

ArevaEPRDCPEm Resource

From: WELLS Russell (AREVA) [Russell.Wells@areva.com]
Sent: Wednesday, March 16, 2011 6:47 PM
To: Tesfaye, Getachew
Cc: HUDSON Greg (AREVA); BUDZIK Dennis (AREVA); BENNETT Kathy (AREVA); DELANO Karen (AREVA); HALLINGER Pat (EXTERNAL AREVA); ROMINE Judy (AREVA); RYAN Tom (AREVA); WILLIFORD Dennis (AREVA)
Subject: DRAFT Response to U.S. EPR Design Certification Application RAI No. 413, Questions 7.8-32, 7.8-35, 7.8-38
Attachments: RAI 413 Questions 07.08-32, -35, -38 Response US EPR DC - DRAFT.pdf

Getachew,

Attached is a draft response to RAI No. 413, Questions 07.08-32, 07.08-35, and 07.08-38. The responses are provided in advance of the final response date of April 14, 2011 as shown below.

Please let me know if the staff has questions, or if this can be sent as a final response.

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: Tuesday, March 15, 2011 10:34 AM
To: Tesfaye, Getachew
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. 413, Supplement 8

Getachew,

AREVA NP provided a schedule for technically complete and correct responses to the questions in RAI 413 on September 08, 2010. Supplement 1 response to RAI No. 413 was sent on November 19, 2010, to provide a revised schedule. Supplement 2 response to RAI No. 413 was sent on December 13, 2010, to provide a revised schedule. Supplement 3 response to RAI No. 413 was sent on January 28, 2011, to provide technically correct and complete responses to seven questions. Supplement 4 response to RAI No. 413 was sent on February 1, 2011, to provide technically correct and complete responses to seven questions. Supplement 5 response to RAI No. 413 was sent on February 23, 2011, to provide technically correct and complete responses to five questions. Supplement 6 response to RAI No. 413 was sent on February 24, 2011, to provide a revised schedule. Supplement 7 response to RAI No. 413 was sent on March 2, 2011, to provide technically correct and complete response to one question. Based on discussions with NRC, the attached file,

"RAI 413 Supplement 8 Response US EPR DC.pdf" provides technically correct and complete responses to two of the remaining 13 questions, as committed.

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

Question #	Start Page	End Page
RAI 413 07.08-17	2	3
RAI 413 07.08-42	4	6

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

Question #	Response Date
RAI 413 07.08-13	April 21, 2011
RAI 413 07.08-19	April 5, 2011
RAI 413 07.08-21	April 5, 2011
RAI 413 07.08-22	April 5, 2011
RAI 413 07.08-26	April 5, 2011
RAI 413 07.08-27	April 5, 2011
RAI 413 07.08-28	April 5, 2011
RAI 413 07.08-29	April 5, 2011
RAI 413 07.08-32	April 14, 2011
RAI 413 07.08-35	April 14, 2011
RAI 413 07.08-38	April 14, 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: WELLS Russell (RS/NB)
Sent: Wednesday, March 02, 2011 3:34 PM
To: 'Tefaye, Getachew'
Cc: BRYAN Martin (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. 413, Supplement 7

Getachew,

AREVA NP Inc. letter NRC 11:019 dated March 2, 2011 provides the final response for RAI 413, Supplement 7, question 07.08-39. 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 respective pages in the enclosure that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 413 07.08-39	2	30

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

Question #	Response Date
RAI 413 07.08-13	April 21, 2011
RAI 413 07.08-17	April 5, 2011
RAI 413 07.08-19	April 5, 2011
RAI 413 07.08-21	April 5, 2011
RAI 413 07.08-22	April 5, 2011
RAI 413 07.08-26	April 5, 2011
RAI 413 07.08-27	April 5, 2011
RAI 413 07.08-28	April 5, 2011
RAI 413 07.08-29	April 5, 2011
RAI 413 07.08-32	April 14, 2011
RAI 413 07.08-35	April 14, 2011
RAI 413 07.08-38	April 14, 2011
RAI 413 07.08-42	April 5, 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: Thursday, February 24, 2011 1:58 PM

To: Tesfaye, Getachew

Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); RYAN Tom (RS/NB); WELLS Russell

(RS/NB)

Subject: Response to U.S. EPR Design Certification Application RAI No. 413, FSAR Ch. 7, Supplement 6

Getachew,

AREVA NP provided a schedule for technically complete and correct responses to the questions in RAI 413 on September 08, 2010. Supplement 1 response to RAI No. 413 was sent on November 19, 2010, to provide a revised schedule. Supplement 2 response to RAI No. 413 was sent on December 13, 2010, to provide a revised schedule. Supplement 3 response to RAI No. 413 was sent on January 28, 2011, to provide technically correct and complete responses to seven questions. Supplement 4 response to RAI No. 413 was sent on February 1, 2011, to provide technically correct and complete responses to seven questions. Supplement 5 response to RAI No. 413 was sent on February 23, 2011, to provide technically correct and complete responses to five questions.

Based upon the information presented to the NRC during the February 15, 2011, Public Meeting, the schedule for the remaining questions has been changed.

The schedule for technically correct and complete responses to the remaining 14 questions is provided below:

Question #	Response Date
RAI 413 07.08-13	April 21, 2011
RAI 413 07.08-17	April 5, 2011
RAI 413 07.08-19	April 5, 2011
RAI 413 07.08-21	April 5, 2011
RAI 413 07.08-22	April 5, 2011
RAI 413 07.08-26	April 5, 2011
RAI 413 07.08-27	April 5, 2011
RAI 413 07.08-28	April 5, 2011
RAI 413 07.08-29	April 5, 2011
RAI 413 07.08-32	April 14, 2011
RAI 413 07.08-35	April 14, 2011
RAI 413 07.08-38	April 14, 2011
RAI 413 07.08-39	April 5, 2011
RAI 413 07.08-42	April 5, 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: WELLS Russell (RS/NB)

Sent: Wednesday, February 23, 2011 2:08 PM

To: 'Tefaye, Getachew'

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

Subject: Response to U.S. EPR Design Certification Application RAI No. 413, FSAR Ch. 7, Supplement 5

Getachew,

AREVA NP provided a schedule for technically complete and correct responses to the questions in RAI 413 on September 08, 2010. Supplement 1 response to RAI No. 413 was sent on November 19, 2010, to provide a revised schedule. Supplement 2 response to RAI No. 413 was sent on December 13, 2010, to provide a revised schedule. Supplement 3 response to RAI No. 413 was sent on January 28, 2011, to provide technically correct and complete responses to seven questions. Supplement 4 response to RAI No. 413 was sent on February 1, 2011, to provide technically correct and complete responses to seven questions. Based on discussions with NRC, the attached file, "RAI 413 Supplement 5 Response US EPR DC.pdf" provides technically correct and complete responses to five of the remaining 19 questions, as committed.

