

## ArevaEPRDCPEm Resource

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**From:** WILLIFORD Dennis (AREVA) [Dennis.Williford@areva.com]  
**Sent:** Friday, March 08, 2013 4:16 PM  
**To:** Snyder, Amy  
**Cc:** Canova, Michael; DELANO Karen (AREVA); LEIGHLITER John (AREVA); ROMINE Judy (AREVA); RYAN Tom (AREVA); WILLS Tiffany (AREVA); LENTZ Tony (EXTERNAL AREVA)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 414, FSAR Ch. 7 OPEN ITEM, Supplement 17- DCR-Related  
**Attachments:** RAI 414 Supplement 17 Response US EPR DC.pdf

Getachew,

AREVA NP provided a schedule on July 14, 2010 for a technically correct and complete response to RAI 414. Supplement 1 response was sent on October 28, 2010 to provide a revised schedule for all questions. Supplement 2 was sent on November 29, 2010 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 3 was sent on January 13, 2011 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 4 was sent on February 3, 2011 to provide technically correct and complete responses to two questions. Supplement 5 was sent on February 8, 2011 to provide technically correct and complete responses to two questions. Supplement 6 was sent on February 18, 2011 to provide technically correct and complete response to one question. Supplement 7 was sent on February 25, 2011 to provide a revised schedule for the remaining 2 questions. Supplement 8 was sent on March 8, 2011 to provide a technically correct and complete response to one question. Supplement 9 sent on April 20, 2011, Supplement 10 sent on May 24, 2011, Supplement 11 sent on July 7, 2011, Supplement 12 sent on August 19, 2011, Supplement 13 sent on October 27, 2011, Supplement 14 sent on January 10, 2012, and Supplement 15 sent on February 17, 2012 provided a revised schedule for the remaining question. Supplement 16 was sent on May 22, 2012 to provide a technically correct and complete [final](#) response to [Question 07.03-30](#).

Based on [comments](#) and discussions with NRC [staff](#), the attached file, "RAI 414 Supplement 17 Response US EPR DC.pdf" provides a revised [final](#) response to [Question 07.03-30](#).

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the revised response to RAI 414 Question 07.03-30.

The associated FSAR markups for the response to this question provided on May 22, 2012 in Supplement 16 of this RAI have been incorporated into Revision 4 of the U.S. EPR FSAR, and are not provided in this supplemental response. The purpose of this supplement is to add additional details about the inner containment isolation valve (CIV) time delays that were not included in Supplement 16. The response and associated markups provided in this supplement, along with the associated response and markups for Supplement 16, provide a final and complete response to RAI 414, Question 07.03-30.

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

Question #	Start Page	End Page
RAI 414 — 07.03-30	2	4

This concludes the formal AREVA NP response to RAI 414, and there are no questions from this RAI for which AREVA NP has not provided responses.

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](mailto:Dennis.Williford@areva.com)

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**From:** WILLIFORD Dennis (RS/NB)  
**Sent:** Tuesday, May 22, 2012 4:43 PM  
**To:** [Getachew.Tesfaye@nrc.gov](mailto: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. 414, FSAR Ch. 7 OPEN ITEM, Supplement 16

Getachew,

AREVA NP Inc. letter NRC:12:029 dated May 22, 2012 provides a technically correct and complete final response to Question 07.03-30 in RAI 414.

Enclosed with the letter as a part of the response are affected pages of ANP-10309P, "U.S. EPR Protection System Technical Report," in redline-strikeout format which support the response to RAI 414, Question 07.03-30. A complete revision to the technical report will be submitted by separate letter. Since AREVA NP considers some of the material contained in the response to be proprietary, an affidavit is included with the letter, as required by 10 CFR 2.390(b), to support the withholding of the information from public disclosure. Proprietary and non-proprietary versions of the enclosure to this letter are provided separately.

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

Question #	Start Page	End Page
RAI 414 — 07.03-30	2	5

This concludes the formal AREVA NP response to RAI 414, and there are no questions from this RAI for which AREVA NP has not provided responses.

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](mailto:Dennis.Williford@areva.com)

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**From:** WILLIFORD Dennis (RS/NB)  
**Sent:** Friday, February 17, 2012 3:43 PM  
**To:** [Getachew.Tesfaye@nrc.gov](mailto: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. 414, FSAR Ch. 7 OPEN ITEM, Supplement 15

Getachew,

AREVA NP provided a schedule on July 14, 2010 for a technically correct and complete response to RAI 414.

Supplement 1 response was sent on October 28, 2010 to provide a revised schedule for all questions. Supplement 2 was sent on November 29, 2010 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 3 was sent on January 13, 2011 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 4 was sent on February 3, 2011 to provide technically correct and complete responses to two questions. Supplement 5 was sent on February 8, 2011 to provide technically correct and complete responses to two questions. Supplement 6 was sent on February 18, 2011 to provide technically correct and complete response to one question. Supplement 7 was sent on February 25, 2011 to provide a revised schedule for the remaining 2 questions. Supplement 8 was sent on March 8, 2011 to provide a technically correct and complete response to one question. Supplement 9 sent on April 20, 2011, Supplement 10 sent on May 24, 2011, Supplement 11 sent on July 7, 2011, Supplement 12 sent on August 19, 2011, Supplement 13 sent on October 27, 2011, and Supplement 14 sent on January 10, 2012 provided a revised schedule for the remaining question.

The schedule for a technically correct and complete response for the remaining question has changed as shown below.

Question #	Response Date
RAI 414 — 07.03-30	May 22, 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](mailto:Dennis.Williford@areva.com)

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**From:** WILLIFORD Dennis (CORP/QP)

**Sent:** Tuesday, January 10, 2012 4:29 PM

**To:** [Getachew.Tesfaye@nrc.gov](mailto: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. 414, FSAR Ch. 7 OPEN ITEM, Supplement 14

Getachew,

AREVA NP provided a schedule on July 14, 2010 for a technically correct and complete response to RAI 414.

Supplement 1 response was sent on October 28, 2010 to provide a revised schedule for all questions. Supplement 2 was sent on November 29, 2010 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 3 was sent on January 13, 2011 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 4 was sent on February 3, 2011 to provide technically correct and complete responses to two questions. Supplement 5 was sent on February 8, 2011 to provide technically correct and complete responses to two questions. Supplement 6 was sent on February 18, 2011 to provide technically correct and complete response to one question. Supplement 7 was sent on February 25, 2011 to provide a revised schedule for the remaining 2 questions. Supplement 8 was sent on March 8, 2011 to provide a technically correct and complete response to one question. Supplement 9 sent on April 20, 2011, Supplement 10 sent on May 24, 2011, Supplement 11 sent on July 7, 2011, Supplement 12 sent on August 19, 2011, and Supplement 13 sent on October 27, 2011 provided a revised schedule for the remaining question.

The schedule for a technically correct and complete response for the remaining question has been revised as shown below.

Question #	Response Date
RAI 414 — 07.03-30	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](mailto:Dennis.Williford@areva.com)

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**From:** WILLIFORD Dennis (RS/NB)  
**Sent:** Thursday, October 27, 2011 10:58 AM  
**To:** [Getachew.Tesfaye@nrc.gov](mailto: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. 414, FSAR Ch. 7 OPEN ITEM, Supplement 13

Getachew,

AREVA NP provided a schedule on July 14, 2010 for a technically correct and complete response to RAI 414. Supplement 1 response was sent on October 28, 2010 to provide a revised schedule for all questions. Supplement 2 was sent on November 29, 2010 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 3 was sent on January 13, 2011 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 4 was sent on February 3, 2011 to provide technically correct and complete responses to two questions. Supplement 5 was sent on February 8, 2011 to provide technically correct and complete responses to two questions. Supplement 6 was sent on February 18, 2011 to provide technically correct and complete response to one question. Supplement 7 was sent on February 25, 2011 to provide a revised schedule for the remaining 2 questions. Supplement 8 was sent on March 8, 2011 to provide a technically correct and complete response to one question. Supplement 9 sent on April 20, 2011, Supplement 10 sent on May 24, 2011, Supplement 11 sent on July 7, 2011, and Supplement 12 sent on August 19, 2011 provided a revised schedule for the remaining question.

The schedule for a technically correct and complete response for the remaining question has been revised as shown below.

