxiliary crane, Spent Fuel Cask Transfer Facility, and fuel racks. The areas associated with the fuel handling equipment are the refueling cavity consisting of the reactor cavity, the core internal storage area and the reactor building transfer compartment, and the fuel pool consisting of the transfer pit, the loading pit and the spent fuel storage pool, loading hall, and the new fuel storage area.

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Figures showing the overall system arrangement in the RB and FB are provided in Section 3.8. Section 3.8.4.1 describes the FB as a Seismic Category I structure. The loading hall and cask loading pit are integral to the FB concrete structure and are designed as Seismic Category I structures. Section 3.8.4.2 identifies the applicable codes and standards used for the design of Seismic Category I structures other than the RB and Reactor Containment Building. Section 3.8.4.4.1 lists the general design procedures applicable to other Seismic Category I structures. The design of anchors and embedments conforms to the requirements of ACI 349-06. The results of seismic analyses for Seismic Category I structures are given in Section 3.7.

9.1.4.2.1 General Description

The fuel handling equipment can handle a fuel assembly underwater from the time a new fuel assembly is lowered into the underwater fuel storage area until the irradiated fuel assembly is placed in a spent fuel cask for shipment from the site. Underwater transfer of spent fuel assemblies provides radiation shielding and cooling for removal of decay heat. The boric acid concentration in the water is sufficient to preclude criticality.

The reactor cavity, the core internal storage compartment, and the reactor building pool transfer compartment are flooded only for refueling during plant shutdowns. The SFP remains full of water and is always accessible to operating personnel.

New Fuel Handling and Storage

New fuel containers are received in the FB loading bay. Typically, each container carries two fuel assemblies. New fuel containers are raised one at a time through a floor opening to the new fuel examination area located at Elevation +48 feet, 6.75 inches with the use of the auxiliary crane. The new fuel assemblies are removed from the container for individual examination using the auxiliary crane and new fuel handling tool. The new fuel assembly is raised through the floor opening until the fuel assembly lower end clears the fuel pool operating floor level (+64 feet) and is then moved and either lowered in the new fuel dry storage area or in the new fuel elevator basket. This process is repeated for the remaining new fuel containers. The new fuel elevator lowers the fuel assembly into the spent fuel storage pool for underwater storage. Administrative controls prevent movement of a new fuel assembly over the

The penetration docking device is fixed on top of the SFCTM and is used to lower the penetration assembly bellows to connect the leak-tight flange to the cask mating surface. The penetration docking device consists of four identical assemblies, each of which includes a screw connected at its lower end to a bearing and whose upper end engages into a swiveled nut of the penetration docking flange. Each screw is moved upwards by an air cylinder and is rotated by an electric motor and a reduction gear that maintains its rotation. Each assembly is irreversible and equipped with a position sensor for a high and low travel. Each screw also has a revolution counter that maintains the balance of the four assemblies and provides for equal loading on the screws. The penetration docking device permits undocking of the cask even with two diametrically opposed assemblies. A manual backup operates the screws in case of loss of electric power. The docking mechanism is shown in Figure 9.1.4-10—Loading Penetration Docking Mechanism.

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The elevator for the lower cover is fixed on the SFCTM. The elevator uses a screw/nut system for lifting and lowering the lower cover. The screw movement is not possible without an external action.

The SFCTM provides shielding for operators in abnormal conditions when loading hall entry is required before the biological lid is inserted into the cask to minimize occupational dose. The shielding is placed around the top of the cask and around equipment that may contain contaminated water or gas.

The SFCTM has an interlock with the external door of the loading hall, which precludes operation if the external door is open. The external door remains closed during cask loading operations. Mechanical stops are used to prevent inadvertent contact of the SFCTM with the loading hall door or wall.

To prevent damage to the penetration assembly seal, the SFCTM is interlocked to prevent moving within the loading hall. Unless the gripper of the biological lid handling station is in the upper position, the anti-seismic devices are unlocked, the penetration docking device is in the lower position, the penetration assembly is in the upper position (movements to and from the penetration station), and the handling area opening is closed (movements to and from the handling station).

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The SFCTM is designed in accordance with the applicable portions of ASME NOG-1-2004 (Reference 5) as a single failure-proof Type I crane trolley. The screw/nut system for the elevator is designed per guidance of ANSI N14.6- 2004. The elevator vertical motorization for moving the screw is designed per guidance of ASME NOG-1, and it includes single failure-proof features to provide assurance that any credible failure of a single component would not result in the loss of capability to stop and hold the lower cover.

