ArevaEPRDCPEm Resource

From: WILLIFORD Dennis (AREVA) [Dennis.Williford@areva.com]
Sent: Friday, February 03, 2012 11:32 AM
To: Tesfaye, Getachew
Cc: BENNETT Kathy (AREVA); CRIBB Arnie (EXTERNAL AREVA); DELANO Karen (AREVA); HATHCOCK Phillip (AREVA); ROMINE Judy (AREVA); RYAN Tom (AREVA); HUDSON Greg (AREVA); MEACHAM Robert (AREVA)
Subject: DRAFT Response to U.S. EPR Design Certification Application RAI No. 505 (5902,5735,5869,5754,5803,5950,5744), FSAR Ch. 7, Question 07.05-10
Attachments: RAI 505 Question 07.05-10 Response US EPR DC - DRAFT.pdf

Getachew,

Attached is a DRAFT response to Question 07.05-10 for RAI No. 505 (FSAR Ch. 7) in advance of the March 8, 2012 final date.

Let me know if the staff has any questions or if this response can be sent as final.

Thanks,

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

From: WILLIFORD Dennis (RS/NB)
Sent: Thursday, January 19, 2012 11:19 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. 505 (5902,5735,5869,5754,5803,5950,5744), FSAR Ch. 7, Supplement 8

Getachew,

On September 29, 2011, AREVA NP Inc. provided a schedule for technically correct and complete responses to the 34 questions in RAI 505. In Supplement 1 sent on October 27, 2011, and Supplement 2 sent on November 17, 2011, AREVA NP provided a revised schedule for technically correct and complete responses to 33 questions and a preliminary revised schedule for Question 07.01-33. AREVA NP provided Supplement 3 on November 22, 2011 to provide a final response to 4 questions. On December 9, 2011, AREVA NP provided Supplement 4 to revise the schedule for 7 questions. On December 14, 2011, AREVA NP provided Supplement 5 to revise the schedule for 5 questions. On December 15, 2011, AREVA NP provided Supplement 6 to provide a complete and final response to 6 questions. On January 10, 2012, AREVA NP provided Supplement 7 to provide a complete and final response to 2 questions.

The attached file, “RAI 505 Supplement 8 Response US EPR DC.pdf” provides a technically correct and complete final response to 1 of the remaining 22 questions.

The following table indicates the respective pages in the response document, "RAI 505 Supplement 8 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 505 — 07.01-42	2	2

The schedule for a technically correct and complete response to the remaining 21 questions is provided below. The preliminary schedule for the response to Question 07.01-33 has been revised and is being reevaluated and a new supplement with a revised schedule will be transmitted by February 21, 2012.

Question #	Response Date
RAI 505 — 07.01-33	**February 21, 2012**
RAI 505 — 07.01-34	April 5, 2012
RAI 505 — 07.01-35	April 26, 2012
RAI 505 — 07.01-36	February 9, 2012
RAI 505 — 07.01-37	March 8, 2012
RAI 505 — 07.01-38	February 9, 2012
RAI 505 — 07.01-39	February 9, 2012
RAI 505 — 07.01-40	February 9, 2012
RAI 505 — 07.01-41	February 9, 2012
RAI 505 — 07.01-44	February 9, 2012
RAI 505 — 07.01-45	April 26, 2012
RAI 505 — 07.01-46	April 26, 2012
RAI 505 — 07.01-47	February 9, 2012
RAI 505 — 07.01-48	February 9, 2012
RAI 505 — 07.01-49	February 9, 2012
RAI 505 — 07.01-50	April 26, 2012
RAI 505 — 07.01-51	February 9, 2012
RAI 505 — 07.03-38	April 26, 2012
RAI 505 — 07.05-10	March 8, 2012
RAI 505 — 07.08-47	April 26, 2012
RAI 505 — 07.09-71	April 5, 2012

Sincerely,

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

From: WILLIFORD Dennis (CORP/QP)
Sent: Tuesday, January 10, 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)
Subject: Response to U.S. EPR Design Certification Application RAI No. 505 (5902,5735,5869,5754,5803,5950,5744), FSAR Ch. 7, Supplement 7

Getachew,

On September 29, 2011, AREVA NP Inc. provided a schedule for technically correct and complete responses to the 34 questions in RAI 505. In Supplement 1 sent on October 27, 2011, and Supplement 2 sent on November 17, 2011, AREVA NP provided a revised schedule for technically correct and complete responses to 33 questions and a preliminary revised schedule for Question 07.01-33. AREVA NP provided Supplement 3 on November 22, 2011 to provide a final response to 4 questions. On December 9, 2011, AREVA NP provided Supplement 4 to revise the schedule for 7 questions. On December 14, 2011, AREVA NP provided Supplement 5 to revise the schedule for 5 questions. On December 15, 2011, AREVA NP provided Supplement 6 to provide a complete and final response to 6 questions.

The attached file, "RAI 505 Supplement 7 Response US EPR DC.pdf" provides technically correct and complete final responses to 2 of the remaining 24 questions. Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 505 Question 07.08-48.

The following table indicates the respective pages in the response document, "RAI 505 Supplement 7 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 505 — 07.08-44	2	3
RAI 505 — 07.08-48	4	5

The schedule for a technically correct and complete response to the remaining 22 questions has changed as provided below. The preliminary schedule for the response to Question 07.01-33 is being reevaluated and a new supplement with a revised schedule will be transmitted by January 25, 2012.

Question #	Response Date
RAI 505 — 07.01-33	January 25, 2012
RAI 505 — 07.01-34	**April 5, 2012**
RAI 505 — 07.01-35	**April 26, 2012**
RAI 505 — 07.01-36	**February 9, 2012**
RAI 505 — 07.01-37	**March 8, 2012**
RAI 505 — 07.01-38	**February 9, 2012**
RAI 505 — 07.01-39	**February 9, 2012**
RAI 505 — 07.01-40	**February 9, 2012**
RAI 505 — 07.01-41	**February 9, 2012**
RAI 505 — 07.01-42	**February 9, 2012**
RAI 505 — 07.01-44	**February 9, 2012**
RAI 505 — 07.01-45	**April 26, 2012**
RAI 505 — 07.01-46	**April 26, 2012**
RAI 505 — 07.01-47	**February 9, 2012**

RAI 505 — 07.01-48	**February 9, 2012**
RAI 505 — 07.01-49	**February 9, 2012**
RAI 505 — 07.01-50	**April 26, 2012**
RAI 505 — 07.01-51	**February 9, 2012**
RAI 505 — 07.03-38	**April 26, 2012**
RAI 505 — 07.05-10	**March 8, 2012**
RAI 505 — 07.08-47	**April 26, 2012**
RAI 505 — 07.09-71	**April 5, 2012**

Sincerely,

Dennis Williford, P.E.
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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: Thursday, December 15, 2011 1:49 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. 505 (5902,5735,5869,5754,5803,5950,5744), FSAR Ch. 7, Supplement 6

Getachew,

On September 29, 2011, AREVA NP Inc. provided a schedule for technically correct and complete responses to the 34 questions in RAI 505. In Supplement 1 sent on October 27, 2011, and Supplement 2 sent on November 17, 2011, AREVA NP provided a revised schedule for technically correct and complete responses to 33 questions and a preliminary revised schedule for Question 07.01-33. AREVA NP provided Supplement 3 on November 22, 2011 to provide a final response to 4 questions. On December 9, 2011, AREVA NP provided Supplement 4 to revise the schedule for 7 questions. On December 14, 2011, AREVA NP provided Supplement 5 to revise the schedule for 5 questions.

