

ArevaEPRDCPEm Resource

From: WILLIFORD Dennis (AREVA) [Dennis.Williford@areva.com]
Sent: Friday, March 01, 2013 3:45 PM
To: Snyder, Amy
Cc: Hearn, Peter; DELANO Karen (AREVA); LEIGHLITER John (AREVA); ROMINE Judy (AREVA); RYAN Tom (AREVA); TOLLEY Tracey (AREVA); VANCE Brian (AREVA); WELLS Russell (AREVA); WILLS Tiffany (AREVA); KOWALSKI David (AREVA); HARRINGTON James (AREVA)
Subject: Advanced Response to U.S. EPR Design Certification Application RAI No. 513 (5971,5040), FSAR Ch. 9, Question 09.01.04-20
Attachments: RAI 513 Question 09.01.04-20 Advanced Response US EPR DC.pdf

Amy,

Attached is an Advanced Response to RAI No.513, Question 09.01.04-20 in advance of the final response date of July 30, 2013.

To keep our commitment to send a final response to this question by the commitment date, we need to receive all NRC staff feedback and comments no later than **April 12, 2013**.

Please let me know if NRC staff has any questions or if this response can be sent as final.

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: Friday, February 01, 2013 5:51 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)
Subject: Response to U.S. EPR Design Certification Application RAI No. 513 (5971,5040), FSAR Ch. 9, Supplement 10

Amy,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the ten questions in RAI No. 513 on October 27, 2011. Supplement 1, Supplement 2 and Supplement 3 responses to RAI No. 513 were sent on December 13, 2011, January 25, 2012, and February 24, 2012, respectively, to provide a revised schedule. Supplement 4 response was sent on April 17, 2012 to provide a technically correct INTERIM response to Question 09.01.01-59 and a revised schedule for the final response to this question. On April 24, 2012, AREVA NP submitted Supplement 5 to provide a technically correct and complete final response to one (Question 09.01.01-56) of the 10 questions in RAI 513. Supplement 6 response sent on June 5, 2012 provided a revised schedule for the remaining questions. Supplement 7 response was sent on August 17, 2012 to

provide a technically correct and complete final response to three of the remaining nine questions in RAI 513 and a revised schedule for two questions. Supplement 8 response was sent on August 31, 2012 to revise the schedule for two questions. Supplement 9 response was sent on December 13, 2012 to provide a technically correct and complete final response to Questions 09.01.01-53 and 09.01.01-54.

To address NRC staff supplemental comments received on the response to Question 09.01.01-53 and as committed in the Supplement 9 response to these supplemental questions, we have provided a schedule for a revised final response to Question 09.01.01-59. The schedule for a technically correct and complete final response to the other questions is unchanged as shown in the following table.

| Question # | Response Date |
|------------------------------|----------------------|
| RAI 513 — 09.01.01-58 | June 28, 2013 |
| RAI 513 — 09.01.01-59 | March 1, 2013 |
| RAI 513 — 09.01.01-61 | June 28, 2013 |
| RAI 513 — 09.01.01-62 | June 28, 2013 |
| RAI 513 — 09.01.04-20 | July 30, 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, December 13, 2012 5:39 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
Subject: Response to U.S. EPR Design Certification Application RAI No. 513 (5971,5040), FSAR Ch. 9, Supplement 9

Amy,

AREVA NP Inc. letter NRC:12:064 dated December 13, 2012 provides a technically correct and complete final response to two of the remaining six questions in RAI 513. AREVA Transnuclear, Inc. has determined that some of the material contained in the response is proprietary. An affidavit is provided, as required by 10 CFR 2.390(b), to support the withholding of the information from public disclosure. Proprietary and non-proprietary versions of the enclosure to this letter are provided separately.