The following table indicates the respective pages in the response document, "RAI 413 Supplement 5 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 413 07.08-10	2	2
RAI 413 07.08-11	3	4
RAI 413 07.08-12	5	6
RAI 413 07.08-14	7	7
RAI 413 07.08-16	8	8

The schedule for technically correct and complete responses to the remaining 14 questions is unchanged and provided below:

Question #	Response Date
RAI 413 07.08-13	March 15, 2011
RAI 413 07.08-17	March 15, 2011
RAI 413 07.08-19	March 31, 2011
RAI 413 07.08-21	March 2, 2011
RAI 413 07.08-22	March 2, 2011
RAI 413 07.08-26	March 31, 2011
RAI 413 07.08-27	March 2, 2011
RAI 413 07.08-28	March 2, 2011
RAI 413 07.08-29	March 31, 2011
RAI 413 07.08-32	March 31, 2011
RAI 413 07.08-35	March 2, 2011
RAI 413 07.08-38	March 2, 2011
RAI 413 07.08-39	March 2, 2011
RAI 413 07.08-42	March 15, 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: Tuesday, February 01, 2011 6:06 PM

To: 'Tesfaye, Getachew'

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

Subject: Response to U.S. EPR Design Certification Application RAI No. 413, FSAR Ch. 7, Supplement 4

Getachew,

AREVA NP provided a schedule for technically complete and correct responses to the questions in RAI 413 on September 08, 2010. Supplement 1 response to RAI No. 413 was sent on November 19, 2010, to provide a revised schedule. Supplement 2 response to RAI No. 413 was sent on December 13, 2010, to provide a revised schedule. Supplement 3 response to RAI No. 413 was sent on January 28, 2011, to provide technically correct and complete responses to seven questions. Based on discussions with NRC, the attached file, "RAI 413 Supplement 4 Response US EPR DC.pdf" provides technically correct and complete responses to seven of the remaining 26 questions, as committed.

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 413 Question 07.08-20.

The following table indicates the respective pages in the response document, "RAI 413 Supplement 4 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 413 07.08-15	2	2
RAI 413 07.08-18	3	4
RAI 413 07.08-20	5	6
RAI 413 07.08-23	7	11
RAI 413 07.08-25	12	14
RAI 413 07.08-33	15	19
RAI 413 07.08-34	20	33

The schedule for technically correct and complete responses to the remaining 19 questions is unchanged and provided below:

Question #	Response Date
RAI 413 07.08-10	March 15, 2011
RAI 413 07.08-11	March 15, 2011
RAI 413 07.08-12	March 15, 2011
RAI 413 07.08-13	March 15, 2011
RAI 413 07.08-14	March 15, 2011
RAI 413 07.08-16	March 15, 2011
RAI 413 07.08-17	March 15, 2011
RAI 413 07.08-19	March 31, 2011

RAI 413 07.08-21	March 2, 2011
RAI 413 07.08-22	March 2, 2011
RAI 413 07.08-26	March 31, 2011
RAI 413 07.08-27	March 2, 2011
RAI 413 07.08-28	March 2, 2011
RAI 413 07.08-29	March 31, 2011
RAI 413 07.08-32	March 31, 2011
RAI 413 07.08-35	March 2, 2011
RAI 413 07.08-38	March 2, 2011
RAI 413 07.08-39	March 2, 2011
RAI 413 07.08-42	March 15, 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: Friday, January 28, 2011 5:41 PM
To: 'Tefaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); RYAN Tom (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 413, FSAR Ch. 7, Supplement 3

Getachew,

The proprietary and non-proprietary responses for RAI 413 Supplement 3 are submitted via AREVA NP Inc. letter, "Response to U.S. EPR Design Certification Application RAI No. 413, Supplement 3, Questions 07.08-24, 07.08-30, 07.08-31, 07.08-36, 07.08-37, 07.08-40, and 07.08-41" NRC 11:010, dated January 28, 2011. An affidavit to support withholding of information from public disclosure, per 10CFR2.390(b), is provided as an enclosure to that letter.

AREVA NP provided a schedule for technically complete and correct responses to the questions in RAI 413 on September 08, 2010. Supplement 1 response to RAI No. 413 was sent on November 19, 2010, to provide a revised schedule. Supplement 2 response to RAI No. 413 was sent on December 13, 2010, to provide a revised schedule.

The following table indicates the respective pages in the response document, "RAI 413 Supplement 3 Response US EPR DC.pdf" that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 413 07.08-24	2	11
RAI 413 07.08-30	12	12
RAI 413 07.08-31	13	22

RAI 413 07.08-36	23	24
RAI 413 07.08-37	25	26
RAI 413 07.08-40	27	38
RAI 413 07.08-41	39	43

To provide additional time to interact with the NRC a revised schedule is provided below (bolded dates have changed).

Question #	Response Date
RAI 413 07.08-10	March 15, 2011
RAI 413 07.08-11	March 15, 2011
RAI 413 07.08-12	March 15, 2011
RAI 413 07.08-13	March 15, 2011
RAI 413 07.08-14	March 15, 2011
RAI 413 07.08-15	March 2, 2011
RAI 413 07.08-16	March 15, 2011
RAI 413 07.08-17	March 15, 2011
RAI 413 07.08-18	March 2, 2011
RAI 413 07.08-19	March 31, 2011
RAI 413 07.08-20	March 2, 2011
RAI 413 07.08-21	March 2, 2011
RAI 413 07.08-22	March 2, 2011
RAI 413 07.08-23	March 2, 2011
RAI 413 07.08-25	March 2, 2011
RAI 413 07.08-26	March 31, 2011
RAI 413 07.08-27	March 2, 2011
RAI 413 07.08-28	March 2, 2011
RAI 413 07.08-29	March 31, 2011
RAI 413 07.08-32	March 31, 2011
RAI 413 07.08-33	March 2, 2011
RAI 413 07.08-34	March 2, 2011
RAI 413 07.08-35	March 2, 2011
RAI 413 07.08-38	March 2, 2011
RAI 413 07.08-39	March 2, 2011
RAI 413 07.08-42	March 15, 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, December 13, 2010 8:40 PM

To: 'Tesfaye, Getachew'

Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); RYAN Tom (RS/NB); PANNELL George (CORP/QP)

Subject: Response to U.S. EPR Design Certification Application RAI No. 413, FSAR Ch. 7, Supplement 2

Getachew,

AREVA NP provided a schedule for technically complete and correct responses to the questions in RAI 413 on September 08, 2010. Supplement 1 response to RAI No. 413 was sent on November 19, 2010, to provide a revised schedule.

To provide additional time to interact with the NRC a revised schedule is provided below (bolded dates have changed).

Question #	Response Date
RAI 413 07.08-10	March 15, 2011
RAI 413 07.08-11	March 15, 2011
RAI 413 07.08-12	March 15, 2011
RAI 413 07.08-13	March 15, 2011
RAI 413 07.08-14	March 15, 2011
RAI 413 07.08-15	January 28, 2011
RAI 413 07.08-16	March 15, 2011
RAI 413 07.08-17	March 15, 2011
RAI 413 07.08-18	January 28, 2011
RAI 413 07.08-19	February 22, 2011
RAI 413 07.08-20	January 28, 2011
RAI 413 07.08-21	January 28, 2011
RAI 413 07.08-22	January 28, 2011
RAI 413 07.08-23	January 28, 2011
RAI 413 07.08-24	January 28, 2011
RAI 413 07.08-25	January 28, 2011
RAI 413 07.08-26	February 22, 2011
RAI 413 07.08-27	January 28, 2011
RAI 413 07.08-28	January 28, 2011
RAI 413 07.08-29	February 22, 2011
RAI 413 07.08-30	January 28, 2011
RAI 413 07.08-31	January 28, 2011
RAI 413 07.08-32	February 22, 2011
RAI 413 07.08-33	January 28, 2011
RAI 413 07.08-34	January 28, 2011
RAI 413 07.08-35	January 28, 2011
RAI 413 07.08-36	January 28, 2011
RAI 413 07.08-37	January 28, 2011
RAI 413 07.08-38	January 28, 2011
RAI 413 07.08-39	January 28, 2011
RAI 413 07.08-40	January 28, 2011
RAI 413 07.08-41	January 28, 2011
RAI 413 07.08-42	March 15, 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: Friday, November 19, 2010 4:51 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); PANNELL George (CORP/QP)
Subject: Response to U.S. EPR Design Certification Application RAI No. 413, FSAR Ch. 7

Getachew,

AREVA NP provided a schedule for technically complete and correct responses to the questions in RAI 413 on September 08, 2010. To provide additional time to interact with the NRC a revised schedule is provided below for questions 07.08-36, 07.08-39, and 07.08-41.