The attached file, "RAI 505 Supplement 6 Response US EPR DC.pdf" provides technically correct and complete responses to 6 of the remaining 30 questions. Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the responses. Also appended to this file are affected pages of Technical Reports ANP-10304 and ANP-10309P. Revisions to these Technical Reports will be submitted by separate letter after completion of all responses to RAI 505.

The following table indicates the respective pages in the response document, "RAI 505 Supplement 6 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 505 — 07.03-37	2	3
RAI 505 — 07.04-15	4	5

RAI 505 — 07.05-11	6	6
RAI 505 — 07.08-43	7	8
RAI 505 — 07.08-45	9	10
RAI 505 — 07.08-49	11	12

The schedule for a technically correct and complete response to the remaining 24 questions remains unchanged. The preliminary schedule for the response to Question 07.01-33 is being reevaluated and a new supplement with a revised schedule will be transmitted by January 25, 2012.

Question #	Response Date
RAI 505 — 07.01-33	January 25, 2012
RAI 505 — 07.01-34	January 10, 2012
RAI 505 — 07.01-35	February 9, 2012
RAI 505 — 07.01-36	January 10, 2012
RAI 505 — 07.01-37	January 19, 2012
RAI 505 — 07.01-38	January 10, 2012
RAI 505 — 07.01-39	January 10, 2012
RAI 505 — 07.01-40	January 10, 2012
RAI 505 — 07.01-41	January 10, 2012
RAI 505 — 07.01-42	January 10, 2012
RAI 505 — 07.01-44	January 10, 2012
RAI 505 — 07.01-45	February 9, 2012
RAI 505 — 07.01-46	February 9, 2012
RAI 505 — 07.01-47	January 10, 2012
RAI 505 — 07.01-48	January 10, 2012
RAI 505 — 07.01-49	January 10, 2012
RAI 505 — 07.01-50	January 10, 2012
RAI 505 — 07.01-51	January 10, 2012
RAI 505 — 07.03-38	February 9, 2012
RAI 505 — 07.05-10	January 19, 2012
RAI 505 — 07.08-44	January 10, 2012
RAI 505 — 07.08-47	January 10, 2012
RAI 505 — 07.08-48	January 10, 2012
RAI 505 — 07.09-71	January 10, 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
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Email: Dennis.Williford@areva.com

From: WILLIFORD Dennis (RS/NB)
Sent: Wednesday, December 14, 2011 11:30 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. 505 (5902,5735,5869,5754,5803,5950,5744), FSAR Ch. 7, Supplement 5

Getachew,

On September 29, 2011, AREVA NP Inc. provided a schedule for technically correct and complete responses to the 34 questions in RAI 505. In Supplement 1 sent on October 27, 2011, and Supplement 2 sent on November 17, 2011, AREVA NP provided a revised schedule for technically correct and complete responses to 33 questions and a preliminary revised schedule for Question 07.01-33. AREVA NP provided Supplement 3 on November 22, 2011 to provide a final response to 4 questions. On December 9, 2011, AREVA NP provided a revised schedule for 7 questions.

The schedule for the response to four questions (Questions 7.1-35, 7.1-45, 7.1-46, and 7.3-38) is being changed, as indicated in bold below. In addition, the preliminary schedule for the response to Question 07.01-33 has been revised as indicated. This schedule is being reevaluated and a new supplement with a revised schedule will be transmitted by January 25, 2012. The schedule for a technically correct and complete response to the remaining 25 questions remains unchanged.

Question #	Response Date
RAI 505 — 07.01-33	**January 25, 2012**
RAI 505 — 07.01-34	January 10, 2012
RAI 505 — 07.01-35	**February 9, 2012**
RAI 505 — 07.01-36	January 10, 2012
RAI 505 — 07.01-37	January 19, 2012
RAI 505 — 07.01-38	January 10, 2012
RAI 505 — 07.01-39	January 10, 2012
RAI 505 — 07.01-40	January 10, 2012
RAI 505 — 07.01-41	January 10, 2012
RAI 505 — 07.01-42	January 10, 2012
RAI 505 — 07.01-44	January 10, 2012
RAI 505 — 07.01-45	**February 9, 2012**
RAI 505 — 07.01-46	**February 9, 2012**
RAI 505 — 07.01-47	January 10, 2012
RAI 505 — 07.01-48	January 10, 2012
RAI 505 — 07.01-49	January 10, 2012
RAI 505 — 07.01-50	January 10, 2012
RAI 505 — 07.01-51	January 10, 2012
RAI 505 — 07.03-37	January 19, 2012
RAI 505 — 07.03-38	**February 9, 2012**
RAI 505 — 07.04-15	January 19, 2012
RAI 505 — 07.05-10	January 19, 2012
RAI 505 — 07.05-11	January 19, 2012
RAI 505 — 07.08-43	January 19, 2012

RAI 505 — 07.08-44	January 10, 2012
RAI 505 — 07.08-45	January 10, 2012
RAI 505 — 07.08-47	January 10, 2012
RAI 505 — 07.08-48	January 10, 2012
RAI 505 — 07.08-49	January 19, 2012
RAI 505 — 07.09-71	January 10, 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: RYAN Tom (RS/NB)
Sent: Friday, December 09, 2011 8:35 AM
To: Getachew.Tesfaye@nrc.gov
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); WILLIFORD Dennis (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 505 (5902,5735,5869,5754,5803,5950,5744), FSAR Ch. 7, Supplement 4

Getachew,

On September 29, 2011, AREVA NP Inc. provided a schedule for technically correct and complete responses to the 34 questions in RAI 505. On October 27, 2011, and November 17, 2011, AREVA NP provided a revised schedule for technically correct and complete responses to 33 questions and a preliminary revised schedule for Question 07.01-33. On November 22, 2011, AREVA NP provided a final response to four questions.

The schedule for the response to the questions 7.1-37, 7.3-37, 7.4-15, 7.5-10, 7.5-11, 7.8-43, and 7.8-49 is being changed and indicated in bold below, the remaining 23 questions remains unchanged, as indicated below. In addition, the preliminary schedule for a response to Question 07.01-33 remains unchanged. The schedule for Question 07.01-33 is being reevaluated and a new supplement with a revised schedule will be transmitted by December 14, 2011.