Question #	Response Date
RAI 414 — 07.03-30	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](mailto:Dennis.Williford@areva.com)

**From:** WILLIFORD Dennis (RS/NB)

**Sent:** Friday, August 19, 2011 2:02 PM

**To:** [Getachew.Tesfaye@nrc.gov](mailto: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. 414, FSAR Ch. 7 OPEN ITEM, Supplement 12

Getachew,

AREVA NP provided a schedule on July 14, 2010 for a technically correct and complete response to RAI 414. Supplement 1 response was sent on October 28, 2010 to provide a revised schedule for all questions. Supplement 2 was sent on November 29, 2010 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 3 was sent on January 13, 2011 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 4 was sent on February 3, 2011 to provide technically correct and complete responses to two questions. Supplement 5 was sent on February 8, 2011 to provide technically correct and complete responses to two questions. Supplement 6 was sent on February 18, 2011 to provide technically correct and complete response to one question. Supplement 7 was sent on February 25, 2011 to provide a revised schedule for the remaining 2 questions. Supplement 8 was sent on March 8, 2011 to provide a technically correct and complete response to one question. Supplement 9 sent on April 20, 2011, Supplement 10 sent on May 24, 2011, and Supplement 11 sent on July 7, 2011 provided a revised schedule for the remaining question.

The schedule for a technically correct and complete response for the remaining question has been revised as shown below.

Question #	Response Date
RAI 414 — 07.03-30	October 27, 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](mailto:Dennis.Williford@areva.com)

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**From:** WILLIFORD Dennis (RS/NB)

**Sent:** Thursday, July 07, 2011 12:13 PM

**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. 414, FSAR Ch. 7 OPEN ITEM, Supplement 11

Getachew,

AREVA NP provided a schedule on July 14, 2010 for a technically correct and complete response to RAI 414. Supplement 1 response was sent on October 28, 2010 to provide a revised schedule for all questions. Supplement 2 was sent on November 29, 2010 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 3 was sent on January 13, 2011 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 4 was sent on February 3, 2011 to provide technically correct and complete responses to two questions. Supplement 5 was sent on February 8, 2011 to provide technically correct and complete responses to two questions. Supplement 6 was sent on February 18, 2011 to provide technically correct and complete response to one question. Supplement 7 was sent on February 25, 2011 to provide a revised schedule for the remaining 2 questions. Supplement 8 was sent on March 8, 2011 to provide a technically

correct and complete response to one question. Supplement 9 sent on April 20, 2011, and Supplement 10 sent on May 24, 2011 provided a revised schedule for the remaining question.

The schedule for a technically correct and complete response for the remaining question has been revised as shown below.

Question #	Response Date
RAI 414 — 07.03-30	August 20, 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](mailto:Dennis.Williford@areva.com)

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**From:** WILLIFORD Dennis (RS/NB)

**Sent:** Tuesday, May 24, 2011 3:03 PM

**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. 414, FSAR Ch. 7 OPEN ITEM, Supplement 10

Getachew,

AREVA NP provided a schedule on July 14, 2010 for a technically correct and complete response to RAI 414.

Supplement 1 response was sent on October 28, 2010 to provide a revised schedule for all questions.

Supplement 2 was sent on November 29, 2010 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 3 was sent on January 13, 2011 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 4 was sent on February 3, 2011 to provide technically correct and complete responses to two questions. Supplement 5 was sent on February 8, 2011 to provide technically correct and complete responses to two questions. Supplement 6 was sent on February 18, 2011 to provide technically correct and complete response to one question. Supplement 7 was sent on February 25, 2011 to provide a revised schedule for the remaining 2 questions. Supplement 8 was sent on March 8, 2011 to provide technically correct and complete response to one question. Supplement 9 was sent on April 20, 2011 to provide a revised schedule for the remaining question.

The schedule for a technically correct and complete response for the remaining question has been revised and is provided below.

Question #	Response Date
RAI 414 — 07.03-30	July 7, 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](mailto:Dennis.Williford@areva.com)

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**From:** WELLS Russell (RS/NB)  
**Sent:** Wednesday, April 20, 2011 8:01 AM  
**To:** 'Tefaye, 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. 414, FSAR Ch. 7 OPEN ITEM, Supplement 9

Getachew,

AREVA NP provided a schedule on July 14, 2010 for a technically correct and complete response to RAI 414. Supplement 1 response was sent on October 28, 2010 to provide a revised schedule for all questions. Supplement 2 was sent on November 29, 2010 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 3 was sent on January 13, 2011 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 4 was sent on February 3, 2011 to provide technically correct and complete responses to two questions. Supplement 5 was sent on February 8, 2011 to provide technically correct and complete responses to two questions. Supplement 6 was sent on February 18, 2011 to provide technically correct and complete response to one question. Supplement 7 was sent on February 25, 2011 to provide a revised schedule for the remaining 2 questions. Supplement 8 was sent on March 8, 2011 to provide technically correct and complete response to one question.

The schedule for a technically correct and complete response for the remaining question has been revised and is provided below.

Question #	Response Date
RAI 414 — 07.03-30	May 24, 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](mailto:Russell.Wells@Areva.com)

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**From:** WELLS Russell (RS/NB)  
**Sent:** Tuesday, March 08, 2011 12:02 PM  
**To:** 'Tefaye, 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. 414, FSAR Ch. 7 OPEN ITEM, Supplement 8

Getachew,



AREVA NP provided a schedule on July 14, 2010 for a technically correct and complete response to RAI 414. Supplement 1 response was sent on October 28, 2010 to provide a revised schedule for all questions. Supplement 2 was sent on November 29, 2010 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 3 was sent on January 13, 2011 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 4 was sent on February 3, 2011 to provide technically correct and complete responses to two questions. Supplement 5 was sent on February 8, 2011 to provide technically correct and complete responses to two questions. Supplement 6 was sent on February 18, 2011 to provide technically correct and complete response to one question. Supplement 7 was sent on February 25, 2011 to provide a revised schedule for the remaining 2 questions. Based on discussions with NRC, the attached file, "RAI 414 Supplement 8 Response US EPR DC.pdf" provides the technically correct and complete response to one of the 2 questions, as committed.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which supports the response to RAI 414 Question 07.02-32.

The following table indicates the respective pages in the response document, "RAI 414 Supplement 8 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 414 07.02-32	2	3

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

Question #	Response Date
RAI 414 — 07.03-30	April 21, 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](mailto:Russell.Wells@Areva.com)

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**From:** WELLS Russell (RS/NB)  
**Sent:** Friday, February 25, 2011 12:44 PM  
**To:** Tesfaye, Getachew  
**Cc:** BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BRYAN Martin (External RS/NB); RYAN Tom (RS/NB)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 414, FSAR Ch. 7 OPEN ITEM, Supplement 7

Getachew,



AREVA NP provided a schedule on July 14, 2010 for a technically correct and complete response to RAI 414. Supplement 1 response was sent on October 28, 2010 to provide a revised schedule for all questions. Supplement 2 was sent on November 29, 2010 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 3 was sent on January 13, 2011 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 4 was sent on February 3, 2011 to provide technically correct and complete responses to two questions. Supplement 5 was sent on February 8, 2011 to provide technically correct and complete responses to two questions. Supplement 6 was sent on February 18, 2011 to provide technically correct and complete response to one question.

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 a technically correct and complete response to the two remaining questions is changed and is provided below.

Question #	Response Date
RAI 414 — 07.02-32	April 5, 2011
RAI 414 — 07.03-30	April 21, 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](mailto:Russell.Wells@Areva.com)*

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**From:** BRYAN Martin (External RS/NB)

**Sent:** Friday, February 18, 2011 10:17 AM

**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. 414, FSAR Ch. 7 OPEN ITEM, Supplement 6

Getachew,

AREVA NP provided a schedule on July 14, 2010 for a technically correct and complete response to RAI 414. Supplement 1 response was sent on October 28, 2010 to provide a revised schedule for all questions. Supplement 2 was sent on November 29, 2010 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 3 was sent on January 13, 2011 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 4 was sent on February 3, 2011 to provide technically correct and complete responses to two questions. Supplement 5 was sent on February 8, 2011 to provide technically correct and complete responses to two questions. Based on discussions with NRC, the attached file, "RAI 414 Supplement 6 Response US EPR DC.pdf" provides technically correct and complete response to one of the remaining 3 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 this question.

The following table indicates the respective pages in the response document, "RAI 414 Supplement 6 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 414 07.03-31	2	3

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

Question #	Response Date
RAI 414 — 07.02-32	March 22, 2011
RAI 414 — 07.03-30	March 10, 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](mailto:Martin.Bryan.ext@areva.com)

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**From:** BRYAN Martin (External RS/NB)

**Sent:** Tuesday, February 08, 2011 9:46 AM

**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. 414, FSAR Ch. 7 OPEN ITEM, Supplement 5

Getachew,

AREVA NP provided a schedule on July 14, 2010 for a technically correct and complete response to RAI 414.

Supplement 1 response was sent on October 28, 2010 to provide a revised schedule for all questions.

Supplement 2 was sent on November 29, 2010 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 3 was sent on January 13, 2011 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 4 was sent on February 3, 2011 to provide technically correct and complete responses to two questions. Based on discussions with NRC, the attached file, "RAI 414 Supplement 5 Response US EPR DC.pdf" provides technically correct and complete responses to two of the remaining 5 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 these two questions.