Question #	Response Date
RAI 413 07.08-10	March 15, 2011
RAI 413 07.08-11	March 15, 2011
RAI 413 07.08-12	March 15, 2011
RAI 413 07.08-13	March 15, 2011
RAI 413 07.08-14	March 15, 2011
RAI 413 07.08-15	December 17, 2010
RAI 413 07.08-16	March 15, 2011
RAI 413 07.08-17	March 15, 2011
RAI 413 07.08-18	December 17, 2010
RAI 413 07.08-19	January 28, 2011
RAI 413 07.08-20	December 17, 2010
RAI 413 07.08-21	January 28, 2011
RAI 413 07.08-22	December 17, 2010
RAI 413 07.08-23	December 17, 2010
RAI 413 07.08-24	January 28, 2011
RAI 413 07.08-25	December 17, 2010
RAI 413 07.08-26	December 17, 2010
RAI 413 07.08-27	December 17, 2010
RAI 413 07.08-28	December 17, 2010
RAI 413 07.08-29	January 28, 2011
RAI 413 07.08-30	January 28, 2011
RAI 413 07.08-31	January 28, 2011
RAI 413 07.08-32	January 28, 2011
RAI 413 07.08-33	December 17, 2010
RAI 413 07.08-34	December 17, 2010
RAI 413 07.08-35	January 28, 2011
RAI 413 07.08-36	December 15, 2010

RAI 413 07.08-37	January 28, 2011
RAI 413 07.08-38	December 17, 2010
RAI 413 07.08-39	December 15, 2010
RAI 413 07.08-40	January 28, 2011
RAI 413 07.08-41	December 15, 2010
RAI 413 07.08-42	March 15, 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: Wednesday, September 08, 2010 4:33 PM
To: Tesfaye, Getachew
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); PANNELL George (CORP/QP)
Subject: Response to U.S. EPR Design Certification Application RAI No. 413, FSAR Ch. 7

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information RAI 413.

The following table indicates the respective pages in the response document, "RAI 413 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 413 07.08-10	2	2
RAI 413 07.08-11	3	3
RAI 413 07.08-12	4	4
RAI 413 07.08-13	5	5
RAI 413 07.08-14	6	6
RAI 413 07.08-15	7	7
RAI 413 07.08-16	8	8
RAI 413 07.08-17	9	9
RAI 413 07.08-18	10	10
RAI 413 07.08-19	11	11
RAI 413 07.08-20	12	12
RAI 413 07.08-21	13	13
RAI 413 07.08-22	14	14
RAI 413 07.08-23	15	15
RAI 413 07.08-24	16	16
RAI 413 07.08-25	17	18
RAI 413 07.08-26	19	19
RAI 413 07.08-27	20	20
RAI 413 07.08-28	21	21
RAI 413 07.08-29	22	22
RAI 413 07.08-30	23	23

RAI 413 07.08-31	24	24
RAI 413 07.08-32	25	25
RAI 413 07.08-33	26	26
RAI 413 07.08-34	27	27
RAI 413 07.08-35	28	28
RAI 413 07.08-36	29	29
RAI 413 07.08-37	30	30
RAI 413 07.08-38	31	31
RAI 413 07.08-39	32	32
RAI 413 07.08-40	33	33
RAI 413 07.08-41	34	34
RAI 413 07.08-42	35	35

A complete answer is not provided for 33 of the 33 questions. The schedule for a technically correct and complete response to these questions is provided below.

Question #	Response Date
RAI 413 07.08-10	March 15, 2011
RAI 413 07.08-11	March 15, 2011
RAI 413 07.08-12	March 15, 2011
RAI 413 07.08-13	March 15, 2011
RAI 413 07.08-14	March 15, 2011
RAI 413 07.08-15	December 17, 2010
RAI 413 07.08-16	March 15, 2011
RAI 413 07.08-17	March 15, 2011
RAI 413 07.08-18	December 17, 2010
RAI 413 07.08-19	January 28, 2011
RAI 413 07.08-20	December 17, 2010
RAI 413 07.08-21	January 28, 2011
RAI 413 07.08-22	December 17, 2010
RAI 413 07.08-23	December 17, 2010
RAI 413 07.08-24	January 28, 2011
RAI 413 07.08-25	December 17, 2010
RAI 413 07.08-26	December 17, 2010
RAI 413 07.08-27	December 17, 2010
RAI 413 07.08-28	December 17, 2010
RAI 413 07.08-29	January 28, 2011
RAI 413 07.08-30	January 28, 2011
RAI 413 07.08-31	January 28, 2011
RAI 413 07.08-32	January 28, 2011
RAI 413 07.08-33	December 17, 2010
RAI 413 07.08-34	December 17, 2010
RAI 413 07.08-35	January 28, 2011
RAI 413 07.08-36	November 19, 2010
RAI 413 07.08-37	January 28, 2011
RAI 413 07.08-38	December 17, 2010
RAI 413 07.08-39	November 19, 2010
RAI 413 07.08-40	January 28, 2011
RAI 413 07.08-41	November 19, 2010
RAI 413 07.08-42	March 15, 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: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Monday, August 09, 2010 3:46 PM
To: ZZ-DL-A-USEPR-DL
Cc: Mott, Kenneth; Spaulding, Deirdre; Jackson, Terry; Canova, Michael; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 413(4772), FSAR Ch. 7

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on June 4, 2010, and discussed with your staff on July 22, 2010. Draft RAI Questions 07.08-19, 07.08-21, 07.08-23, and 07.08-41, 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,
Getachew Tesfaye
Sr. Project Manager
NRO/DNRL/NARP
(301) 415-3361

Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 2706

Mail Envelope Properties (1F1CC1BBDC66B842A46CAC03D6B1CD410419E3AE)

Subject: DRAFT Response to U.S. EPR Design Certification Application RAI No. 413, Questions 7.8-32, 7.8-35, 7.8-38
Sent Date: 3/16/2011 6:47:01 PM
Received Date: 3/16/2011 6:47:28 PM
From: WELLS Russell (AREVA)

Created By: Russell.Wells@areva.com

Recipients:

"HUDSON Greg (AREVA)" <Greg.Hudson@areva.com>
Tracking Status: None
"BUDZIK Dennis (AREVA)" <Dennis.Budzik@areva.com>
Tracking Status: None
"BENNETT Kathy (AREVA)" <Kathy.Bennett@areva.com>
Tracking Status: None
"DELANO Karen (AREVA)" <Karen.Delano@areva.com>
Tracking Status: None
"HALLINGER Pat (EXTERNAL AREVA)" <Pat.Hallinger.ext@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
"WILLIFORD Dennis (AREVA)" <Dennis.Williford@areva.com>
Tracking Status: None
"Tesfaye, Getachew" <Getachew.Tesfaye@nrc.gov>
Tracking Status: None

Post Office: AUSLYNCMX02.adom.ad.corp

Files	Size	Date & Time
MESSAGE	25339	3/16/2011 6:47:28 PM
RAI 413 Questions 07.08-32, -35, -38 Response US EPR DC - DRAFT.pdf		
1141121		

Options

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

**Request for Additional Information No. 413(4772), Revision 1,
Questions 07.08-32, 07.08-35, and 07.08-38**

8/9/2010

U.S. EPR Standard Design Certification

AREVA NP Inc.