The SFCTM is shown in Figure 9.1.4-7—Spent Fuel Cask Transfer Facility.

Penetration Assembly

The penetration assembly provides a leaktight connection between the loading pit and the internal cavity of the cask, an upper cover at the bottom of the loading pit, and a lower cover at the lower end of the penetration. The penetration assembly consists of a supporting structure, internal and external shells, double walled bellows, a leak-tightness flange, and a docking flange.

The upper cover of the penetration is equipped with a mechanism to maneuver and set the cover on the supporting structure seals, and a hoist for operation of the maneuvering mechanism. The hoist is a stationary lifting device and is provided above the loading pit. With the upper cover in the closed position, it forms a leak-tight closure of the penetration assembly. In the open position, it allows the loading of fuel assemblies into a connected cask.

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The lower cover is bolted to the leak-tight flange of the penetration assembly. It is equipped with a nozzle for the recovery of drip-offs. The lower cover is designed to support the weight of the water in the loading pit in the event of an inadvertent opening of the upper cover of the penetration. The lower cover is manually unbolted and removed by the operators using the elevator of the SFCTM when performing cask loading operations.

The penetration assembly is equipped with dual seals at the interface locations shown in Figure 9.1.4-9—Loading Pit Penetration Assembly Seals. Theses are O-ring type seals made from EPDM rubber or other equivalent material and are designed to resist high levels of ionizing radiation.

The integrity of the penetration seals is tested before loading the fuel assemblies. During the seal test and the loading of fuel assemblies, seal leaks between the cask and the docked penetration or of the bellows is detected by a pressure decrease of the compressed air enclosed between the two barriers. The compressed air pressure between the barriers is greater than the water column pressure in the loading pit. The leak-tightness of the penetration vent mechanism is tested separately. Maintenance of the seals is performed when the loading pit is empty and at intervals recommended by the seal manufacturer.

Two concentric seals on the upper part of the supporting structure maintain double barrier leak-tightness to the upper cover of the penetration when the upper cover is closed. The space between the two seals is pressurized with compressed air at a pressure greater than the loading pit water column pressure to avoid any concern of water leakage due to a seal failure. It also monitors the leak-tightness of the upper cover of the penetration in the main control room when the SFCTF is not in use. An alarm is generated in the SFCTF control room upon detection of a leak.

and cask up to and including the first valve (if a normally closed valve), or up to and including a second isolation valve (if a normally open valve with auto close or remote close capability) are designed in accordance with ASME Boiler and Pressure Vessel Code, Section III, Division 1, "Rules for Construction of Nuclear Facility Components," The American Society of Mechanical Engineers, 2004 Edition. The process systems beyond the second isolation provision from the cask and the loading penetration are designed consistent with the design codes for the respective plant systems.

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The hoist for the penetration assembly upper cover is a stationary lifting device and is designed in accordance with the applicable portions of ASME NOG-1 as a single failure-proof hoist (Type1).

SFCTF Fluid and Pneumatic Systems

Fluid and pneumatic systems are provided in the SFCTF for filling, draining, and drying the cask and penetration assembly. These SFCTF systems are connected with the respective plant systems: compressed air system, demineralized water system, nuclear island drain/vent system, and fuel pool cooling and purification system.

These systems consist of process modules installed in a room adjacent to the SFCTF control room, on the SFCTM, and associated piping installed in the loading hall, and flexible hoses to connect the systems to the SFCTM. The process modules consist of pipes, valves, and process sensors. The process modules installed in the room check and monitor the seals and provide connections for the water supply to fill and drain the spent fuel cask and cask loading pit penetration assembly. The process module installed on the SFCTM contributes to the filling and draining of the cask, as well as the drying of the cask. Cask-specific valve adapters are used for connecting the internal cavity of the cask with the process modules. The valve adapter bodies are screwed to the cask; they are watertight and airtight. Cask-specific test adapters are provided to check the leak-tightness of the plugs that close the cask orifices and the leak-tightness of the biological lid and cask upper cover. The SFCTF can also fill the internal cavity of the spent fuel cask with nitrogen if the cask-specific design warrants. The nitrogen circuit also serves as a backup for the compressed air circuit.