The following table indicates the respective pages in the response document, "RAI 414 Supplement 5 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 414 07.07-	2	3

20		
RAI 414 07.07-22	4	5

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

Question #	Response Date
RAI 414 — 07.02-32	March 22, 2011
RAI 414 — 07.03-30	March 10, 2011
RAI 414 — 07.03-31	March 10, 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](mailto:Martin.Bryan.ext@areva.com)

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**From:** BRYAN Martin (External RS/NB)  
**Sent:** Thursday, February 03, 2011 2:44 PM  
**To:** 'Tsfaye, 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. 414, FSAR Ch. 7 OPEN ITEM, Supplement 4

Getachew,

AREVA NP provided a schedule on July 14, 2010 for a technically correct and complete response to RAI 414. Supplement 1 response was sent on October 28, 2010 to provide a revised schedule for all questions. Supplement 2 was sent on November 29, 2010 to provide a revised schedule for 6 of the remaining 7 questions. Supplement 3 was sent on January 13, 2011 to provide a revised schedule for 6 of the remaining 7 questions. Based on discussions with NRC, the attached file, "RAI 414 Supplement 4 Response US EPR DC.pdf" provides technically correct and complete responses to two of the remaining 7 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 these two questions.

The following table indicates the respective pages in the response document, "RAI 414 Supplement 4 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 414 07.02-33	2	3
RAI 414 07.04-14	4	5

To allow additional time to interact with the NRC staff, a revised schedule for the remaining questions is provided.

Question #	Response Date
RAI 414 — 07.02-32	March 22, 2011
RAI 414 — 07.03-30	March 10, 2011
RAI 414 — 07.03-31	March 10, 2011
RAI 414 — 07.07-20	March 10, 2011
RAI 414 — 07.07-22	March 10, 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](mailto:Martin.Bryan.ext@areva.com)

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**From:** BRYAN Martin (External RS/NB)  
**Sent:** Thursday, January 13, 2011 4:35 PM  
**To:** 'Tefaye, 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. 414, FSAR Ch. 7 OPEN ITEM, Supplement 3

Getachew,

AREVA NP provided a schedule on July 14, 2010 for a technically correct and complete response to RAI 414. Supplement 1 response was sent on October 28, 2010 to provide a revised schedule for all questions. Supplement 2 was sent on November 29, 2010 to provide a revised schedule for 6 of the remaining 7 questions. To allow additional time to interact with the NRC staff, a revised schedule for these six questions is provided. The schedule for Question 07.02-32 remains the same.

A complete answer is not provided for the 7 questions. The schedule for technically correct and complete responses to these questions is provided below.

Question #	Response Date
RAI 414 — 07.02-32	March 01, 2011
RAI 414 — 07.03-33	February 11, 2011
RAI 414 — 07.02-30	February 11, 2011
RAI 414 — 07.03-31	February 11, 2011
RAI 414 — 07.04-14	February 11, 2011
RAI 414 — 07.07-20	February 11, 2011
RAI 414 — 07.07-22	February 11, 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](mailto:Martin.Bryan.ext@areva.com)

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**From:** BRYAN Martin (External RS/NB)  
**Sent:** Monday, November 29, 2010 2:35 PM  
**To:** 'Tefaye, 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. 414, FSAR Ch. 7 OPEN ITEM, Supplement 2

Getachew,

AREVA NP provided a schedule on July 14, 2010 for a technically correct and complete response to RAI 414. Supplement 1 response was sent on October 28, 2010 to provide a revised schedule for all questions. To allow additional time to interact with the NRC staff, a revised schedule for six of the seven questions is provided. The schedule for Question 07.02-32 remains the same.

A complete answer is not provided for the 7 questions. The schedule for technically correct and complete responses to these questions is provided below.

Question #	Response Date
RAI 414 — 07.02-32	March 01, 2011
RAI 414 — 07.03-33	January 13, 2011
RAI 414 — 07.02-30	January 13, 2011
RAI 414 — 07.03-31	January 13, 2011
RAI 414 — 07.04-14	January 13, 2011
RAI 414 — 07.07-20	January 13, 2011
RAI 414 — 07.07-22	January 13, 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](mailto:Martin.Bryan.ext@areva.com)

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**From:** BRYAN Martin (External RS/NB)  
**Sent:** Thursday, October 28, 2010 4:53 PM  
**To:** 'Tefaye, 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. 414, FSAR Ch. 7 OPEN ITEM, Supplement 1

Getachew,

AREVA NP provided a schedule on July 14, 2010 for a technically correct and complete response to RAI 414. To allow additional time to interact with the NRC staff, a revised schedule is provided.

A complete answer is not provided for the 7 questions. The schedule for technically correct and complete responses to these questions is provided below.

Question #	Response Date
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RAI 414 — 07.02-32	March 01, 2011
RAI 414 — 07.03-33	November 29, 2010
RAI 414 — 07.02-30	November 29, 2010
RAI 414 — 07.03-31	November 29, 2010
RAI 414 — 07.04-14	November 29, 2010
RAI 414 — 07.07-20	November 29, 2010
RAI 414 — 07.07-22	November 29, 2010

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](mailto:Martin.Bryan.ext@areva.com)

---

**From:** BRYAN Martin (EXT)  
**Sent:** Wednesday, July 14, 2010 6:32 PM  
**To:** 'Tesfaye, Getachew'  
**Cc:** DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); RYAN Tom (AREVA NP INC)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 414, FSAR Ch. 7 OPEN ITEM

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 414 Response US EPR DC.pdf" provides a schedule since technically correct and complete responses to the 7 questions are not provided.

The following table indicates the respective pages in the response document, "RAI 414 Response US EPR DC.pdf" that contain AREVA NP's responses to the subject questions.

Question #	Start Page	End Page
RAI 414 — 07.02-32	2	2
RAI 414 — 07.03-33	3	3
RAI 414 — 07.02-30	4	6
RAI 414 — 07.03-31	7	8
RAI 414 — 07.04-14	9	9
RAI 414 — 07.07-20	10	10
RAI 414 — 07.07-22	11	11

A complete answer is not provided for the 6 questions. The schedule for technically correct and complete responses to these questions is provided below.

Question #	Response Date
RAI 414 — 07.02-32	October 28, 2010
RAI 414 — 07.03-33	October 28, 2010
RAI 414 — 07.02-30	October 28, 2010
RAI 414 — 07.03-31	October 28, 2010
RAI 414 — 07.04-14	October 28, 2010

RAI 414 — 07.07-20	October 28, 2010
RAI 414 — 07.07-22	October 28, 2010

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](mailto:Martin.Bryan.ext@areva.com)

---

**From:** Tesfaye, Getachew [<mailto:Getachew.Tesfaye@nrc.gov>]

**Sent:** Tuesday, June 15, 2010 4:58 PM

**To:** ZZ-DL-A-USEPR-DL

**Cc:** Truong, Tung; Morton, Wendell; Spaulding, Deirdre; Mott, Kenneth; Jackson, Terry; Canova, Michael; Colaccino, Joseph; ArevaEPRDCPEM Resource

**Subject:** U.S. EPR Design Certification Application RAI No. 414(4394,4398,4752,4548), FSAR Ch. 7 OPEN ITEM

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on June 8, 2010, and on June 15, 2010, you informed us that the RAI is clear and no further clarification is needed. As a result, no change is made to the draft RAI. The question in this RAI is an OPEN ITEM in the safety evaluation report for Chapter 7 for Phases 2 and 3 reviews. As such, the schedule we have established for your application assumes technically correct and complete responses prior to the start of Phase 4 review. For any RAI that cannot be answered prior to the start of Phase 4 review, it is expected that a date for receipt of this information will be provided 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:** 4302

**Mail Envelope Properties** (554210743EFE354B8D5741BEB695E6560EE843)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 414, FSAR Ch. 7  
OPEN ITEM, Supplement 17- DCR-Related  
**Sent Date:** 3/8/2013 4:15:40 PM  
**Received Date:** 3/8/2013 4:15:49 PM  
**From:** WILLIFORD Dennis (AREVA)

**Created By:** Dennis.Williford@areva.com

**Recipients:**

"Canova, Michael" <Michael.Canova@nrc.gov>  
Tracking Status: None  
"DELANO Karen (AREVA)" <Karen.Delano@areva.com>  
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"LEIGHLITER John (AREVA)" <John.Leighliter@areva.com>  
Tracking Status: None  
"ROMINE Judy (AREVA)" <Judy.Romine@areva.com>  
Tracking Status: None  
"RYAN Tom (AREVA)" <Tom.Ryan@areva.com>  
Tracking Status: None  
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Tracking Status: None  
"LENTZ Tony (EXTERNAL AREVA)" <Tony.Lentz.ext@areva.com>  
Tracking Status: None  
"Snyder, Amy" <Amy.Snyder@nrc.gov>  
Tracking Status: None