The following table indicates the respective pages in the response that contain AREVA NP's response to the subject questions.

| Question # | Start Page | End Page |
|-----------------------|------------|----------|
| RAI 513 — 09.01.01-53 | 2 | 5 |

| Question # | Start Page | End Page |
|-----------------------|------------|----------|
| RAI 513 — 09.01.01-54 | 6 | 6 |

The schedule for a technically correct and complete final response to the remaining four questions is unchanged as shown in the following table.

| Question # | Response Date |
|-----------------------|---------------|
| RAI 513 — 09.01.01-58 | June 28, 2013 |
| RAI 513 — 09.01.01-61 | June 28, 2013 |
| RAI 513 — 09.01.01-62 | June 28, 2013 |
| RAI 513 — 09.01.04-20 | July 30, 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: Friday, August 31, 2012 8:23 AM
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); KOWALSKI David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 513 (5971,5040), FSAR Ch. 9, Supplement 8

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the ten questions in RAI No. 513 on October 27, 2011. Supplement 1, Supplement 2 and Supplement 3 responses to RAI No. 513 were sent on December 13, 2011, January 25, 2012, and February 24, 2012, respectively, to provide a revised schedule. Supplement 4 response was sent on April 17, 2012 to provide a technically correct INTERIM response to Question 09.01.01-59 and a revised schedule for the final response to this question. On April 24, 2012, AREVA NP submitted Supplement 5 to provide a technically correct and complete final response to one (Question 09.01.01-56) of the 10 questions in RAI 513. Supplement 6 response sent on June 5, 2012 provided a revised schedule for the remaining questions. Supplement 7 response was sent on August 17, 2012 to provide a technically correct and complete final response to three of the remaining nine questions in RAI 513 and a revised schedule for two questions.

The schedule for a technically correct and complete final response to two of the remaining six questions has been revised as shown in the following table.

| Question # | Response Date |
|-----------------------|-------------------|
| RAI 513 — 09.01.01-53 | December 13, 2012 |

| | |
|------------------------------|--------------------------|
| RAI 513 — 09.01.01-54 | December 13, 2012 |
| RAI 513 — 09.01.01-58 | June 28, 2013 |
| RAI 513 — 09.01.01-61 | June 28, 2013 |
| RAI 513 — 09.01.01-62 | June 28, 2013 |
| RAI 513 — 09.01.04-20 | July 30, 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: Friday, August 17, 2012 3:11 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. 513 (5971,5040), FSAR Ch. 9, Supplement 7

Getachew,

AREVA NP Inc. letter NRC:12:044 dated August 17, 2012 provides a technically correct and complete final response to three of the remaining nine questions in RAI 513. As AREVA has determined some of the material contained in the response to be proprietary, an affidavit is provided, as required by 10 CFR 2.390(b), to support the withholding of the information from public disclosure. Proprietary and non-proprietary versions of the enclosure to this letter are provided separately.

The following table indicates the respective pages in the response that contain AREVA NP's response to the subject questions.

| Question # | Start Page | End Page |
|-----------------------|-------------------|-----------------|
| RAI 513 — 09.01.01-57 | 2 | 2 |
| RAI 513 — 09.01.01-59 | 3 | 4 |
| RAI 513 — 09.01.01-60 | 5 | 5 |

The schedule for a technically correct and complete final response to two of the remaining six questions has been revised as shown in the following table.

| Question # | Response Date |
|------------------------------|------------------------|
| RAI 513 — 09.01.01-53 | August 31, 2012 |
| RAI 513 — 09.01.01-54 | August 31, 2012 |
| RAI 513 — 09.01.01-58 | June 28, 2013 |
| RAI 513 — 09.01.01-61 | June 28, 2013 |

| | |
|-----------------------|---------------|
| RAI 513 — 09.01.01-62 | June 28, 2013 |
| RAI 513 — 09.01.04-20 | July 30, 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, July 26, 2012 9:46 PM
To: Getachew.Tesfaye@nrc.gov
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); GARDNER Darrell (RS/NB) (Darrell.Gardner@areva.com); VANCE Brian (RS/NB); LEIGHLITER John (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 513 (5971,5040), FSAR Ch. 9, Questions 9.1.1-53,-54,-57,-59 and -60 - STATUS

Getachew,
AREVA appreciates the notification you provided yesterday on the review status of the DRAFT RAI responses submitted on June 26th and understands that the NRC staff needs additional time to complete their review and provide comments. AREVA will provide a revised schedule for submittal of the final responses to these 5 questions after receipt and evaluation of NRC staff comments.