The portions of SFCTF fluid and pneumatic systems piping directly connected to the penetration assembly, and cask are designed with isolation capability to prevent a loss of water from the SFP and loading pit during and following an SSE that could result in potential offsite exposure. The piping and valves up to the second isolation provision are designed to ASME Section III (Reference 4).

Fluid and pneumatic system valves required to isolate the cask and penetration assembly are closed on a loss of power.

Biological Lid Handling Station

The biological lid handling station is used for handling the biological lid from the cask to its support on the SFCTM and back to the cask after fuel assembly loading. The biological lid handling station consists of a supporting structure and a lifting mechanism. The biological lid handling station uses an irreversible screw design that prevents lid drop on a loss of power.

The biological lid handling station is remotely controlled from the SFCTF control room.

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The biological lid handling station is designed in accordance with the applicable portions of ASME NOG-1-2004 Type 1 crane (Reference 5), ANSI N14.6- 2004 (Reference 6) and AISC Manual of Steel Construction, 9th Edition (Reference 7). The screw jack and gripper are designed per guidance of ANSI N14.6- 2004. The biological lid handling station vertical motorization for moving the screw jack is designed per guidance of ASME NOG-1, and it includes single failure-proof features to provide assurance that any credible failure of a single component would not result in the loss of capability to stop and hold the biological lid.

The biological lid handling station is shown in Figure 9.1.4-7.

9.1.4.2.3 Fuel Handling Tools Description

The new fuel handling tool and spent fuel handling manual tool are used to handle fuel assemblies one at a time, with or without a fuel assembly insert. The fuel assembly insert handling manual tool is used to handle fuel assembly inserts one at a time. The new fuel handling tool, spent fuel handling manual tool, and fuel assembly insert handling manual tool are manually operated, but handled by the auxiliary crane in the FB. The spent fuel handling manual tool can be handled by the polar crane in the RB. The fuel handling tools are designed in accordance with ANSI/ANS 57.1-1992, R1998, R2005 (R=Reaffirmed) (Reference 1). The new fuel handling tool, spent fuel handling manual tool, and fuel assembly insert handling manual tool are not handled by the refueling machine hoist or the spent fuel machine hoist.

New Fuel Handling Tool

The new fuel handling tool performs handling of a new fuel assembly in air with or without a fuel assembly insert between the new fuel container, new fuel examination area, new fuel storage racks, and new fuel elevator.

Spent Fuel Handling Manual Tool

The spent fuel handling manual tool performs underwater handling of a fuel assembly with or without a fuel assembly insert for positions of the underwater fuel storage racks, which are not accessible by the spent fuel machine and in case of a spent fuel

New Fuel Elevator

The NFE hoisting mechanism is equipped with an operational brake, and a safety brake on the drum. The brakes are designed to be engaged when de-energized. The hoisting mechanism is provided with a cable equalizing system and a cable break detector. The movement is stopped if a cable break is detected. The hoisting mechanism is equipped with a load detection device and the movement is stopped in the event of a threshold overrun.

The NFE is designed to accommodate only one fuel assembly at a time and is provided with a radiation monitor that stops the NFE in the event of exceeding the radiation limits.

The NFE is provided with interlocks related to:

- Lowering or lifting.
- Functioning of the SFM.

Auxiliary Crane

Refer to Section 9.1.5 for safety provisions incorporated in the auxiliary crane.

Spent Fuel Cask Transfer Machine

The SFCTM is designed to remain in place and maintain structural support of the spent fuel cask, including during and following an SSE to prevent draining of the SFP. The supporting structure and other load bearing items of the machine are designed conservatively to maintain leak-tight integrity of the penetration assembly under design conditions, including the drop of the fuel assembly from the maximum handling height onto a connected cask.

A cask handling accident inside the FB is prevented by the design of the SFCTM. Anti-seismic locking devices engage the SFCTM with the walls of the loading hall when located at process stations to prevent movement during a seismic event. The lateral guiding device prevents tilting of the SFCTM when between stations in the loading hall. The SFCTM traveling motor brake is applied at every station prior to initiating cask handling activities at the respective station. Brakes are designed to be engaged when de-energized on a loss of power.

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SFCTM movements are stopped and fluid and pneumatic system valves required to isolate the cask and penetration assembly are closed on a loss of power.