Question #	**Response Date**
RAI 505 — 07.01-33	December 14, 2011
RAI 505 — 07.01-34	January 10, 2012
RAI 505 — 07.01-35	January 10, 2012
RAI 505 — 07.01-36	January 10, 2012
RAI 505 — 07.01-37	**January 19, 2012**
RAI 505 — 07.01-38	January 10, 2012
RAI 505 — 07.01-39	January 10, 2012
RAI 505 — 07.01-40	January 10, 2012

RAI 505 — 07.01-41	January 10, 2012
RAI 505 — 07.01-42	January 10, 2012
RAI 505 — 07.01-44	January 10, 2012
RAI 505 — 07.01-45	January 10, 2012
RAI 505 — 07.01-46	January 10, 2012
RAI 505 — 07.01-47	January 10, 2012
RAI 505 — 07.01-48	January 10, 2012
RAI 505 — 07.01-49	January 10, 2012
RAI 505 — 07.01-50	January 10, 2012
RAI 505 — 07.01-51	January 10, 2012
RAI 505 — 07.03-37	**January 19, 2012**
RAI 505 — 07.03-38	January 10, 2012
RAI 505 — 07.04-15	**January 19, 2012**
RAI 505 — 07.05-10	**January 19, 2012**
RAI 505 — 07.05-11	**January 19, 2012**
RAI 505 — 07.08-43	**January 19, 2012**
RAI 505 — 07.08-44	January 10, 2012
RAI 505 — 07.08-45	January 10, 2012
RAI 505 — 07.08-47	January 10, 2012
RAI 505 — 07.08-48	January 10, 2012
RAI 505 — 07.08-49	**January 19, 2012**
RAI 505 — 07.09-71	January 10, 2012

Sincerely,

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

From: WILLIFORD Dennis (RS/NB)
Sent: Tuesday, November 22, 2011 2:51 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. 505 (5902,5735,5869,5754,5803,5950,5744), FSAR Ch. 7, Supplement 3

Getachew,

On September 29, 2011, AREVA NP Inc. provided a schedule for technically correct and complete responses to the 34 questions in RAI 505. On October 27, 2011, and November 17, 2011, AREVA NP provided a revised schedule for technically correct and complete responses to 33 questions and a preliminary revised schedule for Question 07.01-33.

After discussions with NRC staff, the attached file, "RAI 505 Supplement 3 Response US EPR DC.pdf" provides technically correct and complete responses to 4 of the 34 questions. Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the responses to RAI 505 Question 07.07-23, Question 07.08 -46 and Question 07.09.02-72.

The following table indicates the respective pages in the response document, "RAI 505 Supplement 3 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 505 — 07.01-43	2	3
RAI 505 — 07.07-23	4	4
RAI 505 — 07.08-46	5	5
RAI 505 — 07.09-72	6	7

The schedule for the response to the remaining 30 questions remains unchanged, as indicated below. In addition, the preliminary revised schedule for a response to Question 07.01-33 remains unchanged. The schedule for Question 07.01-33 is being reevaluated and a new supplement with a revised schedule will be transmitted by December 14, 2011.

Question #	Response Date
RAI 505 — 07.01-33	December 14, 2011
RAI 505 — 07.01-34	January 10, 2012
RAI 505 — 07.01-35	January 10, 2012
RAI 505 — 07.01-36	January 10, 2012
RAI 505 — 07.01-37	December 11, 2011
RAI 505 — 07.01-38	January 10, 2012
RAI 505 — 07.01-39	January 10, 2012
RAI 505 — 07.01-40	January 10, 2012
RAI 505 — 07.01-41	January 10, 2012
RAI 505 — 07.01-42	January 10, 2012
RAI 505 — 07.01-44	January 10, 2012
RAI 505 — 07.01-45	January 10, 2012
RAI 505 — 07.01-46	January 10, 2012
RAI 505 — 07.01-47	January 10, 2012
RAI 505 — 07.01-48	January 10, 2012
RAI 505 — 07.01-49	January 10, 2012
RAI 505 — 07.01-50	January 10, 2012
RAI 505 — 07.01-51	January 10, 2012
RAI 505 — 07.03-37	December 11, 2011
RAI 505 — 07.03-38	January 10, 2012
RAI 505 — 07.04-15	December 11, 2011
RAI 505 — 07.05-10	December 11, 2011
RAI 505 — 07.05-11	December 11, 2011
RAI 505 — 07.08-43	December 11, 2011

RAI 505 — 07.08-44	January 10, 2012
RAI 505 — 07.08-45	January 10, 2012
RAI 505 — 07.08-47	January 10, 2012
RAI 505 — 07.08-48	January 10, 2012
RAI 505 — 07.08-49	December 11, 2011
RAI 505 — 07.09-71	January 10, 2012

Sincerely,

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

From: WILLIFORD Dennis (RS/NB)
Sent: Thursday, November 17, 2011 5:44 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. 505 (5902,5735,5869,5754,5803,5950,5744), FSAR Ch. 7, Supplement 2

Getachew,

On September 29, 2011, AREVA NP Inc. provided a schedule for technically correct and complete responses to the 34 questions in RAI 505. On October 27, 2011, AREVA NP provided a revised schedule for technically correct and complete responses to 13 questions and a preliminary revised schedule for Question 07.01-33.

The schedule for the final responses has been revised, as indicated in bold below. In addition, the preliminary revised schedule for a response to Question 07.01-33 has been revised. The schedule for Question 07.01-33 is being reevaluated and a new supplement with a revised schedule will be transmitted by December 14, 2011.

Question #	**Response Date**
RAI 505 — 07.01-33	**December 14, 2011**
RAI 505 — 07.01-34	**January 10, 2012**
RAI 505 — 07.01-35	**January 10, 2012**
RAI 505 — 07.01-36	**January 10, 2012**
RAI 505 — 07.01-37	**December 11, 2011**
RAI 505 — 07.01-38	January 10, 2012
RAI 505 — 07.01-39	**January 10, 2012**
RAI 505 — 07.01-40	**January 10, 2012**
RAI 505 — 07.01-41	**January 10, 2012**
RAI 505 — 07.01-42	**January 10, 2012**
RAI 505 — 07.01-43	**December 11, 2011**

RAI 505 — 07.01-44	January 10, 2012
RAI 505 — 07.01-45	January 10, 2012
RAI 505 — 07.01-46	January 10, 2012
RAI 505 — 07.01-47	January 10, 2012
RAI 505 — 07.01-48	January 10, 2012
RAI 505 — 07.01-49	January 10, 2012
RAI 505 — 07.01-50	January 10, 2012
RAI 505 — 07.01-51	January 10, 2012
RAI 505 — 07.03-37	**December 11, 2011**
RAI 505 — 07.03-38	January 10, 2012
RAI 505 — 07.04-15	**December 11, 2011**
RAI 505 — 07.05-10	**December 11, 2011**
RAI 505 — 07.05-11	**December 11, 2011**
RAI 505 — 07.07-23	**December 11, 2011**
RAI 505 — 07.08-43	**December 11, 2011**
RAI 505 — 07.08-44	**January 10, 2012**
RAI 505 — 07.08-45	**January 10, 2012**
RAI 505 — 07.08-46	**December 11, 2011**
RAI 505 — 07.08-47	January 10, 2012
RAI 505 — 07.08-48	January 10, 2012
RAI 505 — 07.08-49	**December 11, 2011**
RAI 505 — 07.09-71	**January 10, 2012**
RAI 505 — 07.09-72	**January 10, 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 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. 505 (5902,5735,5869,5754,5803,5950,5744), FSAR Ch. 7, Supplement 1

Getachew,

On September 29, 2011, AREVA NP Inc. provided a schedule for a technically correct and complete response to the 34 questions in RAI 505.