The schedule for a technically correct and complete final response to the other 4 questions remains unchanged as shown below.

| Question # | Response Date |
|-----------------------|---------------|
| RAI 513 — 09.01.01-53 | TBD |
| RAI 513 — 09.01.01-54 | TBD |
| RAI 513 — 09.01.01-57 | TBD |
| RAI 513 — 09.01.01-58 | June 28, 2013 |
| RAI 513 — 09.01.01-59 | TBD |
| RAI 513 — 09.01.01-60 | TBD |
| RAI 513 — 09.01.01-61 | June 28, 2013 |
| RAI 513 — 09.01.01-62 | June 28, 2013 |
| RAI 513 — 09.01.04-20 | July 30, 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, June 05, 2012 2:43 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. 513 (5971,5040), FSAR Ch. 9, Supplement 6

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the ten questions in RAI No. 513 on October 27, 2011. Supplement 1, Supplement 2 and Supplement 3 responses to RAI No. 513 were sent on December 13, 2011, January 25, 2012, and February 24, 2012, respectively, to provide a revised schedule. Supplement 4 response was sent on April 17, 2012 to provide a technically correct INTERIM response to Question 09.01.01-59 and a revised schedule for the final response to this question. On April 24, 2012, AREVA NP submitted Supplement 5 to provide a technically correct and complete final response to one (Question 09.01.01-56) of the 10 questions in RAI 513.

The schedule for a technically correct and complete final response to the remaining 9 questions has been changed as shown below. This schedule was transmitted to the NRC in AREVA NP letter NRC:12:024 dated May 10, 2012.

| Question # | Response Date |
|-----------------------|----------------------|
| RAI 513 — 09.01.01-53 | July 26, 2012 |
| RAI 513 — 09.01.01-54 | July 26, 2012 |
| RAI 513 — 09.01.01-57 | July 26, 2012 |
| RAI 513 — 09.01.01-58 | June 28, 2013 |
| RAI 513 — 09.01.01-59 | July 26, 2012 |
| RAI 513 — 09.01.01-60 | July 26, 2012 |
| RAI 513 — 09.01.01-61 | June 28, 2013 |
| RAI 513 — 09.01.01-62 | June 28, 2013 |
| RAI 513 — 09.01.04-20 | July 30, 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, April 24, 2012 5:02 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. 513 (5971,5040), FSAR Ch. 9, Supplement 5

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the ten questions in RAI No. 513 on October 27, 2011. Supplement 1, Supplement 2 and Supplement 3 responses to RAI No. 513 were sent on December 13, 2011, January 25, 2012, and February 24, 2012, respectively, to provide a revised schedule. Supplement 4 response was sent on April 17, 2012 to provide a technically correct INTERIM response to Question 09.01.01-59 and a revised schedule for the final response to this question.

The attached file, "RAI 513 Supplement 5 Response US EPR DC.pdf" provides a technically correct and complete final response to Question 09.01.01-56. The following table indicates the pages in the response document, "RAI 513 Supplement 5 Response US EPR DC.pdf" that contain AREVA NP's response to the subject question.

| Question # | Start Page | End Page |
|-----------------------|------------|----------|
| RAI 513 — 09.01.01-56 | 2 | 3 |

The schedule for a technically correct and complete final response to the remaining 9 questions is unchanged as shown below.

| Question # | Response Date |
|-----------------------|-----------------|
| RAI 513 — 09.01.01-53 | July 26, 2012 |
| RAI 513 — 09.01.01-54 | July 26, 2012 |
| RAI 513 — 09.01.01-57 | July 26, 2012 |
| RAI 513 — 09.01.01-58 | August 30, 2013 |
| RAI 513 — 09.01.01-59 | July 26, 2012 |
| RAI 513 — 09.01.01-60 | July 26, 2012 |
| RAI 513 — 09.01.01-61 | August 30, 2013 |
| RAI 513 — 09.01.01-62 | August 30, 2013 |
| RAI 513 — 09.01.04-20 | August 30, 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, April 17, 2012 11:22 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. 513 (5971,5040), FSAR Ch. 9, Supplement 4

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the ten questions in RAI No. 513 on October 27, 2011. Supplement 1, Supplement 2 and Supplement 3 responses to RAI No. 513 were sent on December 13, 2011, January 25, 2012, and February 24, 2012, respectively, to provide a revised schedule.