Docket No. 52-020

SRP Section: 07.08 - Diverse Instrumentation and Control Systems

Application Section: ANP-10304

**QUESTIONS for Instrumentation, Controls and Electrical Engineering 1
(AP1000/EPR Projects) (ICE1)**

DRAFT

Question 07.08-32:

For the Steam Generator Tube Rupture (SGTR) event described in ANP-10304 Rev 1 Section A.3.7.2, provide the following additional information:

- a. An explanation of why the D3 analysis of the SGTR results in SG overfill as compared to the FSAR Section 15.6.3 analysis which does not show SG overfill,
- b. The design reference basis for main steam line loading with solid fill at a hydrostatic pressure of 1.25 design pressure, and
- c. An assessment of the possibility of steam line water hammer occurrence during the SG overfill portion of the SGTR event.

10 CFR Part 50, Appendix A, GDC 22, requires, in part, that design techniques, such as functional diversity or diversity in component design and principles of operation, shall be used to the extent practical to prevent loss of the protective function. The Staff Requirements Memorandum to SECY 93-087, Item II.Q, states that the vendor or applicant shall analyze each postulated common-mode failure for each event and shall demonstrate adequate diversity within the design for each of these events.

Section A.3.7.2 of ANP-10304 Rev 1 reports that the Steam Generator Tube Rupture (SGTR) event results in an overfill of the affected steam generator and discharge of liquid into the main steam line, whereas the SG does not overfill in FSAR Section Chapter 15 SGTR analysis. With essentially the same manual controls available and credited for the FSAR analysis and D3 analysis, plus availability of the DAS MFW isolation on SG High Level, it is unclear why the SGTR with PS SWCCF results in SG overfill. The staff is not able to identify design descriptions that would permit sufficient understanding in order to complete the safety evaluation.

Response to Question 07.08-32:

The original evaluation of the diversity and defense-in-depth (D3) steam generator tube rupture (SGTR) event was made by estimating the steam generator (SG) level response. No operator action was credited for isolation of the main feedwater (MFW) valves in this evaluation. Instead, the rate of SG level increase from the U.S. EPR FSAR Tier 2 analysis was extended for the amount of time that it would take the SG level control system to respond. This estimation resulted in a level of 90 percent wide range when the valves reached full closure. A D3-specific analysis was performed with S-RELAP5 to more precisely evaluate the SG overfill behavior in a best estimate SGTR event. The best estimate SGTR analysis credits the following automatic control systems:

- Pressurizer level control: Charging increases and the second pump is started with falling pressurizer level. Letdown isolation occurs on low-low pressurizer level.
- Reactor coolant system (RCS) pressure control: Pressurizer heaters increase power to compensate for falling RCS pressure.
- SG level control: Normal SG level is 49 percent narrow range (NR), and the full load MFW control valve (FLCV) operates to maintain within a control band around the setpoint. Following a reactor trip (RT), the SG level setpoint is temporarily reduced to 34 percent. The setpoint increases with time after the RT. The protection system (PS) would close the full load control valve and isolation valve on RT check back signal, but this function is not available for the D3 analyses. The normal interlock transition from FLCV control to the lower

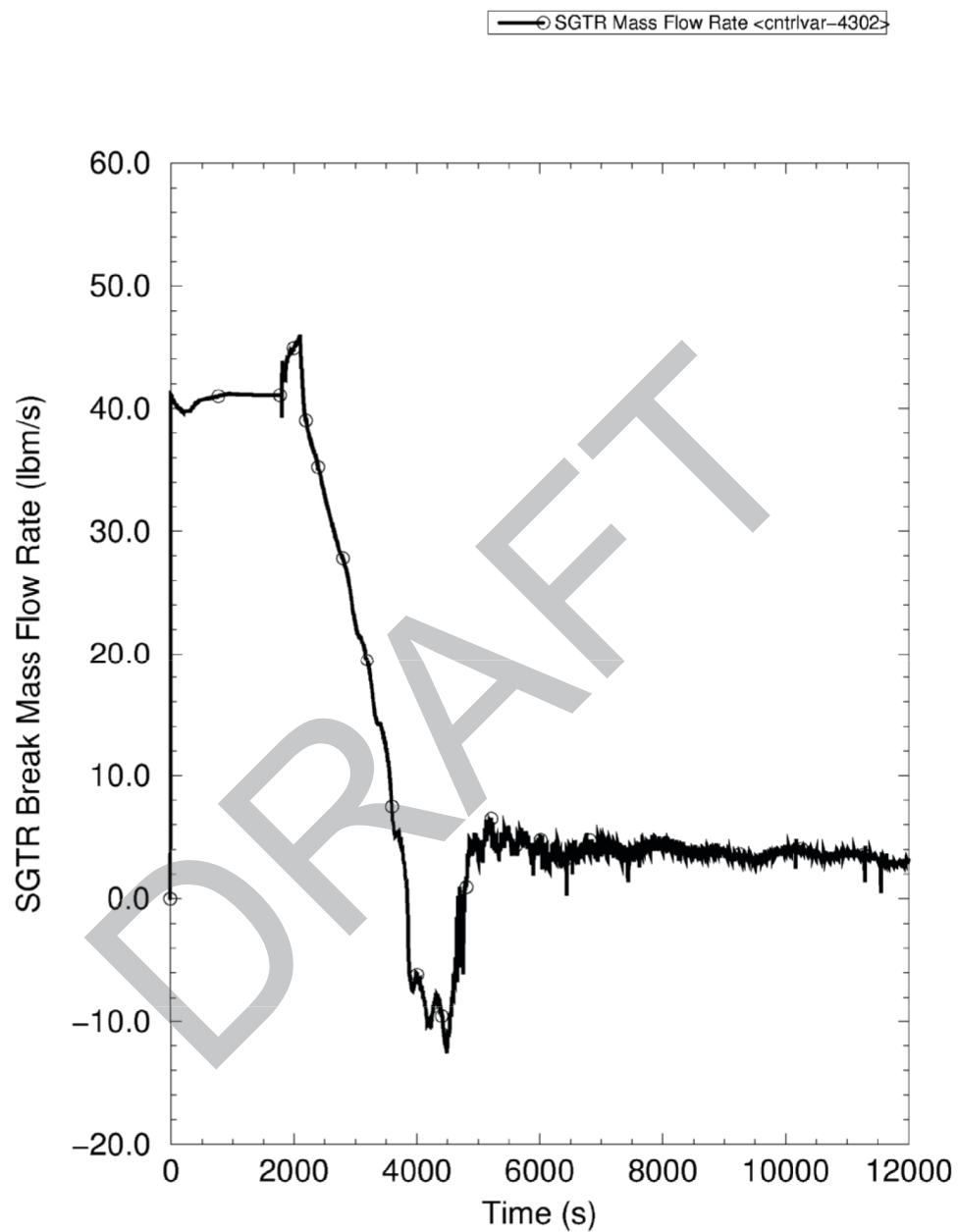
load control valves works as designed and the low load control valve (LLCV) (<5-20 percent reactor power) or very low load control valve (VLLCV) (<5 percent reactor power) operate to maintain SG level at the programmed setpoint. After the affected SG is isolated, no further FW is introduced to that SG.