The schedule for the final response to Questions 07.01-38, 07.01-44, 07.01-45, 07.01-46, 07.01-47, 07.01-48, 07.01-49, 07.01-50, 07.01-51, 07.03-38, 07.08-43, 07.08-47, 07.08-48 has been revised, as indicated in bold

below. In addition, a preliminary revised schedule for a technically correct and complete response to Question 07.01-33 is provided below. The schedule for Question 07.01-33 is being reevaluated and a new supplement with a revised schedule will be transmitted by November 17, 2011.

Question #	Response Date
RAI 505 — 07.01-33	**November 17, 2011**
RAI 505 — 07.01-34	December 8, 2011
RAI 505 — 07.01-35	November 17, 2011
RAI 505 — 07.01-36	December 8, 2011
RAI 505 — 07.01-37	December 8, 2011
RAI 505 — 07.01-38	**January 10, 2012**
RAI 505 — 07.01-39	December 8, 2011
RAI 505 — 07.01-40	December 8, 2011
RAI 505 — 07.01-41	November 17, 2011
RAI 505 — 07.01-42	December 20, 2011
RAI 505 — 07.01-43	November 17, 2011
RAI 505 — 07.01-44	**January 10, 2012**
RAI 505 — 07.01-45	**January 10, 2012**
RAI 505 — 07.01-46	**January 10, 2012**
RAI 505 — 07.01-47	**January 10, 2012**
RAI 505 — 07.01-48	**January 10, 2012**
RAI 505 — 07.01-49	**January 10, 2012**
RAI 505 — 07.01-50	**January 10, 2012**
RAI 505 — 07.01-51	**January 10, 2012**
RAI 505 — 07.03-37	November 17, 2011
RAI 505 — 07.03-38	**January 10, 2012**
RAI 505 — 07.04-15	November 17, 2011
RAI 505 — 07.05-10	November 17, 2011
RAI 505 — 07.05-11	November 17, 2011
RAI 505 — 07.07-23	November 17, 2011
RAI 505 — 07.08-43	**January 10, 2012**
RAI 505 — 07.08-44	December 8, 2011
RAI 505 — 07.08-45	December 8, 2011
RAI 505 — 07.08-46	December 8, 2011
RAI 505 — 07.08-47	**January 10, 2012**
RAI 505 — 07.08-48	**January 10, 2012**
RAI 505 — 07.08-49	November 17, 2011
RAI 505 — 07.09-71	December 8, 2011
RAI 505 — 07.09-72	December 8, 2011

Sincerely,

Dennis Williford, P.E.
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.

7207 IBM Drive, Mail Code CLT 2B
Charlotte, NC 28262
Phone: 704-805-2223
Email: Dennis.Williford@areva.com

From: WILLIFORD Dennis (RS/NB)
Sent: Thursday, September 29, 2011 11:04 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. 505 (5902,5735,5869,5754,5803,5950,5744), FSAR Ch. 7

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 505 Response US EPR DC.pdf," provides a schedule since a technically correct and complete response to the 34 questions cannot be provided at this time.

The following table indicates the respective pages in the response document, "RAI 505 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 505 — 07.01-33	2	2
RAI 505 — 07.01-34	3	3
RAI 505 — 07.01-35	4	4
RAI 505 — 07.01-36	5	5
RAI 505 — 07.01-37	6	6
RAI 505 — 07.01-38	7	7
RAI 505 — 07.01-39	8	8
RAI 505 — 07.01-40	9	9
RAI 505 — 07.01-41	10	10
RAI 505 — 07.01-42	11	11
RAI 505 — 07.01-43	12	12
RAI 505 — 07.01-44	13	13
RAI 505 — 07.01-45	14	14
RAI 505 — 07.01-46	15	15
RAI 505 — 07.01-47	16	16
RAI 505 — 07.01-48	17	18
RAI 505 — 07.01-49	19	19
RAI 505 — 07.01-50	20	20
RAI 505 — 07.01-51	21	22
RAI 505 — 07.03-37	23	23
RAI 505 — 07.03-38	24	24
RAI 505 — 07.04-15	25	25
RAI 505 — 07.05-10	26	26
RAI 505 — 07.05-11	27	27
RAI 505 — 07.07-23	28	28

RAI 505 — 07.08-43	29	29
RAI 505 — 07.08-44	30	30
RAI 505 — 07.08-45	31	31
RAI 505 — 07.08-46	32	32
RAI 505 — 07.08-47	33	33
RAI 505 — 07.08-48	34	34
RAI 505 — 07.08-49	35	35
RAI 505 — 07.09-71	36	36
RAI 505 — 07.09-72	37	37

A complete answer is not provided for the 34 questions. The schedule for a technically correct and complete response to these questions is provided below.

Please note that the date for the response to Question 07.01-33 is a commitment date to provide a final schedule for the response in a follow-up letter.

Question #	**Response Date**
RAI 505 — 07.01-33	October 27, 2011
RAI 505 — 07.01-34	December 8, 2011
RAI 505 — 07.01-35	November 17, 2011
RAI 505 — 07.01-36	December 8, 2011
RAI 505 — 07.01-37	December 8, 2011
RAI 505 — 07.01-38	December 20, 2011
RAI 505 — 07.01-39	December 8, 2011
RAI 505 — 07.01-40	December 8, 2011
RAI 505 — 07.01-41	November 17, 2011
RAI 505 — 07.01-42	December 20, 2011
RAI 505 — 07.01-43	November 17, 2011
RAI 505 — 07.01-44	December 20, 2011
RAI 505 — 07.01-45	December 20, 2011
RAI 505 — 07.01-46	December 20, 2011
RAI 505 — 07.01-47	December 8, 2011
RAI 505 — 07.01-48	December 20, 2011
RAI 505 — 07.01-49	December 20, 2011
RAI 505 — 07.01-50	December 20, 2011
RAI 505 — 07.01-51	December 20, 2011
RAI 505 — 07.03-37	November 17, 2011
RAI 505 — 07.03-38	December 20, 2011
RAI 505 — 07.04-15	November 17, 2011
RAI 505 — 07.05-10	November 17, 2011
RAI 505 — 07.05-11	November 17, 2011
RAI 505 — 07.07-23	November 17, 2011
RAI 505 — 07.08-43	December 20, 2011
RAI 505 — 07.08-44	December 8, 2011
RAI 505 — 07.08-45	December 8, 2011

RAI 505 — 07.08-46	December 8, 2011
RAI 505 — 07.08-47	December 20, 2011
RAI 505 — 07.08-48	December 20, 2011
RAI 505 — 07.08-49	November 17, 2011
RAI 505 — 07.09-71	December 8, 2011
RAI 505 — 07.09-72	December 8, 2011

Sincerely,

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From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Tuesday, August 30, 2011 1:23 PM
To: ZZ-DL-A-USEPR-DL
Cc: Zhang, Deanna; Morton, Wendell; Spaulding, Deirdre; Mott, Kenneth; Truong, Tung; Zhao, Jack; Mills, Daniel; Jackson, Terry; Canova, Michael; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 505 (5902,5735,5869,5754,5803,5950,5744), FSAR Ch. 7