The attached file, "RAI 513 Supplement 4 Response US EPR DC-INTERIM.pdf" provides a technically correct INTERIM response to Question 09.01.01-59. The following table indicates the pages in the response document, "RAI 513 Supplement 4 Response US EPR DC-INTERIM.pdf" that contains AREVA NP's INTERIM response to the subject question.

| Question # | Start Page | End Page |
|-----------------------|------------|----------|
| RAI 513 — 09.01.01-59 | 2 | 2 |

The schedule for a technically correct and complete final response to this question (Question 09.01.01-59) has been changed as provided below. The schedule for the final response to the remaining questions is unchanged.

| Question # | Response Date |
|-----------------------|----------------------|
| RAI 513 — 09.01.01-53 | July 26, 2012 |
| RAI 513 — 09.01.01-54 | July 26, 2012 |
| RAI 513 — 09.01.01-56 | April 26, 2012 |
| RAI 513 — 09.01.01-57 | July 26, 2012 |
| RAI 513 — 09.01.01-58 | August 30, 2013 |
| RAI 513 — 09.01.01-59 | July 26, 2012 |
| RAI 513 — 09.01.01-60 | July 26, 2012 |
| RAI 513 — 09.01.01-61 | August 30, 2013 |
| RAI 513 — 09.01.01-62 | August 30, 2013 |
| RAI 513 — 09.01.04-20 | August 30, 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: Friday, February 24, 2012 8:51 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. 513 (5971,5040), FSAR Ch. 9, Supplement 3

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the ten questions in RAI No. 513 on October 27, 2011. Supplement 1 and Supplement 2 responses to RAI No. 513 were sent on December 13, 2011 and January 25, 2012, respectively, to provide a revised schedule.

The schedule for technically correct and complete responses to the ten 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 513 — 09.01.01-53 | July 26, 2012 |
| RAI 513 — 09.01.01-54 | July 26, 2012 |
| RAI 513 — 09.01.01-56 | April 26, 2012 |
| RAI 513 — 09.01.01-57 | July 26, 2012 |
| RAI 513 — 09.01.01-58 | August 30, 2013 |
| RAI 513 — 09.01.01-59 | April 26, 2012 |
| RAI 513 — 09.01.01-60 | July 26, 2012 |
| RAI 513 — 09.01.01-61 | August 30, 2013 |
| RAI 513 — 09.01.01-62 | August 30, 2013 |
| RAI 513 — 09.01.04-20 | August 30, 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, January 25, 2012 12:54 PM

To: Getachew.Tesfaye@nrc.gov

Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); NOXON David (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. 513 (5971,5040), FSAR Ch. 9, Supplement 2

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a response to the ten questions in RAI No. 513 on October 27, 2011. Supplement 1 response sent on December 13, 2011 provided a preliminary revised schedule.

The preliminary schedule for the response to these ten questions 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.

| Question # | Response Date |
|-----------------------|--------------------------|
| RAI 513 — 09.01.01-53 | February 21, 2012 |
| RAI 513 — 09.01.01-54 | February 21, 2012 |
| RAI 513 — 09.01.01-56 | February 21, 2012 |
| RAI 513 — 09.01.01-57 | February 21, 2012 |
| RAI 513 — 09.01.01-58 | February 21, 2012 |
| RAI 513 — 09.01.01-59 | February 21, 2012 |
| RAI 513 — 09.01.01-60 | February 21, 2012 |
| RAI 513 — 09.01.01-61 | February 21, 2012 |
| RAI 513 — 09.01.01-62 | February 21, 2012 |
| RAI 513 — 09.01.04-20 | 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: WILLIFORD Dennis (RS/NB)

Sent: Tuesday, December 13, 2011 4:55 PM

To: Getachew.Tesfaye@nrc.gov

Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); NOXON David (RS/NB); KOWALSKI David (RS/NB)

Subject: Response to U.S. EPR Design Certification Application RAI No. 513 (5971,5040), FSAR Ch. 9, Supplement 1

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a response to the 10 questions of RAI 513 on October 27, 2011.