In the D3 SGTR analysis, the operation of the chemical and volume control system (CVCS) system compensates for the break flow (see Figure 07.08-32-1). The pressurizer pressure (see Figure 07.08-32-2) remains above the setpoint, and an automatic RT does not occur prior to 30 minutes. At 30 minutes, the operator performs a manual RT. After RT, the operator performs the actions necessary to isolate the affected SG. In an isolated SG, MFW, emergency feedwater (EFW), and SG blowdown are isolated, the main steam relief train (MSRT) setpoint is raised above the safety injection (SI) shutoff head, and the main steam isolation valve (MSIV) is closed. The operator then manually initiates a cooldown with the unaffected SGs and performs a concurrent RCS depressurization to allow the RCS to be connected to the residual heat removal system (RHRS). The maximum level, 84 percent wide range (58 percent narrow range), is reached at 63 minutes (see Figure 07.08-32-3 and Figure 07.08-32-4). Because the SG does not overfill throughout the event, an evaluation of main steam line loading and main steam line water hammer is not necessary.

Technical Report ANP-10304, "U.S. EPR Diversity and Defense-in-Depth Assessment," will be revised to include the information requested in this RAI. The revision to Technical Report ANP-10304 will be transmitted separately.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Figure 07.08-32-1—D3 SGTR Event – Break Flow