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on August 12, 2011, and discussed with your staff on August 22 and 25, 2011. No change is made to the draft RAI as a result of those discussions. 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: 3730

Mail Envelope Properties (2FBE1051AEB2E748A0F98DF9EEE5A5D4AA0C25)

Subject: DRAFT Response to U.S. EPR Design Certification Application RAI No. 505 (5902,5735,5869,5754,5803,5950,5744), FSAR Ch. 7, Question 07.05-10
Sent Date: 2/3/2012 11:32:13 AM
Received Date: 2/3/2012 11:32:28 AM
From: WILLIFORD Dennis (AREVA)

Created By: Dennis.Williford@areva.com

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Files	**Size**	**Date & Time**	
MESSAGE	31238	2/3/2012 11:32:28 AM	
RAI 505 Question 07.05-10 Response US EPR DC - DRAFT.pdf			828562

Options
Priority: Standard
Return Notification: No
Reply Requested: No
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Recipients Received:

Response to

Request for Additional Information No. 505 (5902,5735,5869,5754,5803,5950,5744), Question 07.05-10, Revision 0

8/30/2011

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 07.01 - Instrumentation and Controls - Introduction
SRP Section: 07.03 - Engineered Safety Features Systems
SRP Section: 07.04 - Safe Shutdown Systems
SRP Section: 07.05 - Information Systems Important to Safety
SRP Section: 07.07 - Control Systems
SRP Section: 07.08 - Diverse Instrumentation and Control Systems
SRP Section: 07.09 - Data Communication Systems

Application Section: FSAR Chapter 7

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

Question 07.05-10:

OPEN ITEM

Provide additional information which addresses conformance to Regulatory Guide (RG) 1.97, Revision 4, and address the completeness of the post accident monitoring (PAM) variable list.

10 CFR Part 50, Appendix A, General Design Criteria 13, "Instrumentation and Controls," requires, in part, instrumentation to be provided to monitor variables and systems over their anticipated ranges for normal operation, anticipated operational occurrences, and accident conditions. U.S. EPR FSAR Section 7.5, Interim Revision 3 mark-up, identifies a list of PAM variables and states that the design conforms to RG 1.97, Revision 4. The staff requests the applicant to address the following issues with regards to the PAM variables:

a. The applicant states conformance to RG 1.97, Revision 4, but acknowledges that emergency procedure guidelines, emergency operating procedures, and abnormal operating procedures for the U.S. EPR are not developed and used in developing the PAM variable list. It appears that some alternative methods were used to develop the PAM variable list. If that is the case, the applicant should clearly state how they conform to RG 1.97, Revision 4, and where they are proposing alternative methods to RG 1.97.

b. In U.S. EPR FSAR Section 7.5, Interim Revision 3 mark-up, the applicant provides some information for how the PAM instrument list was developed, including the use of Babcock and Wilcox emergency operating procedure technical basis. However, the staff requires a more comprehensive analysis as to how the applicant arrived at the PAM instrument list. As one example, the applicant noted differences between Babcock and Wilcox plants and the U.S. EPR, but did not specify those differences.

c. The applicant states that the PAM instrument list is a bounding list. As review guidance, the staff considers RG 1.97, Revision 3, as a bounding PAM instrument list. Provide the basis for differences between the RG 1.97, Revision 3, and the U.S. EPR PAM instrument descriptions.

d. If the U.S. EPR PAM instrument list is considered bounding, revise wording in Tier 1 and Tier 2 of the application to indicate that the list is bounding and no further verification is necessary. In addition, if the U.S. EPR PAM instrument list is bounding, ITAAC Item 2.1 of Tier 1, Table 3.7-2, is not necessary and should be removed.

Response to Question 07.05-10:

a) Regulatory Guide 1.97, Revision 4, endorses IEEE 497-2002 as an acceptable method for providing instrumentation to monitor variables for accident conditions. Section 4.0 of that standard provides selection criteria for variables based on their accident management function and use in the Emergency Procedure Guidelines (EPG), Emergency Operating Procedures (EOP), and Abnormal Operating Procedures (AOP). U.S EPR FSAR Tier 2, Section 13.5.2.1.2 describes the EOP development process. Preparation of EOPs and AOPs for the U.S. EPR plant requires detailed design of systems to be completed. Because preparation of procedures is not required for design certification, an alternative approach to section 4.0 of IEEE 497-2002, was performed to develop the list of PAM variables for the U.S. EPR plant.

The plant-specific EOPs will be developed from a U.S. EPR technical bases document that is based on detailed design safety analyses, which are not completed and are not needed for design certification. U.S. EPR FSAR, Section 13.5.2.1.2, "Emergency Operating Procedure Development Process," states that the EOPs for the U.S. EPR design will be based on the same symptom-based approach and mitigation strategies as the Babcock and Wilcox (B&W) Unit EOP technical bases document. This document, which represents the vendor emergency procedure guidelines (EPGs), provides the bases that were used to develop the plant-specific EOPs for currently operating plants that have the B&W nuclear steam supply system. The relevant NRC requirements that will be used as acceptance criteria during the development of the EPGs and EOPs are provided in U.S. EPR FSAR, Tier 2, Section 13.4.2.1.4, "EOP Development Acceptance Criteria."

Because completed EOPs and AOPs procedures are not required for design certification and are not currently available, the steps of Volume 1 of the B&W technical bases document were used as an alternative evaluation. These steps were used as surrogates for actual U.S. EPR EOP guidance that will be developed later during detailed plant design. The majority of the actions described in the B&W technical bases document guidance will be applicable to the U.S. EPR design, since both plants are pressurized water reactor designs; however, there are differences between the plant designs which could affect specific actions required to implement the mitigation strategies. These known design differences were used as input to the evaluation of each technical bases document step. This is described in the response to item (b).

This approach is described in U.S. EPR FSAR, Tier 2, Section 7.5.2.2.1, "Conformance to RG 1.97 and BTP 7-10."

b) U.S. EPR FSAR Tier 2, Section 13.5.2.1.2 describes the EOP development process. Preparation of EOPs and AOPs for the U.S. EPR plant requires detailed design of systems to be completed. A comprehensive evaluation was performed to develop the list of PAM variables for the U.S. EPR plant.

Each step of Volume 1 of the B&W technical bases document was evaluated to determine whether the action was applicable to the U.S. EPR design. Some actions in the B&W technical bases document are not applicable to the U.S. EPR because of differences in the respective designs. For example, actions to mitigate excessive tube-to-shell differential temperature are not applicable to the U.S. EPR design because of differences in the design of the steam generators. If the action was not applicable, it was eliminated from further consideration.

Each remaining step was evaluated to determine the minimum set of required instrumentation to support the action. The usage of each identified instrument in the context of the action specified was then characterized. These descriptions of the instrument usage were then compared to the definitions of the post-accident monitoring variable types, as described in IEEE 497-2002 and RG 1.97, Revision 4. If the usage of the instrument did not meet the definition of one of the variable types, it was not assigned a variable type. This resulted in a list of Type B and Type D variables based on their usage in the technical bases document. This list of instruments was further evaluated to identify which of these instruments met the definition of Type C variables. The variables which met this criterion were also classified as Type C variables.