A preliminary revised schedule for technically correct and complete responses to these 10 questions is provided below. This schedule is being reevaluated and a new supplement with a revised schedule will be transmitted by January 25, 2012.

| Question # | Response Date |
|-----------------------|-------------------------|
| RAI 513 — 09.01.01-53 | January 25, 2012 |

| | |
|-----------------------|-------------------------|
| RAI 513 — 09.01.01-54 | January 25, 2012 |
| RAI 513 — 09.01.01-56 | January 25, 2012 |
| RAI 513 — 09.01.01-57 | January 25, 2012 |
| RAI 513 — 09.01.01-58 | January 25, 2012 |
| RAI 513 — 09.01.01-59 | January 25, 2012 |
| RAI 513 — 09.01.01-60 | January 25, 2012 |
| RAI 513 — 09.01.01-61 | January 25, 2012 |
| RAI 513 — 09.01.01-62 | January 25, 2012 |
| RAI 513 — 09.01.04-20 | January 25, 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, October 27, 2011 3:04 PM

To: 'Tefaye, Getachew'

Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); NOXON David (RS/NB); KOWALSKI David (RS/NB)

Subject: Response to U.S. EPR Design Certification Application RAI No. 513 (5971,5040), FSAR Ch. 9

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 513 Response US EPR DC.pdf," provides a schedule since a technically correct and complete response to the 10 questions cannot be provided at this time.

The following table indicates the respective pages in the response document, "RAI 513 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

| Question # | Start Page | End Page |
|-----------------------|-------------------|-----------------|
| RAI 513 — 09.01.01-53 | 2 | 2 |
| RAI 513 — 09.01.01-54 | 3 | 3 |
| RAI 513 — 09.01.01-56 | 4 | 4 |
| RAI 513 — 09.01.01-57 | 5 | 5 |
| RAI 513 — 09.01.01-58 | 6 | 6 |
| RAI 513 — 09.01.01-59 | 7 | 7 |
| RAI 513 — 09.01.01-60 | 8 | 8 |
| RAI 513 — 09.01.01-61 | 9 | 9 |
| RAI 513 — 09.01.01-62 | 10 | 10 |
| RAI 513 — 09.01.04-20 | 11 | 12 |

A preliminary schedule for technically correct and complete responses to the 10 questions in RAI 513 is provided below. This schedule is being reevaluated and a new supplement with a revised schedule will be transmitted by December 14, 2011.

| Question # | Response Date |
|-----------------------|-------------------|
| RAI 513 — 09.01.01-53 | December 14, 2011 |
| RAI 513 — 09.01.01-54 | December 14, 2011 |
| RAI 513 — 09.01.01-56 | December 14, 2011 |
| RAI 513 — 09.01.01-57 | December 14, 2011 |
| RAI 513 — 09.01.01-58 | December 14, 2011 |
| RAI 513 — 09.01.01-59 | December 14, 2011 |
| RAI 513 — 09.01.01-60 | December 14, 2011 |
| RAI 513 — 09.01.01-61 | December 14, 2011 |
| RAI 513 — 09.01.01-62 | December 14, 2011 |
| RAI 513 — 09.01.04-20 | December 14, 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: Tesfaye, Getachew [<mailto:Getachew.Tesfaye@nrc.gov>]
Sent: Friday, September 30, 2011 3:01 PM
To: ZZ-DL-A-USEPR-DL
Cc: Patel, Amrit; Lu, Shanlai; Donoghue, Joseph; Nolan, Ryan; Segala, John; Lee, Samuel; Hearn, Peter; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 513 (5971,5040), FSAR Ch. 9

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on September 14, 2011, and discussed with your staff on September 29, 2011. Draft RAI Question 09.01.01-55 was deleted, and Draft RAI Questions 09.01.01-56 and 09.01.01-58 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. 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,
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Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 4251

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Advanced Response to

Request for Additional Information No. 513, Question 09.01.04-20

9/30/2011

U. S. EPR Standard Design Certification

AREVA NP Inc.

Docket No. 52-020

SRP Section: 09.01.01 - Criticality Safety of Fresh and Spent Fuel Storage and Handling

SRP Section: 09.01.04 - Light Load Handling System (Related to Refueling)

Application Section: 9.1 and Technical Report TN-Rack.0101, Rev 0

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

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

Question 09.01.04-20:**OPEN ITEM****Follow Up to RAI 337, Question 09.01.04-14:**

The staff requested AREVA to address operating experience considerations associated with refueling cavity seals in Request for Additional Information (RAI) 337, Question 09.01.04-14 dated December 15, 2009. Based on a review of AREVA's response received on August 5, 2011, the staff has determined that the applicant's response does not address all the staff concerns as discussed in Question 09.01.04-14. Therefore, the staff requests the applicant to revise the response to RAI Question 09.01.04-14 to address the following items:

- a. Reactor Cavity Level Monitoring: Based on recent operating experience that indicated that inadvertent drain downs of the reactor cavity at relatively rapid rates can occur during refueling, the staff had previously requested AREVA to describe the detection method for indentifying the draindown of the cavity. In the RAI response, AREVA described the cavity seal as a permanently installed welded stainless steel ring and did not propose a dedicated leak detection/collection system. In addition, AREVA indicated that a decrease in reactor cavity level can be detected by level instrumentation installed in the fuel pool or visually in the cavity by an operator. Since the fuel building can be isolated from the reactor building, leaving no instrumentation in the reactor cavity to alert operators of an abnormal condition, it is not clear that visual water level monitoring is adequate to identify a draindown event without having either an alarmed level instrumentation in the reactor cavity or a dedicated ring leak detection/collection system. In addition, Technical Specification (TS) 3.9.6 requires a minimum water level of 23ft above the reactor vessel flange before initiating movement of fuel in the reactor cavity. Based on the proposed design, it is unclear that AREVA intends to meet this TS. Therefore, the staff requests the applicant to justify in the FSAR the verification and monitoring of this TS without alarmed level instrumentation in the reactor cavity, and the absence of reactor cavity water level instrumentation that provides level indication and alarm for abnormal conditions (low level and rate of change) both locally and in the main control room.
- b. FSAR Section 9.1.4.3 states that the COL applicant will develop procedures to handle inadvertent draining of the refueling cavity in accordance with FSAR Section 13.5, without making this a COL information item. The staff requests the applicant to include in FSAR Section 9.1.4.3 a description of the essential elements of the procedures or to make this a commitment for a COL information item. The essential elements should consider directing the COL applicants to establish and implement procedures responding to pool drain down events, performing periodic maintenance and inspection of the cavity ring and other seals in accordance with vendor recommendations, and monitoring cavity leakage.
- c. Proposed Figure 9.1.4-14-1 in the RAI response shows details of the refueling cavity ring. From the information contained in the drawing and the description in the response, it is unclear to the staff the means by which the ring is protected from the movement of core components since parts of the ring are above the reactor vessel flange. The staff requests the applicant to explain in the FSAR the protective measures and design features credited to ensure the movement of core components do not damage the

reactor cavity ring. In addition, for illustrative purposes, this figured should be added to the FSAR.

- d. The FSAR markup in the RAI response states, "The cavity ring is also designed to withstand the impact of one fuel assembly with resultant leakage less than the capacity of the makeup flow to the refueling cavity." Because there is no cover plate for protection of the cavity ring and no leak detection of the cavity ring, the staff requests the applicant to provide the analysis that demonstrates a dropped fuel assembly will not result in a leak greater than makeup capability.

Response to Question 09.01.04-20:

- a. The U.S. EPR design reflects dedicated level instrumentation that indicates changes in the reactor cavity level. Refer to U.S. EPR FSAR Tier 2, Figure 9.1.3-2—Fuel Pool Purification System. The movement of spent fuel is considered a carefully monitored activity; the reactor cavity level is continuously monitored in the main control room and visually monitored from the refueling platform during refueling operations.
- b. U.S. EPR FSAR Tier 2, Sections 9.1.4.2.1 and 9.1.4.3.3 will be revised to reflect additional information addressing the concerns of an inadvertent draindown of the reactor cavity, and identify key elements to be included in plant procedures to address inadvertent draining of the refueling cavity.
- c. The response to Question 09.01.04-14 provided in RAI 337, Supplement 17, contained Figure 09.01.04-14-1—Permanent RPV Refueling Cavity Ring - General Configuration. This figure is being replaced by a new U.S. EPR FSAR Tier 2, Figure 9.1.4-12—Permanent RPV Refueling Cavity Ring - General Configuration.

This new U.S. EPR FSAR figure reflects the implementation of a design change that involved redesigning the cavity seal plate to add a protective cover plate, approximately 10 inches above the reactor vessel flange. The cover plate is a permanently welded part of the seal ring. During the movement of core components, the cover plate protects the RPV cavity ring from potential damage from dropped components. The addition of the cover plate does not represent a significant barrier to the movement of core components.