07.08-32-2—D3 SGTR Event – Pressurizer Pressure

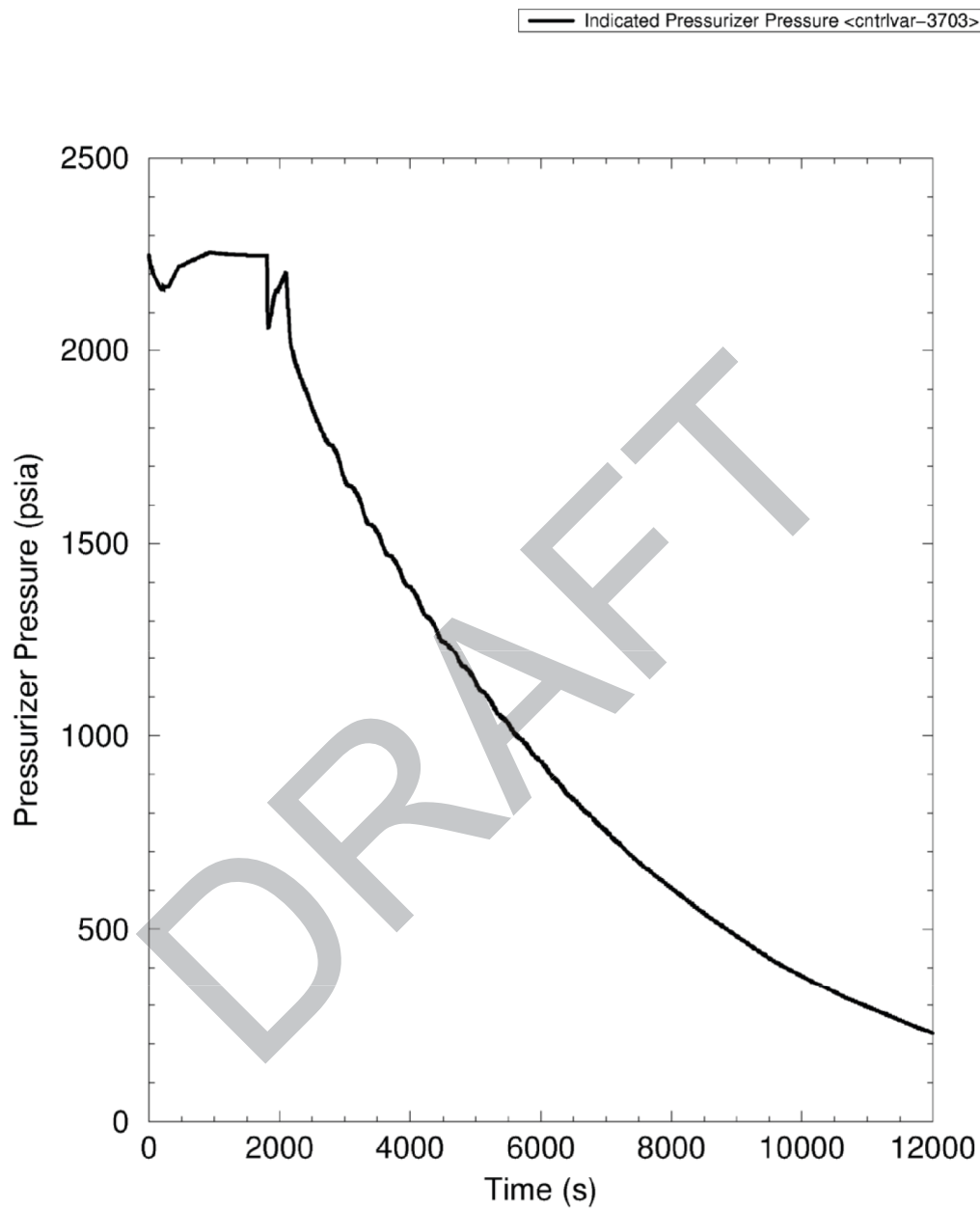


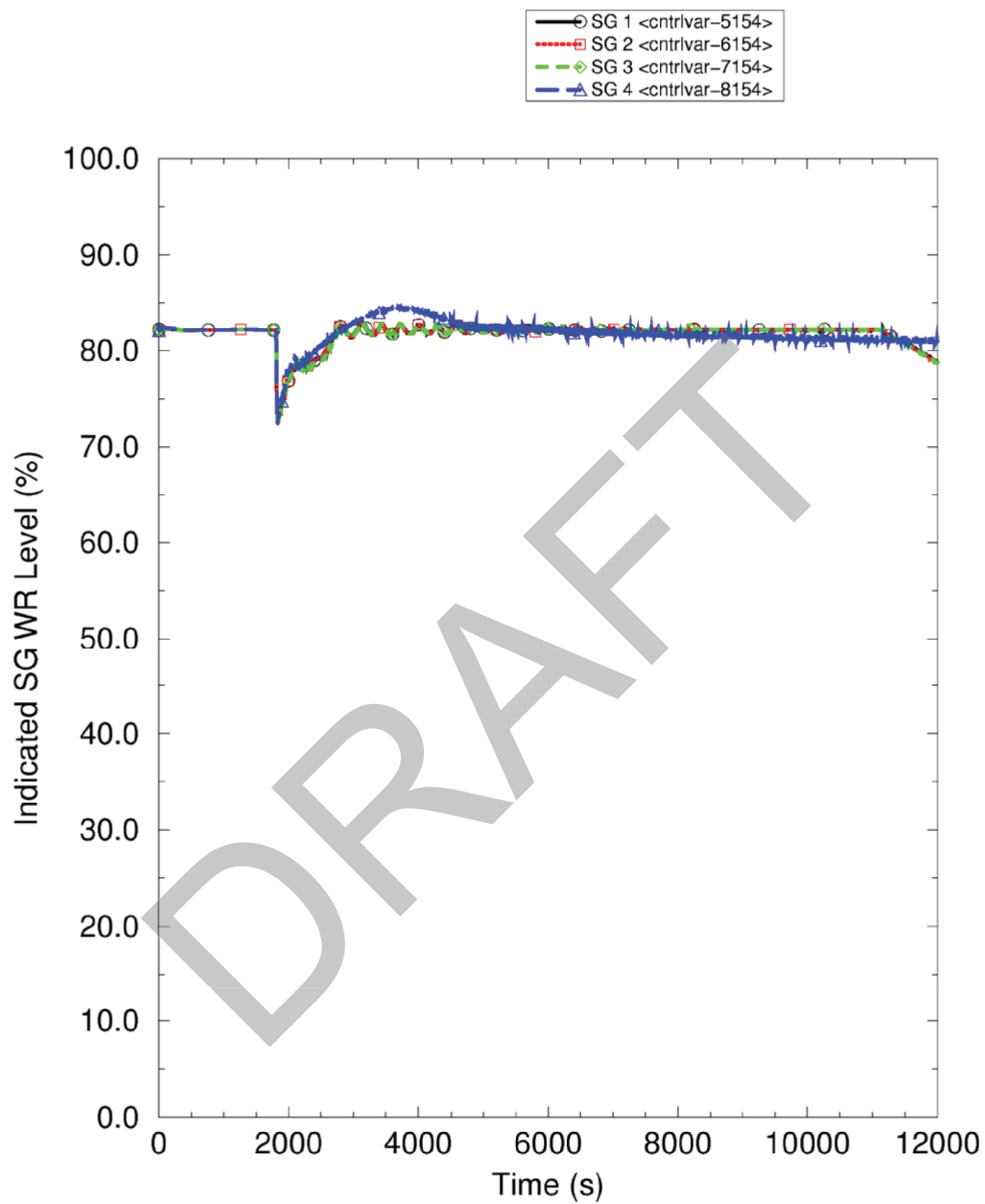
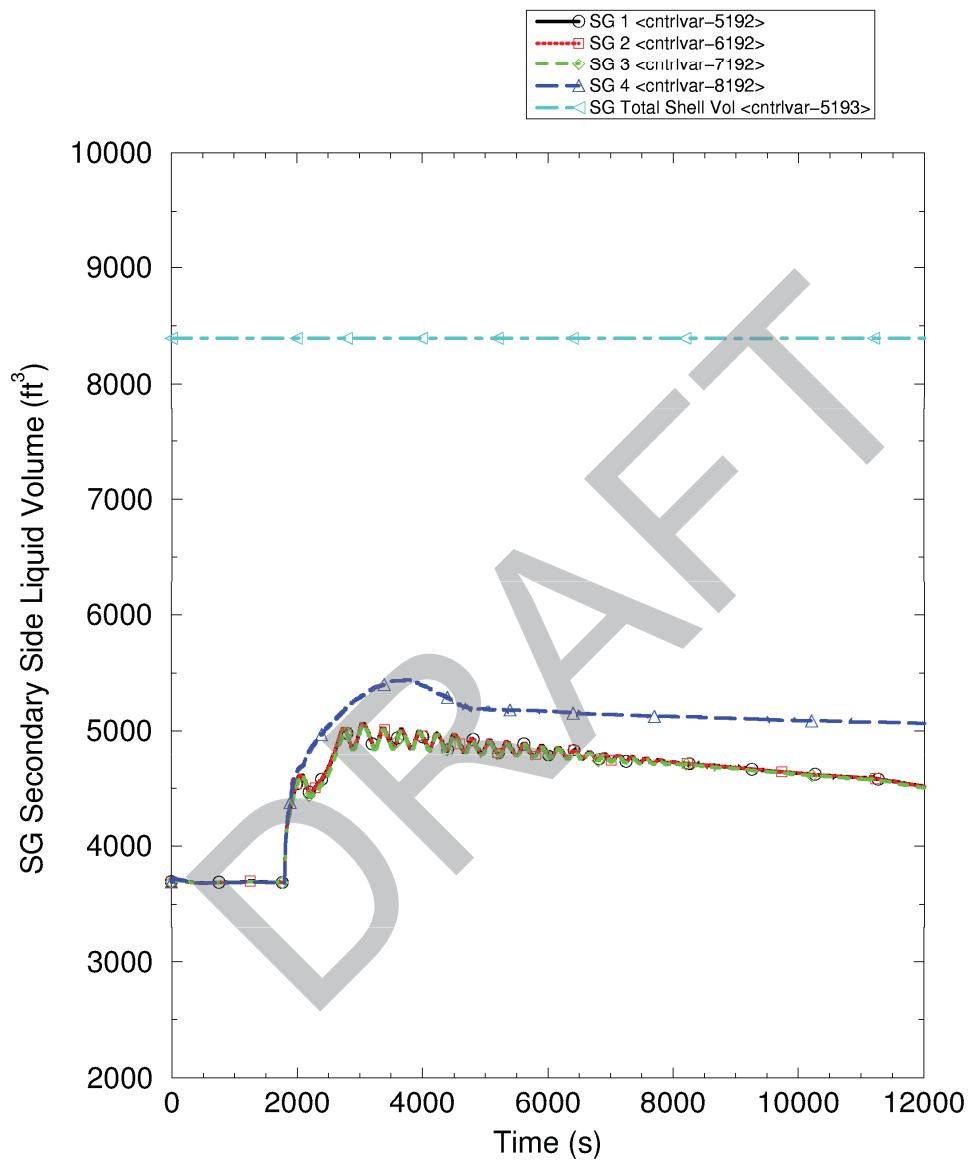
Figure 07.08-32-3—D3 SGTR Event – SG Level, Wide Range

Figure 07.08-32-4—D3 SGTR Event – SG Volume

Question 07.08-35:

Identify the credited diverse means to address the loss of the PS initiated safety functions of RT on a high pressurizer level and CVCS isolation on high pressurizer level, as discussed in ANP-10304, Revision 1, Section A.3.6.2, "CVCS Malfunction that Increases RCS Inventory," in accordance with the D3 policy stated in SRM to SECY-93-087, Point 3. If the credited diverse means are manual actuations, provide the detailed design descriptions that would address the guidance of Standard Review Plan (SRP) Appendix 18-A, "Crediting Manual Operator Actions in Diversity and Defense-In-Depth (D3) Analyses." Applying the credited diverse means, provide the following additional information:

- a. A description of the operator action sequence, starting with recognition of the increasing RCS inventory event and ending with isolation of CVCS,
- b. The time within which the operator can accomplish the required actions to isolate CVCS and terminate the event, and
- c. Identification of the procedure or procedure type (e.g., EPGs) that will prescribe the steps to accomplish the required operator action and whether a special D3 coping procedure is required.