**Post Office:** FUSLYNCMX03.fdom.ad.corp

Files	Size	Date & Time
MESSAGE	37223	3/8/2013 4:15:49 PM
RAI 414 Supplement 17 Response US EPR DC.pdf		316624

**Options**

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

**Response to**

**Request for Additional Information No. 414, Supplement 17**

**6/15/2010**

**U. S. EPR Standard Design Certification**

**AREVA NP Inc.**

**Docket No. 52-020**

**SRP Section: 07.02 - Reactor Trip System**

**SRP Section: 07.03 - Engineered Safety Features Systems**

**SRP Section: 07.04 - Safe Shutdown Systems**

**SRP Section: 07.07 - Control Systems**

**Application Section: FSAR Chapter 7**

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

**Question 07.03-30:****OPEN ITEM****Follow-up to RAI 285, Question 07.03-25.**

The staff requests that the applicant provide the following information:

1. Explain and/or clarify exactly what components are involved in the 'response time testing' of the PS in the PS ITAAC and surveillance testing. The Chapter 15 definition remains somewhat vague and the presentation by the applicant on surveillance testing says that the testing is from sensor to final actuating device. The applicant's response to RAI Question 07.09.47 would seem to be in conflict with this.
2. Based upon the applicant's response to RAI Question 07.09.47, explain and/or clarify why the applicant believes that the PACS does not need to be involved in the overall response time testing of the PS. The PACS modules are specific to ESFAS and ESFAS actuations cannot occur without the PACS. They are digital devices that are part of the overall logic chain for an ESFAS actuation.

**QUESTION BASIS:**

IEEE Std. 603-1998, Clause 4.d, requires, in part, that the U.S. EPR DCD document the variables or combinations of variables used by the ESF actuation system to be monitored manually or automatically. Also Clause 4.d requires the U.S. EPR DCD to document the analytical limit associated with each variable, the ranges and rates of change of these variables till completion of protective action is ensured.

The staff issued RAI 957, Question 07.03-11, in order to get clarification on this issue. The applicant provided an initial response to this RAI question in which it stated that ESF response times are documented in the U.S. EPR DCD Tier 2, Table 15.0-8, and that the PS response times will be tested and verified according to the ITAAC documented in the U.S. EPR DCD Tier 2, Section 14.2.12.10 Test #146. The applicant provided its response to RAI 78, Supplement 2, which contained the FSAR markups for Question 07.03-11.

Based upon the review of the applicant's response, the staff created a supplemental RAI 285, Question 07.03-25. In response to Question 07.03-25, the applicant commits to adding specific testing for ESF response times to support the Chapter 15 accident analyses.

In response to RAI Question 07.09.47, the applicant states the following:

*“ The bounding PS response times discussed in the Second Request for Additional Information for ANP-10281(P), Attachment B are consistent with the response time assumptions used in the accident analysis and listed in U.S. EPR FSAR Tier 2, Table 15.0-7 and Table 15.0-8. If needed, AREVA NP can provide supporting documentation, such as a function-by-function demonstration of consistency, for NRC audit. Refer to U.S. EPR FSAR Tier 1, Section 2.4.1, Item 4.24 and associated ITAAC , which has been added in the Response to RAI 285 Supplement 4, Question 07.03-25 and addresses verification that the PS response times support accident analysis assumptions.*

*The Second Request for Additional Information for ANP-10281(P), Attachment B, Paragraph one states: "The total response time for a given function consists of several sub-intervals that span from a process variable exceeding a pre-defined limit to completion of the protective function. The sub-interval addressed herein accounts for the computerized portion of the protection channel, and is defined as the time from sensor conditioning output to RT breaker input terminals for RT functions, or to input terminals of the PACS for ESF actuation functions." The priority and actuator control system (PACS) is not included in the PS response time analysis. Time delays introduced by the priority module in the PACS are included with the response time of the actuator it controls and is verified through response time testing of the actuator."*

US EPR DCD, Tier 2, Chapter 15, Page 15.0-58, states the time delays(response times):

"....Represents the total time for completion of the function. Includes sensor delay, I&C delay, and other delays as noted until the function is completed."

In addition, in a presentation made to the staff concerning continuous self-testing of the PS, the applicant stated:

"The Protection System response time shall be that time interval from when the monitored parameter exceeds its PS actuation setpoint at the division sensor until the PS equipment is capable of performing its safety function."

The applicant states that the PACS system has not been included in the response times. This appears to be in conflict with the definition of the response times for completion of ESF actuation in Chapter 15. The Chapter 15 definition makes no distinction between the computerized portions of the PS and the PACS, and implies that the response times would envelope all timing delays from sensor to final actuation device. It should also be noted that the PACS ITAAC in U.S. EPR DCD, Tier 1, Section 2.4.5 makes no mention of response timing. Emergency Feedwater (EFW) is an ESF. The ITAAC for EFW is in U.S. EPR DCD, Tier 1, Section 2.2.4. There is no mention of response timing, in terms of valve stroke time with the PACS module, mentioned in the ITAAC. There is also no mention of response time testing in order to meet the bounding times of the Chapter 15 safety analyses. This appears to be in conflict with what the applicant states in its response to RAI Question 07.09-47. If the response timing of the PACS is not listed in either the PS, PACS or any other ESF ITAAC, then the staff cannot have confidence that the as-built configuration of the PS will meet the bounding response times of the Chapter 15 safety analyses.

**Note:** The applicant has committed to meeting the guidance of Regulatory Guide 1.118, "Periodic Testing of Electric Power and Protection Systems". RG 1.118 cites 10 CFR Part 50, Appendix A, GDC 21, as a regulatory basis and endorses IEEE Std. 338-1987, "IEEE Standard Criteria for Periodic Surveillance Testing of Nuclear Power Generating Station Safety Systems". Section 6.3.5 of IEEE Std. 338-1987, "Logic System Functional Test" states:

"A logic system functional test shall test all logic components from sensor through to the actuated device. Logic components consist of relays, contacts, and solid-state logic elements of a logic circuit. The test may be performed by a series of sequential, overlapping, or total system tests so that an entire logic system is tested."

While the applicant does not consider the PACS as part of the computerized portions of the PS, it is a part of the 'entire logic system' for ESFAS and would be considered a part of a logic system functional test.

**Response to Question 07.03-30:**

The response to this question was provided on May 22, 2012 in Supplement 16 of this RAI. The associated markups have been incorporated into Revision 4 of the U.S. EPR FSAR, and are not provided in this supplemental response. The purpose of this supplement is to add additional details about the inner containment isolation valve (CIV) time delays as discussed below that were not included in Supplement 16. The response and associated markups provided in this supplement, along with the associated response and markups for Supplement 16, provide a final and complete response to RAI 414, Question 07.03-30.

The closure sequence for inner CIVs in Divisions 1, 2, 3, and 4 is staggered to limit the "peak load" on the Class 1E uninterruptible power supply (EUPS) batteries and inverters. The staggered CIV sequence reduces the size of the EUPS batteries and inverters needed to achieve peak load. The time delay interval allows the motor operated valve (MOV) peak in-rush current to decay prior to energizing the next group of inner CIV MOVs. This staggering of the valves reduces the peak demand on both the batteries and the inverters.

The U.S. EPR EUPS system supplies the MOVs and therefore requires an output of 480V three phase. The MOVs normally create a large demand on the EUPS, and an even larger demand as a peak load because of the large starting current required to energize the MOV, which is typically five to seven times the running current. If numerous large MOVs are cycled simultaneously (such as for the non-staggered containment isolation signal), then the demand on both the battery and the inverter can be significant.

**FSAR Impact:**

U.S. EPR FSAR Tier 2, Sections 6.2.4, Table 6.2.4-1, Section 7.3.1.2.9, and Figure 7.3-20 will be revised as described in the response and indicated on the enclosed markup.

# U.S. EPR Final Safety Analysis Report Markups

receipt of a containment isolation signal, the automatic initiating signal provides the primary mode and a remote manual initiation from the MCR is the secondary mode. For power-operated isolation valves that do not receive a containment isolation signal, the primary actuation mode is a remote manual initiation signal from the MCR. For the power operated isolation valves outside the containment, a local secondary mode of operation is provided, such as a handwheel for manual operation.

Containment isolation valves that are capable of being operated remotely are operated from the MCR. The signal to initiate individual containment isolation valves is listed in Table 6.2.4-1.