U.S. EPR FSAR Tier 2, Section 15.0.0.3.7, "Operator Actions," contains a list of credited operator manual actions for which no automatic control is provided. Each of these actions was evaluated to determine instrumentation required to support performance of the actions. The instrumentation required to support each action was then evaluated to determine whether that instrument was uniquely required for the performance of the action. If the instrument constituted a key instrument to support performance of the manual action, then the instrument was designated as a Type A variable.

The U.S. EPR radiation monitoring instruments were reviewed to determine which of the instruments met the definitions in IEEE 497-2002 and RG 1.97, Revision 4, of Type C and Type E variables. Those instruments meeting the variable type definitions were assigned the appropriate variable types.

The technical bases document is written to provide high-level guidance on the implementation of transient mitigation strategies. The U.S. EPR EOPs that will be written based on a U.S. EPR technical bases document will contain a greater level of detail; and, therefore, more actions. Although these procedures are not written, it is possible to identify certain actions that would need to be included in the U.S. EPR EOPs, and to identify instruments required to support those actions. A team of personnel familiar with the U.S. EPR design and with experience that included plant operations, EOP generation, and auditing EOPs for conformance to the technical bases document reviewed the list of instruments generated by the previous steps. Additional instrumentation was identified that would be required to perform actions that were expected to be required, but were either below the level of detail of the B&W technical bases document, or driven by design features unique to the U.S. EPR design. As a result of this evaluation, hot leg injection flow and emergency feedwater pool level (wide range) were added to the list of post-accident monitoring instruments.

Following selection and classification of the variables, further evaluation was performed to verify that the list of Type B and Type C variables provided complete monitoring coverage of the critical safety functions and fission product barriers described in IEEE 497-2002 and RG 1.97, Revision 4.

IEEE 497-2002, Paragraph 4.2, describes Type B variables as variables that provide primary information to the control room operators to assess the plant critical safety functions. The list of critical safety functions is described in Paragraph 3.7 of IEEE 497-2002. Each Type B variable was listed along with the critical safety function that it monitored. This list was then evaluated in the aggregate to verify that all of the critical safety functions would be adequately monitored by the list of Type B variables.

IEEE 497-2002, Paragraph 4.3, describes Type C variables as those that provide primary information to the control room operators to indicate the potential for breach or the actual breach of the three fission product barriers: the fuel cladding, the reactor coolant system pressure boundary, and the containment pressure boundary. Each Type C variable was listed, along with the fission product barrier that it monitored. This list was then evaluated in the aggregate to ensure that all of the fission product barriers would be adequately monitored by the list of Type C variables.

c) A comparison of the U.S. EPR PAM variables list to RG 1.97, Revision 3 is not consistent with currently published NRC Guidance.

NUREG-0800, Branch Technical Position 7-10, states that: "Plants that obtained an operating license after June 2006 should reference the guidance of RG 1.97, Revision 4."

RG 1.97, Rev 4, June 2006 states that:

> "Revision 3 of Regulatory Guide 1.97 has become outdated, in that it does not provide criteria for advanced instrumentation system designs based on modern digital technology. Revision 3 also does not address the need for technology-neutral guidance for licensing new plants. In addition, the guidance should be less prescriptive and based on the accident management functions of the individual variable types."

Therefore, the basis for differences between the RG 1.97, Revision 3, and the U.S. EPR PAM instrument descriptions is that the U.S. EPR PAM instrumentation descriptions were developed based on the guidance of RG 1.97, Revision 4, as stipulated in NUREG-0800, BTP 7-10, using the alternative approach described above in (a) and (b).

The complete evaluation is available for audit at AREVA offices.

d) The U.S. EPR FSAR contains a bounding list of PAM instrumentation. This bounding list was developed using the methodology described in the response to part (a) and (b) of this response. The existing COL item 7.1-1 in Table 1.8-2 and Section 7.5.2.2.1 will be deleted. This will be clarified in U.S. EPR FSAR Tier 2, Section 1.8 and 7.5.2.2.1. The COL applicant will identify the need for site-specific PAM variables. U.S. EPR FSAR, Chapter 16, Technical Specifications, Table 3.3.2-1 and associated Bases will be updated to add a [bracketed] entry for the COL applicant to include site specific PAM variables if required.

   U.S. EPR Tier 1, Table 3.7-1, Item 2.1 will be revised to state that there will be a test performed in the main control room (MCR) to verify that Type A, B and C PAM variables are indicated in the MCR.

FSAR Impact:

U.S. EPR FSAR Tier 1, Section 3.7 and U.S. EPR FSAR Tier 2, Sections 1.8, 7.5.2.2.1, 7.5.3, and 16.3.3.2 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

3.7 Post-Accident Monitoring Instrumentation

1.0 Description

The post-accident monitoring (PAM) variables permit the operator to perform the following:

- Preplanned, required, manual safety functions where no automatic control is provided (Type A).
- Capability to assess critical plant safety functions (Type B).
- Capability to assess the potential for an actual breech of the three fission product barriers (Type C).

The instruments that are determined as PAM instrumentation are contained in various plant systems. The performance, design, and qualification of the PAM instrumentation are selected in accordance with the accident management functions defined by the emergency procedures, and emergency guidelines~~, and licensing basis documents~~.

07.05-10

2.0 ~~Analyses~~Instrumentation and Controls (I&C) Design Features, Displays, and Controls

2.1 PAM ~~indications~~ variables are provided in the MCR to perform Type A, B, and C accident management functions ~~defined by the emergency procedures and licensing basis documents~~.

~~3.0Design Features~~

~~3.1~~2.2 ~~The~~ PAM instrumentation ~~are~~ is designed and qualified based on the level of importance of the variable type that each instrument supports.

~~4.0~~3.0 Inspections, Tests, Analyses, and Acceptance Criteria

Table 3.7-1 lists the post-accident monitoring instrumentation ITAAC.

07.05-10

Table 3.7-1—Post-Accident Monitoring Instrumentation
ITAAC

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
2.1	PAM ~~indications~~ variables are provided in the MCR to perform Type A, B, and C accident management functions ~~defined by the emergency procedures and licensing basis documents~~.	Tests will be performed in the MCR using test signals.~~An analysis of emergency procedures and licensing basis documents will be performed to identify a list of PAM variables required for accident management functions.~~	Type A, B, and C PAM variables are indicated in the MCR.~~A report exists that documents the PAM variables are provided for required accident management functions. The PAM variable list are documented in a table format that includes the following:~~ ~~•Variable name that indicates the variable function.~~ ~~•Variable Type (A, B, C).~~ ~~•Range.~~ ~~•Safety classification (1E or non-1E).~~ ~~•Environmental and Seismic Qualification.~~ ~~•Minimum number of instruments required.~~ • ~~Monitoring duration for the variable.~~
2.2~~3.1~~	~~The~~ PAM instrumentation ~~are~~ is designed and qualified based on the level of importance of the variable type that each instrument supports.	a. An analysis will be performed to determine the performance, design, and qualification criteria for each PAM instrument based on the level of importance of the variable type that each instrument supports. b. Inspections, tests, or analyses will be performed to verify that the PAM instrumentation meets the ~~documented~~ performance, design, and qualification criteria.	a. A report exists that documents the performance, design, and qualification, criteria for each PAM instrument. b. A report ~~exists and~~ concludes that the PAM instrumentation meets the ~~documented~~ performance, design, and qualification criteria.
~~3.2~~	~~Deleted.~~	~~Deleted.~~	~~Deleted.~~
~~3.3~~	~~Deleted.~~	~~Deleted.~~	~~Deleted.~~
~~3.4~~	~~Deleted.~~	~~Deleted.~~	~~Deleted.~~