U.S. EPR FSAR Tier 2, Section 3.8.3.1.1 will be revised to reflect redesigning the cavity seal plate to add a protective cover plate.

- d. Refer to the response to Part (c), for a description of a design change involving the addition of a cover plate to protect the portion of the RPV cavity ring that functions as an expansion joint. The installation of this cover plate precludes the requirement for an analysis demonstrating that a dropped fuel assembly on the cavity ring will not result in a leak greater than the makeup capability.

FSAR Impact:

U.S. EPR FSAR Tier 2, Sections 3.8.3.1.1, 9.1.4.2.1, and 9.1.4.3.3 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR FSAR, Tier 2, Figure 9.1.4-12 will be added as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

3.8.3.1.1 Reactor Vessel Support Structure and Reactor Cavity

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

Large penetrations in the circular RV support concrete wall are provided for the primary loop piping and the cavity ventilation system. A permanently installed cavity ring ([Refer to Figure 9.1.4-12—Permanent RPV Refueling Cavity Ring - General Configuration](#)) and neutron shield assembly rests on an embedded ring at the top of the wall. This cavity ring and shield assembly is fabricated of stainless steel and radiation shielding material that bridges the annular gap between the RV and vessel cavity concrete wall. This ring seals the lower RV cavity to prevent water leakage from the refueling canal located above.

The cavity ring is designed to accommodate the expansion and contraction of the RPV during heatup and cooldown. The cavity ring is designed to Seismic Category I requirements and to meet the stress limits of ASME BPVC, Section III, Subsection ND. Base metal and weld materials are consistent with specifications in ASME Code Section II. Welding procedures and welders will be qualified in accordance with ASME Code Section IX. Welds will be examined in accordance with ASME Code Section V. The cavity ring does not rely on inflated seals, gaskets, o-rings, or other active components. ~~The cavity ring is also designed to~~ withstand the impact of one fuel assembly, [the portion of the cavity ring that functions as an expansion joint has a protective cover plate \(Refer to Figure 9.1.4-12\).](#) ~~with resultant leakage less than the capacity of the makeup flow to the refueling cavity.~~

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

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



spent fuel racks while it is moved from the new fuel storage rack or new fuel examination area to the new fuel elevator. The new fuel assemblies placed in the new fuel dry storage will be moved to underwater storage prior to the refueling outage. From the spent fuel storage racks, the fuel assemblies are transferred under water until loaded into the reactor.

Refueling Procedure

Refueling operations are started after the reactor coolant system (RCS) is borated as specified in the Technical Specifications and cooled down to refueling shutdown conditions.

The refueling operation is divided into five major evolutions: (1) RCS and refueling system preparation, (2) disassembly of the reactor, (3) fuel handling during refueling operations, (4) reassembly of the reactor, and (5) preoperational checks and startups. A general description of a typical refueling operation through these evolutions is provided below.

RCS and Refueling System Preparation

The reactor is shut down, borated, and cooled to refueling conditions. After an initial radiation survey, access to the reactor vessel head is allowed. The coolant level in the reactor vessel is lowered to a point slightly below the vessel flange. The fuel transfer tools and equipment are checked, inspected and tested for operation.

Disassembly of the Reactor

Mechanical and instrumentation connections to the reactor pressure vessel are disconnected to allow removal of the vessel head. The refueling cavity is prepared for flooding by checking the underwater lights, and tools; closing the refueling cavity drain lines; and removing the blind flange from the fuel transfer tube. The accessible portion of the reactor cavity ring is inspected for damage at welds and the area that functions as an expansion joint, including the protective cover (Refer to Figure 9.1.4-12—Permanent RPV Refueling Cavity Ring - General Configuration).

With the refueling cavity prepared for flooding, the vessel head is unseated and raised above the vessel flange using the reactor building polar crane (refer to Section 9.1.5 for equipment handling heavy loads). Water from the in-containment refueling water storage tank (IRWST) is directed into the reactor coolant system in order to fill the RB refueling cavity. The vessel head is lifted and placed on the head stand. When the RB refueling cavity water level reaches the specified depth for shielding and the water level in the FB transfer pit is equalized to the refueling cavity level, the fuel transfer tube isolation valve is opened. The refueling machine is positioned over the core and the control rod drive shafts are disconnected. Once the control rod shafts are disconnected, the internals lifting rig is installed. The upper internals are removed from the vessel and stored in the refueling canal in a designated area located away



from the fuel load path. The refueling machine is indexed over the core and tested underwater. The core is ready for refueling when all fuel handling prerequisites have been met and the reactor cavity and connected pools have stable water levels and no evidence of abnormal leakage.