#### 6.2.4.2.5 Electrical Power Supplies

07.03-30

The MOV isolation valves inside the containment are supplied from Class 1E 480 Vac buses and are backed up by the Class 1E uninterruptible power supply system (EUPS) and emergency diesel generators. These buses are also supplied by the station blackout diesel generators (SBODG) during station blackout (SBO) conditions. To limit the peak load on the EUPS batteries and inverters a staggered closure sequence is provided by the PS for valves inside the containment that are powered by the EUPS and receive a containment isolation signal. The PS implementation of the containment isolation function is described in Section 7.3.1.2.9.

The MOV isolation valves outside the containment are supplied from Class 1E 480 Vac buses. The buses are backed up by the emergency diesel generators, and can also be supplied from the SBODGs during SBO conditions. Additionally, the 12-hour UPS can be manually connected to provide power to these buses.

The power supplies for containment isolation valves, and for valve position indication, satisfy station blackout requirements. Station blackout is addressed in Section 8.4.

Electrical alternate feeds, as described in Section 8.3.1.1.1 provide normal and standby power when certain electrical components are out of service. The alternate feeds create two divisional pairs in the emergency power supply system. Containment isolation valves that require electrical power to perform the containment isolation safety function are powered from separate divisional pairs to satisfy single failure criteria with respect to the electrical power supply. Valves that fail to reach their safety position, such as solenoid valves, may be powered from the same divisional pair to satisfy operational requirements.

The use of motor-operated valves that fail in the as-is position upon loss of actuating power is based on the consideration of what valve position provides for the plant safety requirements.



Table 6.2.4.1—Containment Penetration, Isolation Valve, and Actuator Data  
Sheet 1 of 23

Penetration No.	GDC Req.	System Name	Fluid	Line Size (in)	Essent System	Potent Bypass Path	Valve Number	Valve Location	LLRT	Valve Type and Operator	Primary Actuation	Secondary Actuation	Normal Position	Shut-down Position	Post Accident Position	Power Failure Position	Cont. Isolation Signal	Valve Closure Time		Power Source
																		T3	T4	
12BQ017	56	FPCPS	water	6.0	no	no	FAL15AA003	inside	C	swing check	self	self	o/c	o/c	close	n/a	n/a	n/a	n/a	n/a
12BQ016	56	FPCPS	water	6.0	no	no	FAL12AA001	inside	C	gate/MOV	PS <sup>1</sup>	RM	o/c	o/c	close	as-is	Stage 1	≤ 0.5 sec	≤ 29.5 sec	34BRA
12BQ017	56	FPCPS	water	6.0	no	no	FAL15AA002	outside	C	gate/MOV	PS	RM	o/c	o/c	close	as-is	Stage 1	≤ 0.5 sec	≤ 29.5 sec	31BNB03
12BQ016	56	FPCPS	water	6.0	no	no	FAL12AA002	outside	C	gate/MOV	PS	RM	o/c	o/c	close	as-is	Stage 1	≤ 0.5 sec	≤ 29.5 sec	31BNB03
60BQ042	56	FHS (Transfer Tube)	air/water	20.0	no	no	n/a	n/a	B	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
74BQ034	57	DWDS	water	2.0	no	no	GHC74AA002	inside	C	globe/MOV	PS <sup>3</sup>	RM	open	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BRA
74BQ034	57	DWDS	water	2.0	no	no	GHC74AA001	outside	C	globe/MOV	PS	RM	open	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	31BNB03
10BQ021	55	EBS loop 1&2	water	2.0	yes	no	JDH10AA007	inside	C	lift check	self	self	close	close	open	n/a	n/a	n/a	n/a	n/a
40BQ022	55	EBS loop 3&4	water	2.0	yes	no	JDH40AA007	inside	C	lift check	self	self	close	close	open	n/a	n/a	n/a	n/a	n/a
10BQ021	55	EBS loop 1&2	water	2.0	yes	no	JDH10AA006	outside	C	globe/MOV	PS	RM	open	open	open	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	31BNB03
40BQ022	55	EBS loop 3&4	water	2.0	yes	no	JDH40AA006	outside	C	globe/MOV	PS	RM	open	open	open	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BNB03
10BQ001	55	CVCS Seal Return	water	2.0	yes	no	JEW50AA001	inside	C	globe/MOV	PS	RM	open	close	o/c	as-is	Stage 2	≤ 0.5 sec	≤ 14.5 sec	34BRA
10BQ004	55	CVCS Seal Injection	water	2.0	yes	no	JEW01AA006	inside	C	lift check	self	self	open	close	o/c	n/a	n/a	n/a	n/a	n/a
10BQ001	55	CVCS Seal Return	water	2.0	yes	no	JEW50AA002	outside	C	globe/MOV	PS	RM	open	close	o/c	as-is	Stage 2	≤ 0.5 sec	≤ 14.5 sec	31BNB03

Table 6.2.4-1—Containment Penetration, Isolation Valve, and Actuator Data  
Sheet 2 of 23

Penetration No.	GDC Req.	System Name	Fluid	Line Size (in)	Essent System	Potent Bypass Path	Valve Number	Valve Location	LLRT	Valve Type and Operator	Primary Act-uation	Second-ary Act-uation	Normal Position	Shut-down Position	Post Accident Position	Power Failure Position	Cont. Isolation Signal	Valve Closure Time		Power Source
																		T3	T4	
10BQ004	55	CVCs Seal Injection	water	2.0	yes	no	JEW01AA005	outside	C	globe/MOV	PS	RM	open	close	o/c	as-is	Stage 2	≤0.5 sec	≤14.5 sec	31BNB03
60BQ054	56	Equip. Hatch	air	n/a	n/a	n/a	n/a	n/a	B	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
BQ211	56	Personnel airlock	air	n/a	n/a	n/a	n/a	n/a	B	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
BQ053	56	Emer. airlock	air	n/a	n/a	n/a	n/a	n/a	B	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
BQ052	56	Const. Opening	air	n/a	n/a	n/a	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
10BQ048	56	Leak Off System	air	10.0	no	no	JMM10AA006	inside	C	gate/MOV	PS <sup>i</sup>	RM	close	o/c	close	as-is	Stage 1	≤0.5 sec	≤49.5 sec	34BRA
10BQ048	56	Leak Off System	air	10.0	no	no	JMM10AA007	outside	C	gate/MOV	PS	RM	close	o/c	close	as-is	Stage 1	≤0.5 sec	≤49.5 sec	31BNB03
30BQ312	56	Leak Off System	air	0.5	no	no	JMM30AA001	inside	C	globe/manual	n/a	n/a	close	o/c	close	n/a	n/a	n/a	n/a	n/a
30BQ312	56	Leak Off system	air	0.5	no	no	JMM30AA003	outside	C	globe/manual	n/a	n/a	close	o/c	close	n/a	n/a	n/a	n/a	n/a
23BQ065	57	Leak Off System	air	2.0	yes	no	JMM23AA001	inside	C	globe/MOV	RM	RM	open	o/c	open	as-is	no	≤0.5 sec	≤14.5 sec	31BRA
23BQ065	57	Leak Off System	air	2.0	yes	no	JMM23AA002	outside	C	globe/MOV	RM	RM	open	o/c	open	as-is	no	≤0.5 sec	≤14.5 sec	34BRA
41BQ104	56	SAHRS Spray Line	water	8.0	no	no	JMQ41AA002	inside	C	swing check	self	self	close	close	o/c	n/a	n/a	n/a	n/a	n/a
41BQ104	56	SAHRS Spray Line	water	8.0	no	no	JMQ41AA001	outside	C	globe/MOV	PS	RM	close	close	o/c	as-is	Stage 1	≤0.5 sec	≤39.5 sec	34BNB03
42BQ105	56	SAHRS Basement Cooling Line	water	8.0	no	no	JMQ42AA002	inside	C	swing check	self	self	close	close	o/c	n/a	n/a	n/a	n/a	n/a

Table 6.2.4-1—Containment Penetration, Isolation Valve, and Actuator Data  
Sheet 9 of 23