07.05-10

07.05-10

Next File

Table 1.8-2—U.S. EPR Combined License Information Items
Sheet 20 of 40

Item No.	Description	Section
6.4-3	A COL applicant that references the U.S. EPR design certification will evaluate the results of the toxic chemical accidents from Section 2.2.3, address their impact on control room habitability in accordance with RG 1.78, and if necessary, identify the types of sensors and automatic control functions required for control room operator protection.	6.4.1
6.4-4	A COL applicant that references the U.S. EPR design certification will confirm that the radiation exposure of main control room occupants resulting from a design basis accident at a nearby unit on a multi-unit site is bounded by the radiation exposure from the postulated design basis accidents analyzed for the U.S. EPR; or confirm that the limits of GDC-19 are met.	6.4.4
6.6-1	A COL applicant that references the U.S. EPR design certification will identify the implementation milestones for the site-specific ASME Section XI preservice and inservice inspection program for the Class 2 and Class 3 components, consistent with the requirements of 10 CFR 50.55a (g). The program will identify the applicable edition and addenda of the ASME Code Section XI, and will identify additional relief requests and alternatives to Code requirements.	6.6 07.05-10
7.1-1	Deleted.~~A COL applicant that references the U.S. EPR design certification will confirm the inventory list of PAM variables in Table 7.5-1—Inventory of Post-Accident Monitoring Variables upon completion of the emergency operating and abnormal operating procedures prior to fuel loading.~~	Deleted.~~7.5.2.2.1~~
7.1-2	A COL applicant that references the U.S. EPR design certification will, following selection of the actual plant operating instrumentation and calculation of the instrumentation uncertainties of the operating plant parameters, prior to fuel load, calculate the primary power calorimetric uncertainty. The calculations will be completed using an NRC acceptable method and confirm that the safety analysis primary power calorimetric uncertainty bounds the calculated values.	7.7.2.3.5
7.1-3	A COL applicant that references the U.S. EPR design certification will identify the need for any site-specific PAM variables.	7.5.2.2.1
8.1-1	A COL applicant that references the U.S. EPR design certification will provide site-specific information describing the interface between the offsite transmission system, and the nuclear unit, including switchyard interconnections.	8.1.1
8.1-2	A COL applicant that references the U.S. EPR design certification will identify site-specific loading differences that raise EDG or Class 1E battery loading, and demonstrate the electrical distribution system is adequately sized for the additional load.	8.1.3

7.5.2.1.2 GDC 13, "Instrumentation and Control"

The PICS and SICS provide the capability for monitoring PAM variables and system variables over their anticipated ranges for normal operation, for AOOs, and for postulated accident conditions as appropriate. This monitoring provides reasonable assurance of safety by including those variables and systems that can affect the fission process, the integrity of the reactor core, the reactor coolant pressure boundary, or the containment and its associated systems. The PICS and SICS also provide a means of manual control capabilities for maintaining these variables and systems within prescribed operating ranges.

7.5.2.2 Discussion

07.05-10

7.5.2.2.1 Conformance to Regulatory Guide 1.97 and BTP 7-10

~~The guidance of RG 1.97, Revision 4, will be used to confirm the PAM variables during detailed design.~~ With clarifying regulatory positions, RG 1.97, Revision 4, endorses IEEE Std 497-2002 (Reference 1), which provides performance-based criteria for selecting variables and recommends determining the variable type according to its accident management function. The accident management function is to be identified by its use in the Emergency Procedure Guidelines (EPG), Emergency Operating Procedures (EOP), and Abnormal Operating Procedures (AOP). ~~The development of these guidelines and procedures is discussed in Section 13.5. When these procedures are complete and verified, they will be used to confirm the PAM variables list.~~

~~Development of the PAM Variables List~~

Section 13.5.2.1.2 describes the EOP development process. Preparation of EOPs and AOPs for the U.S. EPR plant requires detailed design of systems to be completed. Because preparation of procedures is not required for design clarification, ~~A~~an alternative ~~evaluation~~to the use of EOPs and AOPs in the IEEE 497-2002, Section 4.0 Selection Criteria, was performed to develop the list of PAM variables for the U.S. EPR plant. The evaluation included:

- A step-by-step evaluation of Volume 1 of the Babcock and Wilcox (B&W) Owners Group Emergency Operating Procedures Technical Basis Document (Reference 11) was performed to identify required supporting instrumentation. The evaluation considered the differences in the U.S. EPR and the B&W plant designs.

- A review of the operator manual actions listed in Chapter 15 for which no automatic control is provided to determine instrumentation required to support those actions.

- A review of radiation monitoring system design to identify instruments necessary to support post-accident monitoring.

- Identification of additional instrumentation based on engineering judgment considering differences between the U.S. EPR and the B&W plant designs.

07.05-10

- An ~~gap~~ evaluation was performed to confirm that critical safety functions and fission product barriers described in IEEE Std 497-2002 were adequately monitored by the list of instruments developed.

The list of PAM variables is provided in Table 7.5-1.

A COL applicant that references the U.S. EPR design certification will identify the need for site-specific PAM variables.

~~**Confirmation of the PAM Variables**~~

~~To meet the guidance of RG 1.97, Revision 4 and Reference 1, a systematic step-by-step review of the plant-specific EOPs for the U.S. EPR is required. See Section 13.5 for more information on U.S. EPR procedure development.~~

~~A COL applicant that references the U.S. EPR design certification will confirm the inventory list of PAM variables in Table 7.5-1 upon completion of the emergency operating and abnormal operating procedures prior to fuel loading.~~

~~The confirmation of the PAM variables list by the COL Applicant will be documented in a table format that includes the following:~~

- ~~Variable name that indicates the variable function.~~
- ~~Variable Type (A, B, C, D or E).~~
- ~~Range.~~
- ~~Safety classification (1E or non-1E).~~
- ~~Environmental and Seismic Qualification.~~
- ~~Minimum number of instruments required.~~
- ~~Monitoring duration for the variable.~~

Criteria for Selection of Variable Types

In accordance with RG 1.97, Revision 4, and IEEE Std 497-2002, the PAM variables are selected and the variable types are determined according to its accident management function. These variables are the primary source of post-accident monitoring information. Five types of variables exist and the selection criteria are described as follows:

7.5.2.2.7 Independence and Compliance with IEEE Std 603-1998

Section 7.1 describes the overall I&C system architecture and how independence is achieved between safety-related and non-safety-related I&C systems. Compliance with Clause 5.6.3, "Independence Between Safety Systems and Other Systems," and Clause 6.3, "Interaction Between the Sense and Command Features and Other Systems," are addressed in Section 7.1.