Fuel Handling during Refueling Operations

The refueling sequence begins in the RB with the refueling machine. Spent fuel assemblies are removed; and partially irradiated fuel assemblies are relocated in the core per the refueling plan and new fuel assemblies are added to the core. The general fuel handling sequence for a full core off load or a core fuel shuffle are essentially the same, except for the number of fuel assemblies removed from the reactor vessel.

The general fuel handling sequence for refueling involving moving the fuel assembly from the reactor vessel to the SFP is as follows:

1. The refueling machine is automatically or manually positioned over a fuel assembly in the core. Once the refueling machine mast is positioned over the selected fuel assembly; the fuel assembly gripper is lowered and engages the fuel assembly.
2. The refueling machine withdraws the selected fuel assembly from the core and raises it to a predetermined height sufficient to clear the vessel flange and reactor cavity ring cover. The maximum height of the fuel assembly is limited to provide sufficient water covering the fuel assembly. The fuel assembly is then transported to the fuel transfer tube facility area of the reactor building refueling cavity.
3. The fuel transfer system conveyor car is positioned in the fuel transfer tube facility area of the refueling cavity, and the fuel container is in the vertical position.
4. The refueling machine is positioned to line up the fuel assembly over the empty fuel container. The fuel assembly is lowered and placed into the empty fuel container of the conveyor car. The upender pivots the fuel container to the horizontal position and is transported by the conveyor car to the SFP side of the fuel transfer tube facility. The upender then pivots the fuel container to the vertical position.
5. The spent fuel machine is positioned over the fuel assembly then it latches and withdraws the assembly from the fuel container. The spent fuel machine then transports the fuel assembly to a predetermined location in the SFP where it is lowered into the fuel rack location and unlatched.

The general fuel handling sequence for refueling involving moving the fuel assembly from the SFP to the reactor vessel is as follows:

1. A fuel assembly is taken from a specified location in the SFP storage rack and loaded into the empty fuel container of the conveyor car by the spent fuel machine.



handling to avoid potential damage. The fuel assembly insert handling manual tool is equipped with means to indicate proper resting of the tool on the fuel assembly top nozzle. The fuel assembly insert handling manual tool is suspended from the auxiliary crane by means of an extension piece, which confirms an acceptable amount of water shielding is present when the crane hook is in the upper position.

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

9.1.4.3.3 Refueling Cavity Drindown Events

Rapid drindown of the refueling cavity resulting in fuel uncover during refueling is not a credible event. The reactor vessel cavity ring is a permanently installed stainless steel assembly welded to the reactor vessel and the refueling cavity liner to prevent water leakage from the refueling cavity (Refer to Figure 9.1.4-12). The passive cavity ring design does not rely on active components such as pneumatic seals and is not susceptible to gross failure. Seals for openings in the refueling cavity liner do not rely on active components and do not pose a risk for rapid cavity draining.

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

Inadvertent draining of the refueling cavity is addressed by plant procedures. Key elements to be included in plant procedures to address inadvertent draining of the refueling cavity:

- Inspect accessible portion of the reactor cavity ring for damage at welds and the area that function as an expansion joint, including the protective cover (Refer to Figure 9.1.4-12), prior to filling the reactor cavity.
- Confirm that reactor cavity, connected pools, and systems have stable water levels and no evidence of abnormal leakage, prior to moving fuel.
- Continuously monitor water levels in reactor cavity, connected pools and IRWST during movement of fuel.
- Isolate system that is confirmed to be cause of inadvertent draining of refueling cavity.
- Identify and confirm availability of system(s) to make up water from the IRWST, if the cause of leakage is the reactor cavity ring or other leakage in the Reactor Building. Refer to Section 13.5 for plant procedure information.

Any credible drainage from the refueling cavity will be detected visually or by installed instrumentation in adequate time to place a handled fuel assembly, if

Figure 9.1.4-12—Permanent RPV Refueling Cavity Ring - General Configuration