Penetration No.	GDC Req.	System Name	Fluid	Line Size (in)	Essent System	Potent Bypass Path	Valve Number	Valve Location	LLRT	Valve Type and Operator	Primary Act-uation	Second-ary Act-uation	Normal Position	Shut-down Position	Post Accident Position	Power Failure Position	Cont. Isolation Signal	Valve Closure Time		Power Source
																		T3	T4	
60BQ108	57	CCWS & CVCS to RCP	water	12.0	no	no	KAB60AA018	inside	C	gate/MOV	PS	RM	open	o/c	close	as-is	Stage 2	≤ 0.5 sec	≤ 59.5 sec	34BRA
60BQ108	57	CCWS & CVCS to RCP	water	12.0	no	no	KAB60AA019	outside	C	gate/MOV	PS	RM	open	o/c	close	as-is	Stage 2	≤ 0.5 sec	≤ 59.5 sec	31BNB03
60BQ113	57	CCWS to HVAC & PEH	water	10.0	no	no	KAB40AA002	inside	C	swing check	self	self	open	o/c	close	n/a	n/a	n/a	n/a	n/a
60BQ113	57	CCWS to HVAC & PEH	water	10.0	no	no	KAB40AA001	outside	C	gate/MOV	PS	RM	open	o/c	close	as-is	Stage 1	≤ 0.5 sec	≤ 49.5 sec	31BNB03
60BQ114	57	CCWS Return HVAC & PEH	water	10.0	no	no	KAB40AA012	inside	C	gate/MOV	PS	RM	open	o/c	close	as-is	Stage 1	≤ 0.5 sec	≤ 49.5 sec	34BRA
60BQ114	57	CCWS Return HVAC & PEH	water	10.0	no	no	KAB40AA006	outside	C	gate/MOV	PS	RM	open	o/c	close	as-is	Stage 1	≤ 0.5 sec	≤ 49.5 sec	31BNB03
60BQ117	57	CCWS Supply to RCP	water	4.0	yes	no	KAB30AA050	inside	C	gate/MOV	RM	RM	open	open	open	as-is	no	≤ 0.5 sec	≤ 14.5 sec	34BRA
60BQ117	57	CCWS Supply to RCP	water	4.0	yes	no	KAB30AA049	outside	C	gate/MOV	RM	RM	open	open	open	as-is	no	≤ 0.5 sec	≤ 14.5 sec	31BNB03
60BQ118	57	CCWS Return RCP	water	4.0	yes	no	KAB30AA052	outside	C	gate/MOV	RM	RM	open	open	open	as-is	no	≤ 0.5 sec	≤ 14.5 sec	31BNB03
60BQ118	57	CCWS Return RCP	water	4.0	yes	no	KAB30AA051	inside	C	gate/MOV	RM	RM	open	open	open	as-is	no	≤ 0.5 sec	≤ 14.5 sec	34BRA
60BQ407	57	CCWS & CVCS to RCP	water	12.0	no	no	KAB70AA014	inside	C	swing check	self	self	open	o/c	close	n/a	n/a	n/a	n/a	n/a
60BQ407	57	CCWS & CVCS to RCP	water	12.0	no	no	KAB70AA013	outside	C	gate/MOV	PS	RM	open	o/c	close	as-is	Stage 2	≤ 0.5 sec	≤ 59.5 sec	34BNB03

Table 6.2.4-1—Containment Penetration, Isolation Valve, and Actuator Data  
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Penetration No.	GDC Req.	System Name	Fluid	Line Size (in)	Essent System	Potent Bypass Path	Valve Number	Valve Location	LLRT	Valve Type and Operator	Primary Act-uation	Second-ary Act-uation	Normal Position	Shut-down Position	Post Accident Position	Power Failure Position	Cont. Isolation Signal	Valve Closure Time		Power Source
																		T3	T4	
60BQ408	57	CCWS & CVCS Return RCP	water	12.0	no	no	KAB70AA018	inside	C	gate/MOV	PS	RM	open	o/c	close	as-is	Stage 2	≤ 0.5 sec	≤ 59.5 sec	31BRA
60BQ408	57	CCWS & CVCS Return RCP	water	12.0	no	no	KAB70AA019	outside	C	gate/MOV	PS	RM	open	o/c	close	as-is	Stage 2	≤ 0.5 sec	≤ 59.5 sec	34BNB03
60BQ420	57	CCWS Supply to RCP	water	4.0	yes	no	KAB30AA054	inside	C	gate/MOV	RM	RM	open	open	open	as-is	no	≤ 0.5 sec	≤ 14.5 sec	33BRA
60BQ420	57	CCWS Supply to RCP	water	4.0	yes	no	KAB30AA053	outside	C	gate/MOV	RM	RM	open	open	open	as-is	no	≤ 0.5 sec	≤ 14.5 sec	32,4BNB03
60BQ421	57	CCWS Return RCP	water	4.0	yes	no	KAB30AA055	inside	C	gate/MOV	RM	RM	open	open	open	as-is	no	≤ 0.5 sec	≤ 14.5 sec	33BRA
60BQ421	57	CCWS Return RCP	water	4.0	yes	no	KAB30AA056	outside	C	gate/MOV	RM	RM	open	open	open	as-is	no	≤ 0.5 sec	≤ 14.5 sec	32,4BNB03
10BQ002	55	CVCS Charging	water	4.0	no	no	KBA34AA003	inside	C	swing check	self	self	open	close	close	n/a	n/a	n/a	n/a	n/a
10BQ002	55	CVCS Charging	water	4.0	no	no	KBA34AA002	outside	C	globe/MOV	PS	RM	open	close	close	as-is	Stage 2	≤ 0.5 sec	≤ 19.5 sec	31BNB03
10BQ003	55	CVCS Letdown	water	6.0	no	no	KBA14AA002	inside	C	globe/MOV	PS	RM	open	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 29.5 sec	31BRA
10BQ003	55	CVCS Letdown	water	6.0	no	no	KBA14AA003	outside	C	globe/MOV	PS	RM	open	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 29.5 sec	34BNB03
30BQ044	56	CVS Supply	air	39.0	no	no	KLA30AA003	inside	C	special/air	PS	RM	close	o/c	close	close	Stage 1	n/a	n/a	n/a
30BQ044	56	CVS Supply	air	39.0	no	no	KLA30AA002	outside	C	special/air	PS	RM	close	o/c	close	close	Stage 1	n/a	n/a	n/a
40BQ045	56	CVS Exhaust	air	39.0	no	no	KLA40AA001	inside	C	special/air	PS	RM	close	o/c	close	close	Stage 1	n/a	n/a	n/a

Table 6.2.4-1—Containment Penetration, Isolation Valve, and Actuator Data  
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Penetration No.	GDC Req.	System Name	Fluid	Line Size (in)	Essent System	Potent Bypass Path	Valve Number	Valve Location	LLRT	Valve Type and Operator	Primary Act-uation	Second-ary Act-uation	Normal Position	Shut-down Position	Post Accident Position	Power Failure Position	Cont. Isolation Signal	Valve Closure Time		Power Source
																		T3	T4	
60BQ452	56	CSC pressure	air	0.5	yes	no	KLA70AA704	outside	C	gate/manual	manual	manual	open	open	open	n/a	n/a	n/a	n/a	n/a
60BQ005	55	GWPS	gas	2.0	no	no	KPL84AA003	inside	C	globe/MOV	PS <sup>2</sup>	RM	open	o/c	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	31BRA
60BQ005	55	GWPS	gas	2.0	no	no	KPL84AA002	outside	C	globe/MOV	PS	RM	open	o/c	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BNB03
60BQ006	55	GWPS	gas	2.0	no	no	KPL85AA003	inside	C	globe/MOV	PS <sup>2</sup>	RM	open	o/c	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	31BRA
60BQ006	55	GWPS	gas	2.0	no	no	KPL85AA004	outside	C	globe/MOV	PS	RM	open	o/c	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BNB03
10BQ007	57	NIDVS	water	3.0	no	no	KTA10AA017	inside	C	globe/MOV	PS <sup>3</sup>	RM	open	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BRA
10BQ007	57	NIDVS	water	3.0	no	no	KTA10AA018	outside	C	globe/MOV	PS	RM	open	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	31BNB03
10BQ008	56	NIDVS	water	2.0	no	no	KTC10AA005	inside	C	globe/MOV	PS <sup>3</sup>	RM	close	o/c	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	31BRA
10BQ008	56	NIDVS	water	2.0	no	no	KTC10AA006	outside	C	globe/MOV	PS	RM	close	o/c	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BNB03
10BQ012	56	NIDVS Return	water	2.0	no	no	KTC10AA029	inside	C	lift check	self	self	open	o/c	close	n/a	n/a	n/a	n/a	n/a
10BQ012	56	NIDV Return	water	2.0	no	no	KTC10AA010	outside	C	globe/MOV	PS	RM	close	o/c	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BNB03
10BQ014	56	NIDVS	water	2.0	no	no	KTD10AA024	inside	C	globe/MOV	PS <sup>3</sup>	RM	close	o/c	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	31BRA
10BQ014	56	NIDVS	water	2.0	no	no	KTD10AA015	outside	C	globe/MOV	PS	RM	close	o/c	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BNB03
10BQ070	56	NIDVS to Annulus	water	1.0	no	no	KTD10AA008	inside annulus	C	lift check	self	self	o/c	o/c	close	n/a	n/a	n/a	n/a	n/a
10BQ070	56	NIDVS to Annulus	water	1.0	no	no	KTD10AA025	outside	C	globe/MOV	PS	RM	close	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BNB03
10BQ009	55	NSS LS	water	0.25	no	no	KUA10AA003	inside	C	globe/MOV	PS <sup>3</sup>	RM	open	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	31BRA