7.5.3 References

1. IEEE Std 497-2002, "Standard Criteria for Accident Monitoring Instrumentation for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, 2002.

2. Deleted.

3. IEEE Std 603-1998, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, 1998.

4. NUREG-0696, "Functional Criteria for Emergency Response Facility," Nuclear Regulatory Commission, 1981.

5. NUREG-0654, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," Nuclear Regulatory Commission, 1980.

6. NUREG-0737, "Clarification of TMI Action Plan Requirements," Nuclear Regulatory Commission, 1980.

7. NUREG-0800, BTP 7-10, "Guidance on Application of Regulatory Guide 1.97," Nuclear Regulatory Commission, March 2007.

8. Deleted.

9. Deleted.

10. NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," Nuclear Regulatory Commission, March 2007.

11. Letter ~~OG-1789~~NRC:08:001, ~~Tony Stallard, Chairman, B&W OG Operator Support Committee, to Chief, Reactor Systems Branch (NRC)~~Ronnie Gardner, Manager Site Operations and Regulatory Affairs, AREVA NP, Inc. to Document Control Desk, NRC, "Transmittal of Revision 10 of B&W ~~Owners Group Emergency Operating Procedures~~ Generic Technical Bases Document~~, Revision 9~~," dated ~~April 26, 2000~~January 2, 2008 and attachments (~~ML003711891~~ML080100644).

07.05-10

07.05-10

Table 3.3.2-1 (page 1 of 1)
Post Accident Monitoring Instrumentation

	FUNCTION	REQUIRED CHANNELS	CONDITION REFERENCED FROM REQUIRED ACTION D.1
1.	Cold Leg Temperature (Wide Range)	2[(c)]	E
2.	Containment Isolation Valve Position Indication	2 per penetration flow path[(a)(b)]	E, [F]
3.	Containment Service Compartment Pressure (Wide Range)	2[(c)]	E
4.	Core Outlet Thermocouples (Wide Range)	2 per quadrant[(d)]	E, [F]
5.	EFW ~~Pump Discharge~~ Flow to SG	2 per train[~~(c)~~]	E, [F]
6.	Hot Leg Pressure (Wide Range)	2[(c)]	E
7.	Hot Leg Temperature (Wide Range)	2[(c)]	E
8.	Intermediate Range Detector Flux	2[(c)]	E
9.	Low Head Safety Injection Flow (Wide Range)	2 per train	E, [F]
10.	Medium Head Safety Injection Flow (Wide Range)	2 per train	E, [F]
11.	Pressurizer Level (Narrow Range)	2[(c)]	E
12.	Radiation Monitor - Annulus Ventilation System Gamma Activity	2	E, [F]
13.	Radiation Monitor - Containment High Range	2[(c)]	E
14.	Radiation Monitor - Main Steam Line	2 per line	E, [F]
15.	Steam Generator Level (Wide Range)	2 per SG[(e)]	E
16.	Steam Generator Pressure	2 per SG[(e)]	E
17.	Source Range Detector Flux	2	E, [F]
18.	Subcooling Margin	2	E, [F]
[19.	Site-specific variables		]

(a) Not required for isolation valves whose associated penetration is isolated by at least one closed and deactivated automatic valve, closed manual valve, blind flange, or check valve with flow through the valve secured.

(b) Only one position indication channel is required for penetration flow paths with only one installed control room indication channel.

(c) Note that more restrictive operability requirements for the associated components are contained in LCO 3.3.1, "Distributed Control System" (i.e., LCO 3.3.1 requires three sensors for OPERABILITY. The PAM LCO only requires two sensors).

(d) A channel consists of three Core Outlet Thermocouples (Wide Range).

(e) Note that additional operability requirements are contained in LCO 3.3.1, "Distributed Control System".

BASES

LCO (continued)

The Core Outlet Thermocouples are distributed as homogeneously as possible across the core to provide representative indication of core outlet temperatures. The core is divided into two radial regions. The inner radial region is divided into four azimuthal zones, and the outer radial region is divided into eight azimuthal zones. One Core Outlet Thermocouple is provided in each of these 12 zones.

Each of the four channels acquires one Core Outlet Thermocouple measurement at three locations distributed radially and azimuthally in the core. Each channel acquires Core Outlet Thermocouples measurements from one zone in the inner radial region of the core, and two zones in the outer radial region of the core. The Core Outlet Thermocouples measurement location assignments are made such that each channel monitors Core Outlet Thermocouples temperatures over a wide area of the core. The Core Outlet Thermocouples assignment ensures that each channel is capable of providing indication of radial and azimuthal differences in core outlet temperatures that could be caused by factors such as radial decay power distribution, condensate runback in the hot legs, and non-uniform inlet temperatures.

Three Core Outlet Thermocouple indication is provided for each core quadrant with a range of 32°F to 2300°F.

5. Emergency Feedwater ~~System~~ Flow to SG ← 07.05-10

Emergency Feedwater (EFW) flow is used by the operator to identify which SGs are supplied by EFW in order to determine which reactor coolant pumps should be stopped during a feedwater line break event. They are also used to determine the status of core heat removal.

Each EFW train has two channels of EFW Flow indication with a range of 0 to 545 gpm.

6. Hot Leg Pressure (Wide Range)

RCS hot leg pressure is used to control RCS pressure during the extended partial cooldown and subsequent cooldown, and in management of the Medium Head Safety Injection (MHSI) System, during an SGTR event. This instrumentation is also used to control RCS pressure during post accident cooldown to residual heat removal (RHR) conditions, and to detect RHR entry conditions.

BASES

LCO (continued)

SMI supports manual actions to align hot leg injection after a Loss of Coolant Accident and to manage MHSI after an SGTR. Subcooling margin is also used to determine when conditions requiring full MHSI are present, and to determine if the conditions that require hot leg injection exist.

Four channels of SMI are provided with a range of 611°F Subcooling Margin to 2088°F Superheat.

07.05-10

[19. Site-specific Variables]

----------REVIEWER'S NOTE----------
Site-specific PAM variables will be provided by the COL applicant for site-specific Type A, B, and C parameters that meet the selection criteria in IEEE 497-2002.

APPLICABILITY

The PAM instrumentation LCO is applicable in MODES 1, 2, and 3. These variables are related to the diagnosis and preplanned actions required to mitigate postulated accidents. The applicable postulated accidents are assumed to occur in MODES 1, 2, and 3. In MODES 4, 5, and 6, plant conditions are such that the likelihood of an event occurring that would require PAM instrumentation is low; therefore, PAM instrumentation is not required to be OPERABLE in these MODES.

ACTIONS

A Note has been added in the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each Function. The Completion Time(s) of the inoperable channel(s) of a Function will be tracked separately for each Function starting from the time the Condition was entered for that Function.

A.1

When one or more Functions have one required channel that is inoperable, the required inoperable channel must be restored to OPERABLE status within 30 days. The 30 day Completion Time is based on operating experience and takes into account the remaining OPERABLE channels, the passive nature of the instrument (no critical automatic action is assumed to occur from these instruments), and the