10 CFR Part 50, Appendix A, GDC 22, requires, in part, that design techniques, such as functional diversity or diversity in component design and principles of operation, shall be used to the extent practical to prevent loss of the protective function. The Staff Requirements Memorandum to SECY 93-087, Item II.Q, states that the vendor or applicant shall analyze each postulated common-mode failure for each event and shall demonstrate adequate diversity within the design for each of these events.

For the Increase in RCS Inventory event with SWCCF, as described in Section A.3.6.2 of ANP-10304 Rev 1, the transient does not terminate on Pressurizer High Level as is the case with the FSAR Chapter 15 analysis. In the FSAR analysis, the pressurizer high level causes a reactor trip and CVCS isolation. For the D3 analysis, neither the reactor trip nor the CVCS isolation occurs, and the pressurizer fills solid. Although Section A.3.6.2 of ANP-10304 Rev 1 states that pressurizer PSRVs are capable of relieving water, thus ensuring that the RCS pressure boundary is maintained, sufficient indication and procedures should be available to ensure that the plant operations personnel recognize and terminate the event in a timely manner. The staff is not able to identify design descriptions that would permit sufficient understanding in order to complete the safety evaluation.

Response to Question 07.08-35:

The chemical and volume control system (CVCS) malfunction that increases reactor coolant system (RCS) inventory event results from a spurious actuation, either by a control system or operator action, of the CVCS that adds fluid to the RCS without letdown. At steady-state full power operation, one charging pump of the CVCS is operating, and the CVCS maintains the pressurizer level through control of the letdown valve position. The CVCS malfunction isolates letdown and starts the second charging pump. Two charging pumps inject fluid to the RCS from the volume control tank (VCT) without letdown.

In the U.S. EPR FSAR Tier 2, Chapter 15 analysis of this event, the pressurizer high level causes a reactor trip (RT) and CVCS isolation. These features are components of the

protection system (PS). For the diversity and defense-in-depth (D3) analysis, with a software common cause failure (SWCCF) in the PS, the RT and the CVCS isolation does not occur. Technical Report ANP-10304, Revision 1, Section A.3.6.2 conservatively estimates that it takes 24 minutes for the pressurizer to fill solid if the CVCS malfunction continues unabated. Twenty-four minutes is sufficient time for the operator to recognize and terminate the charging flow before the pressurizer overfills. Under this scenario, there are indications/opportunities that alert the operator that the pressurizer is filling uncontrollably. The operator sees a deviation alarm when the pressurizer level exceeds the normal pressurizer level control band. The VCT tank level decreases, resulting in the automatic start of the boron and reactor water makeup pumps.

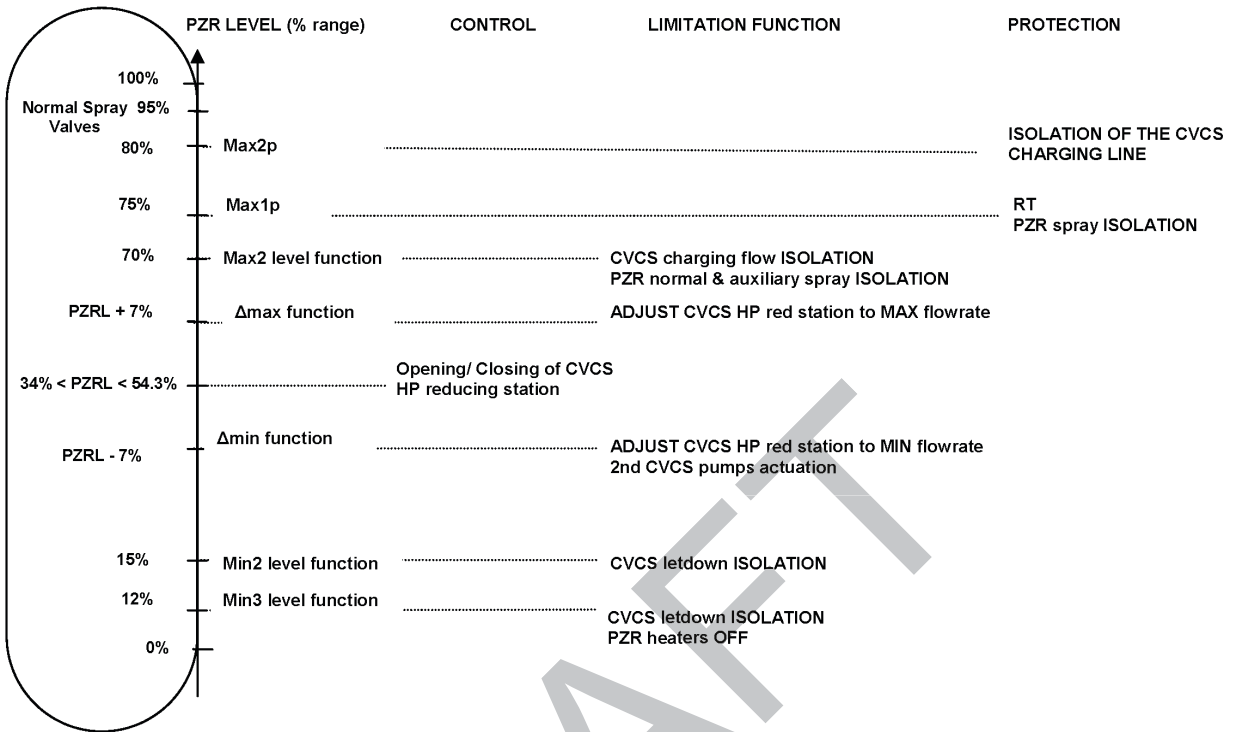
This assessment is conservative because systems that would be available for event mitigation are not credited. In the U.S. EPR design, a pressurizer level limitation function exists in the process automation system (PAS), which is separate from the PS. This function improves plant availability by avoiding a RT and other safety-related function actuations for events that lead to increasing levels in the pressurizer. Figure 07.08-35-1 shows that the limitation function isolates charging and pressurizer spray when the pressurizer level reaches 70 percent. The pressurizer level limitation function will terminate this event before filling the pressurizer. This automatic feature will actuate approximately 8.5 minutes after event initiation.

With credit for the pressurizer level limitation system, there is no need for operator action for this event. Charging flow would be automatically isolated when pressurizer level reaches 70 percent. Specific procedures are not required for this event.

Technical Report ANP-10304, "U.S. EPR Diversity and Defense-in-Depth Assessment," will be revised to include the information requested in this RAI. The revision to Technical Report ANP-10304 will be transmitted separately.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Figure 07.08-35-1—Pressurizer Level Setpoints

Question 07.08-38:

For Section A.3.2.3 of ANP-10304 Rev 1, describe the neutronics calculations that are done to determine the decalibration. In particular, address the issue of the temperature decrease in neutron reflector coolant. Also describe how the decalibration is implemented in the S-RELAP5 model.