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Table 6.2.4-1—Containment Penetration, Isolation Valve, and Actuator Data  
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Penetration No.	GDC Req.	System Name	Fluid	Line Size (in)	Essent System	Potent Bypass Path	Valve Number	Valve Location	LLRT	Valve Type and Operator	Primary Act-uation	Second-ary Act-uation	Normal Position	Shut-down Position	Post Accident Position	Power Failure Position	Cont. Isolation Signal	Valve Closure Time		Power Source
																		T3	T4	
10BQ009	55	NSS LS	water	0.25	no	no	KUA10AA004	outside	C	globe/MOV	PS	RM	open	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BNB03
20BQ011	55	NSS LS	water	0.25	no	no	KUA20AA002	inside	C	globe/MOV	PS <sup>1</sup>	RM	open	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	31BRA
20BQ011	55	NSS LS	water	0.25	no	no	KUA20AA003	outside	C	globe/MOV	PS	RM	open	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BNB03
30BQ010	55	NSS LS	water	0.25	no	no	KUA30AA003	inside	C	globe/MOV	PS <sup>3</sup>	RM	open	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BRA
30BQ010	55	NSS LS	water	0.25	no	no	KUA30AA004	outside	C	globe/MOV	PS	RM	open	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	31BNB03
10BQ027	55	NSS LLLS	water	0.25	no	no	KUB10AA001	inside	C	globe/MOV	PS <sup>1</sup>	RM	close	o/c	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	31BRA
10BQ027	55	NSS LLLS	water	0.25	no	no	KUB10AA002	outside	C	globe/MOV	PS	RM	close	o/c	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BNB03
51BQ449	56	SASS	air	0.375	no	no	KUL51AA002	outside	C	ball/MOV	PS	RM	close	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	31BNB03
51BQ449	56	SASS	air	0.375	no	no	KUL51AA003	outside	C	ball/MOV	PS	RM	close	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BNB03
52BQ450	56	SASS	air	0.375	no	no	KUL52AA002	outside	C	ball/MOV	PS	RM	close	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	31BNB03
52BQ450	56	SASS	air	0.375	no	no	KUL52AA003	outside	C	ball/MOV	PS	RM	close	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BNB03
60BQ109	57	FW to SG1	water	20.0	no	no	LAB60AA002	outside	no	gate/MOV	RM	RM	open	o/c	close	as-is	no	≤ 0.5 sec	≤ 59.5 sec	31BNB02
60BQ109	57	FW to SG1	water	20.0	no	no	LAB60AA003	inside	no	lift check	self	self	open	o/c	close	n/a	n/a	n/a	n/a	n/a
70BQ207	57	FW to SG2	water	20.0	no	no	LAB70AA002	outside	no	gate/MOV	RM	RM	open	o/c	close	as-is	no	≤ 0.5 sec	≤ 59.5 sec	32BNB02
70BQ207	57	FW to SG2	water	20.0	no	no	LAB70AA003	inside	no	lift check	self	self	open	o/c	close	n/a	n/a	n/a	n/a	n/a
80BQ306	57	FW to SG3	water	20.0	no	no	LAB80AA002	outside	no	gate/MOV	RM	RM	open	o/c	close	as-is	no	≤ 0.5 sec	≤ 59.5 sec	33BNB02

Table 6.2.4-1—Containment Penetration, Isolation Valve, and Actuator Data  
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Penetration No.	GDC Req.	System Name	Fluid	Line Size (in)	Essent System	Potent Bypass Path	Valve Number	Valve Location	LLRT	Valve Type and Operator	Primary Actuation	Secondary Actuation	Normal Position	Shut-down Position	Post Accident Position	Power Failure Position	Cont. Isolation Signal	Valve Closure Time		Power Source
																		T3	T4	
40BQ410	57	MS from SG 4	steam	27.5	no	no	LBA40AA002	outside	no	gate/HOV	RM	RM	open	close	o/c	close	no	n/a	n/a	n/a
40BQ410	57	MS to MSRV	steam	14.0	no	no	LBA43AA001	outside	no	globe/PORV	self	self	close	close	o/c	close	no	n/a	n/a	n/a
40BQ410	57	MS to MSRCV	steam	14.0	no	no	LBA43AA101	outside	no	globe- <del>gate</del> /MOV	RM	RM	close	close	o/c	as-is	no	n/a	n/a	34BRA
40BQ410	57	MS to MSSV	steam	8.0	no	no	LBA41AA191	outside	no	safety	Self	self	close	close	o/c	n/a	n/a	n/a	n/a	n/a
40BQ410	57	MS to MSSV	steam	8.0	no	no	LBA42AA191	outside	no	safety	Self	self	close	close	o/c	n/a	n/a	n/a	n/a	32BNB02
40BQ410	57	MS Warm Up Line	steam	6.0	no	no	LBA44AA001	outside	no	globe/MOV	RM	RM	close	close	close	as-is	n/a	≤ 0.5 sec	≤ 29.5 sec	34BNB02
40BQ410	57	MS Drain Line	steam	2.0	no	no	LBA40AA441	outside	no	globe/MOV	RM	RM	close	close	close	as-is	n/a	≤ 0.5 sec	≤ 14.5 sec	34BNB02
10BQ304	57	MC to BD Clrs	water	6.0	no	no	LCA90AA004	inside	C	swing check	self	self	open	close	close	n/a	n/a	n/a	n/a	n/a
10BQ304	57	MC to BD Clrs	water	6.0	no	no	LCA90AA003	outside	C	gate/MOV	PS	RM	open	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 29.5 sec	32BNB03
10BQ305	57	MC from BD Clrs	water	6.0	no	no	LCA90AA005	inside	C	gate/MOV	PS <sup>1</sup>	RM	open	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 29.5 sec	33BRA
10BQ305	57	MC from BD Clrs	water	6.0	no	no	LCA90AA006	outside	C	gate/MOV	PS	RM	open	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 29.5 sec	32BNB03
60BQ019	57	SG BD Clrs	water	6.0	no	no	LCO51AA002	inside	C	gate/MOV	PS <sup>2</sup>	RM	open	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 29.5 sec	31BRA
60BQ019	57	SG BD Clrs	water	6.0	no	no	LCO51AA003	outside	C	gate/MOV	PS	RM	open	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 29.5 sec	34BNB03
60BQ205	57	SG BD Clrs	water	12.0	no	no	LCO52AA001	inside	C	gate/MOV	PS	RM	open	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 59.5 sec	33BRA
60BQ205	57	SG BD Clrs	water	12.0	no	no	LCO52AA002	outside	C	gate/MOV	PS	RM	open	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 59.5 sec	32BNB03
60BQ041	57	NGDS	gas	1.0	no	no	QJB40AA002	inside	C	globe/MOV	PS <sup>2</sup>	RM	open	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BRA

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Table 6.2.4-1—Containment Penetration, Isolation Valve, and Actuator Data  
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Penetration No.	GDC Req.	System Name	Fluid	Line Size (in)	Essent System	Potent Bypass Path	Valve Number	Valve Location	LLRT	Valve Type and Operator	Primary Actuation	Secondary Actuation	Normal Position	Shut-down Position	Post Accident Position	Power Failure Position	Cont. Isolation Signal	Valve Closure Time			Power Source
																		T3	T4	T5	
60BQ041	57	NGDS	gas	1.0	no	no	QJB40AA001	outside	C	globe/MOV	PS	RM	open	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	31BNB03	
60BQ066	57	NGDS	gas	1.0	no	no	QJB40AA003	outside	C	globe/MOV	PS	RM	open	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	31BNB03	
60BQ066	57	NGDS	gas	1.0	no	no	QJB40AA004	inside	C	globe/MOV	PS <sup>2</sup>	RM	open	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BRA	
41BQ035	57	OCWS Supply to CBVS	water	8.0	no	no	QN/41AA003	inside	C	lift check	self	self	open	open	close	n/a	n/a	n/a	n/a	n/a	
41BQ035	57	OP-CWS Supply to CBVS	water	8.0	no	no	QN/41AA002	outside	C	globe/MOV	PS	RM	open	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 39.5 sec	34BNB03	
41BQ036	57	OP-CWS Return CBVS	water	8.0	no	no	QN/41AA027	inside	C	globe/MOV	PS <sup>1</sup>	RM	open	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 39.5 sec	31BRA	
41BQ036	57	OP-CWS Return CBVS	water	8.0	no	no	QN/41AA028	outside	C	globe/MOV	PS	RM	open	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 39.5 sec	34BNB03	
11BQ023	57	NSS for SG BD	water	0.375	no	no	QUC11AA011	inside	C	globe/MOV	PS <sup>2</sup>	RM	open	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BRA	
11BQ023	57	NSS for SG BD	water	0.375	no	no	QUC11AA001	outside	C	globe/MOV	PS	RM	open	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	31BNB03	
12BQ024	57	NSS for SG BD	water	0.375	no	no	QUC12AA011	inside	C	globe/MOV	PS <sup>2</sup>	RM	open	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BRA	
12BQ024	57	NSS for SG BD	water	0.375	no	no	QUC12AA001	outside	C	globe/MOV	PS	RM	open	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	31BNB03	
13BQ025	57	NSS for SG BD	water	0.375	no	no	QUC13AA011	inside	C	globe/MOV	PS <sup>2</sup>	RM	open	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	31BRA	
13BQ025	57	NSS for SG BD	water	0.375	no	no	QUC13AA001	outside	C	globe/MOV	PS	RM	open	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BNB03	
14BQ026	57	NSS for SG BD	water	0.375	no	no	QUC14AA011	inside	C	globe/MOV	PS <sup>2</sup>	RM	open	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	31BRA	
14BQ026	57	NSS for SG BD	water	0.375	no	no	QUC14AA001	outside	C	globe/MOV	PS	RM	open	close	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BNB03	

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Table 6.2.4-1—Containment Penetration, Isolation Valve, and Actuator Data  
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Penetration No.	GDC Req.	System Name	Fluid	Line Size (in)	Essent System	Potent Bypass Path	Valve Number	Valve Location	LLRT	Valve Type and Operator	Primary Act-uation	Second-ary Act-uation	Normal Position	Shut-down Position	Post Accident Position	Power Failure Position	Cont. Isolation Signal	Valve Closure Time		Power Source
																		T3	T4	
10BQ030	56/57	CADS to IA	air	2.0	no	no	SCB01AA002	inside	C	globe/MOV	PS <sup>2</sup>	RM	open	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	31BRA
10BQ030	56/57	CADS to IA	air	2.0	no	no	SCB01AA001	outside	C	globe/MOV	PS	RM	open	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 14.5 sec	34BNB03
01BQ031	56/57	CADS to SA	air	2.0	no	no	SCB02AA002	inside	C	globe/manual	n/a	n/a	close	open	close	n/a	admin close	n/a	n/a	n/a
01BQ031	56/57	CADS to SA	air	2.0	no	no	SCB02AA001	outside	C	globe/manual	n/a	n/a	close	open	close	n/a	admin close	n/a	n/a	n/a
30BQ033	56/57	FWDS- <del>inside-NI</del>	water	8.0	no	no	SGB30AA032	inside	C	gate/MOV	PS <sup>1</sup>	RM	close	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 39.5 sec	31BRA
30BQ033	56/57	FWDS- <del>inside-NI</del>	water	8.0	no	no	SGB30AA031	outside	C	gate/MOV	PS	RM	close	open	close	as-is	Stage 1	≤ 0.5 sec	≤ 39.5 sec	34BNB03
60BQ064	n/a	Mech. Spare (Dedicated Penetration)	air	36.0	n/a	n/a	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
32	n/a	Mech. Spare	air	n/a	n/a	n/a	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
40	n/a	Mech. Spare	air	n/a	n/a	n/a	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
67	n/a	Electr. Spare	air	n/a	n/a	n/a	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
68	n/a	Electr. Spare	air	n/a	n/a	n/a	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
69	n/a	Electr. Spare	air	n/a	n/a	n/a	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
75	n/a	Electr. Spare	air	n/a	n/a	n/a	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
76	n/a	Mech. Spare	air	n/a	n/a	n/a	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
77	n/a	Mech. Spare	air	n/a	n/a	n/a	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Table 6.2.4-1—Containment Penetration, Isolation Valve, and Actuator Data  
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Penetration No.	GDC Req.	System Name	Fluid	Line Size (in)	Essent System	Potent Bypass Path	Valve Number	Valve Location	LLRT	Valve Type and Operator	Primary Actuation	Secondary Actuation	Normal Position	Shut-down Position	Post Accident Position	Power Failure Position	Cont. Isolation Signal	Valve Closure Time		Power Source
																		T3	T4	
40GE446	53	Low voltage	air	n/a	n/a	n/a	n/a	n/a	B	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
40GE447	53	Low voltage	air	n/a	n/a	n/a	n/a	n/a	B	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
40GP448	53	Low voltage	air	n/a	n/a	n/a	n/a	n/a	B	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
454	n/a	Mech. Spare	air	n/a	n/a	n/a	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
455	n/a	Mech. Spare	air	n/a	n/a	n/a	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

**Notes:**

1. Group 1 CIV (see Section 7.3.1.2.9).
2. Group 2 CIV (see Section 7.3.1.2.9).
3. Group 3 CIV (see Section 7.3.1.2.9).

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The sense and command outputs for MFW isolation can be reset manually from the SICS in the MCR. Reset of the sense and command output does not result in opening of the associated valves; it allows the operator to take further manual actions to open the valves.

The functional logic for MFW isolation is shown in Figure 7.3-16—MFWS Isolation - Full Load, Figure 7.3-17—MFWS Isolation - SSS, Figure 7.3-18—MFW Actuators (Div. 1&2), and Figure 7.3-19—MFW Actuators (Div. 3&4).

#### 7.3.1.2.9 Containment Isolation

During a LOCA, radioactive coolant is released into the containment. Therefore, the containment has to be isolated to prevent activity release to the environment. The U.S. EPR provides containment isolation in two stages to isolate nonessential components based on the size of the break. Containment pressure measurements and high-range activity monitors are used to initiate containment isolation and to determine which stage is actuated. Additionally, containment isolation is actuated anytime a safety injection actuation signal is generated.

The containment isolation actuators and their functionality are described in Section 6.2.4.

The U.S. EPR design uses the following initiating conditions to isolate the containment:

- Containment equipment compartment pressure > Max1p (Stage 1).
- Containment service compartment pressure (NR) > Max2p (Stage 1).
- Containment activity > Max1p (Stage 1).
- SIS actuation signal (Stage 1).
- Containment service compartment pressure (WR) > Max3p (Stages 1 and 2).

Stage 1 isolation is provided for a small break loss of coolant accident (SBLOCA) to isolate containment penetrations that have no active function for LOCA mitigation and to start ventilation of containment annulus. A Stage 1 containment isolation order is generated when two-out-of-four PS divisions detect high containment pressure. Either two-out-of-four equipment compartment pressure measurements exceeding the Max1p setpoint, two-out-of-four service compartment pressure (NR) measurements exceeding the Max2p setpoint, or two-out-of-four containment service compartment pressure (WR) measurements exceeding the Max3p setpoint results in Stage 1 isolation. If two-out-of-four high range containment activity sensors indicate radioactivity in containment, a Stage 1 isolation order is also generated. A safety injection actuation signal also results in a Stage 1 containment isolation actuation.

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limit the peak load on the EUPS batteries and inverters, a staggered closure sequence is provided by the PS for containment isolation valves (CIVs) that receive a Stage 1 containment isolation signal and are located in the reactor containment building and powered by the EUPS. The staggering of the Stage 1 containment isolation signal is implemented through time delays in the PS. The inside CIVs that are staggered are arranged in three groups and each group is associated with a different time delay. There is no time delay associated with an initial group of CIVs. The different grouping of CIVs is described in Section 6.2.4.2.5.

Stage 2 containment isolation order is generated when two-out-of-four service compartment pressure (WR) measurements exceed Max3p setpoint. A LOCA of sufficient size to raise containment pressure to Max3p setpoint does not require RCPs for mitigation. In fact, on a Stage 2 containment isolation signal, RCPs are tripped to limit energy input to containment, and containment penetrations for processes that support RCP operation are isolated.

There are no operating bypasses associated with containment isolation. This function is available during all plant conditions.

Capability for manual system-level initiation of containment isolation on a per-stage basis is provided on the SICS in the MCR. Four manual system-level isolation controls are provided for each stage. Any two of the four controls actuate the appropriate stage of containment isolation.

The capability for component-level control of the containment isolation actuators is available to the operator on both the PICS and the SICS in the MCR.

Sense and command outputs for containment isolation can be reset manually from SICS in the MCR. Reset of sense and command outputs does not result in change of state of containment isolation actuators; it allows the operator to take further manual actions to change state of individual actuators.

Functional logic for actuation of containment isolation is shown in Figure 7.3-20—Containment Isolation.

#### **7.3.1.2.10 Chemical and Volume Control System (CVCS) Charging Isolation**

A malfunction of the chemical and volume control system (CVCS) could result in overfilling the pressurizer and opening of the pressurizer safety relief valves (PSRV). Isolation of the CVCS is therefore required when the pressurizer water level increases inadvertently.

The isolation is performed by redundant isolation valves. The following initiating condition is used to perform the CVCS charging isolation:



**Note:** The Stage 1 Containment Isolation time delays for valves located inside containment are described in Table 6.2.4-1

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