10 CFR Part 50, Appendix A, GDC 22, requires, in part, that design techniques, such as functional diversity or diversity in component design and principles of operation, shall be used to the extent practical to prevent loss of the protective function. The Staff Requirements Memorandum to SECY 93-087, Item II.Q, states that the vendor or applicant shall analyze each postulated common-mode failure for each event and shall demonstrate adequate diversity within the design for each of these events.

Section A.3.2.3 of ANP-10304 Rev 1 states that the reduction in downcomer water temperature that results from the Increase in Steam Flow event causes the excore neutron detectors to become decalibrated, thereby delaying reactor trip. The staff is not able to identify design descriptions that would permit sufficient understanding in order to complete the safety evaluation.

Response to Question 07.08-38:

The temperature decalibration factors are determined by an independent adjoint DORT (Discrete Ordinates Transport) calculation. This adjoint calculation uses the Oak Ridge National Laboratory (ORNL) programs GIP and DORT. The GIP program generates 47 group neutron cross sections for the materials internal and adjacent to the U.S. EPR pressure vessel. The DORT program calculates the adjoint fluxes necessary to obtain the desired excore detector response factors for a 25°F temperature variation around the nominal inlet coolant temperature. Because of the uncertainty on the exact location of the excore detector, the factor is calculated for three different locations of the excore detector. The temperature decalibration factor, DF, for the locations is calculated to be 0.51 percent/°F.

In the S-RELAP5 best estimate model used for the diversity and defense-in-depth (D3) analysis, the decalibration factor is applied through the following:

$$currentIndicatedPower(\%) = reactorPower(\%) + \Delta T(^{\circ}F) \times DF \left(\frac{\%}{^{\circ}F} \right) \quad (1)$$

$$where \quad \Delta T(^{\circ}F) = T_{calibration}^{Downcomer} - T_{current}^{Downcomer}$$

When the temperature decreases, like during the increased steam flow event (see Technical Report ANP-10304, Revision 1, Figure A.3.2-2), the correction $T(^{\circ}F) \times DF \left(\frac{\%}{^{\circ}F} \right)$ is negative.

The indicated reactor power is lower than the current reactor power, and the reactor trip (RT) on high neutron flux is delayed as stated in Technical Report ANP-10304, Section A.3.2.3.

Formula (1) is incorrect. The correct formula for utilization in the best estimate D3 analyses is:

$$revisedIndicatedPower(\%) = reactorPower(\%) \times \left\{ 1 + \frac{\left[\Delta T(^{\circ}F) \times DF\left(\frac{\%}{^{\circ}F}\right) \right]}{100(\%)} \right\}$$

The power correction resulting from the change in downcomer temperature depends on the current reactor power. This dependence was omitted from the previous equation.

A AREVA NP corrective action process establishes that a revision of the decalibration formula in the S-RELAP5 deck would not change the D3 analyses conclusions.

For the increased steam flow event presented in Technical Report ANP-10304, Appendix A, Section A.3.2.3, the indicated reactor power increases and stabilizes below the diverse actuation system (DAS) high neutron flux (power range) RT setpoint (see Technical Report ANP-10304, Figure A.3.2-1). No other RT is actuated.

According to the numerical simulation in this response, the revised indicated power would be lower because of the negative ΔT , and the conditions would be farther from the RT conditions. The transient analysis would not be impacted by this correction. However, between the end of cycle (EOC) and the beginning of cycle (BOC), reactivity kinetics conditions can lead to the stabilization of the indicated neutron flux signal just under the RT setpoint. A transient calculation was performed with these conditions for the moderator temperature coefficient (MTC) and fuel Doppler coefficient (DTC). Figure 07.08-38-1 shows the indicated power and the nuclear power. For this case, Figure 07.08-38-2 shows the corresponding departure from nucleate boiling ratio (DNBR) and the linear power density (LPD) margin.

If the decalibration coefficient calculated for a 25°F, variation is not applicable to the predicted 34.5°F variation during the increased steam flow event. In an extreme case, the revised indicated power would be higher than previously calculated, and the DAS high neutron flux RT setpoint would be reached. In this case, the transient would be interrupted and the consequences would be less severe than in the case presented in Technical Report ANP-10304, Section A.3.2.3.

Numerical simulation :

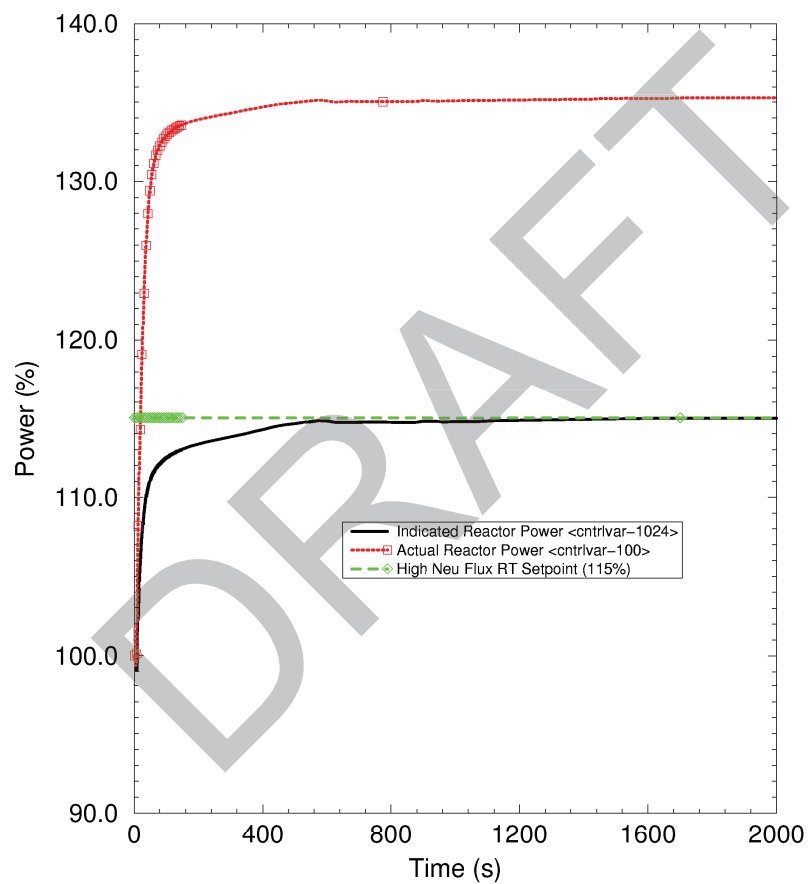
The calculation with the approximate final conditions of the increased steam flow event (Reactor power = 131 percent and $\Delta T = -34.5^{\circ}F$), shown in Technical Report ANP-10304, Figures A.3.2-1 and A.3.2-2, gives 113.41 percent for the current indicated power and 107.95 percent for the revised indicated power (the RT setpoint is 115 percent).

Technical Report ANP-10304, "U.S. EPR Diversity and Defense-in-Depth Assessment," will be revised to include the information requested in this RAI. The revision to Technical Report ANP-10304 will be transmitted separately.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Figure 07.08-38-1—D3 - Increase in Steam Flow - Case Stabilizing under the High Neutron Flux Setpoint - Power



ID:25531 22Feb2011 08:08:14 D3_hfp_bmmoc.dmx:1

Figure 07.08-38-2—D3 - Increase in Steam Flow - Case Stabilizing under the High Neutron Flux Setpoint - DNBR and Linear Heat Generation Rate vs. Limits

