

## ArevaEPRDCPEm Resource

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**From:** WELLS Russell (AREVA) [Russell.Wells@areva.com]  
**Sent:** Wednesday, March 30, 2011 12:47 PM  
**To:** Tesfaye, Getachew  
**Cc:** CORNELL Veronica (EXTERNAL AREVA); BENNETT Kathy (AREVA); DELANO Karen (AREVA); ROMINE Judy (AREVA); RYAN Tom (AREVA)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 384, FSAR Ch. 3, Supplement 13  
**Attachments:** RAI 384 Supplement 13 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for responses to 9 of the 9 questions of RAI No. 384 on June 22, 2010. AREVA NP submitted Supplement 1 on July 29, 2010, to provide a FINAL response to 1 of the remaining 9 questions. AREVA NP submitted Supplement 2 on July 29, 2010, to provide an INTERIM response to Question 03.04.02-13. AREVA NP submitted Supplement 3 on August 12, 2010, to provide a FINAL response to Question 03.04.02-14. AREVA NP submitted Supplement 4 on August 30, 2010, to provide a FINAL response to 4 of the 7 remaining questions (i.e., Questions 03.08.04-11 through 03.08.04-14). AREVA NP submitted Supplement 5 on September 7, 2010 to provide a FINAL response to 1 of the 3 remaining questions (i.e., Question 03.10-31). AREVA NP submitted Supplement 6 on November 10, 2010 to revise the schedule for Question 03.09.02-68 to allow additional time to interact with the NRC. AREVA NP submitted Supplement 7 on December 7, 2010 to revise the schedule for Question 03.09.02-68 to allow additional time to interact with the NRC. AREVA NP submitted Supplement 8 on January 12, 2011 to revise the schedule for Question 03.04.02-13 to allow additional time to interact with the NRC. AREVA NP submitted Supplement 9 on January 20, 2011, to revise the schedule for Question 03.09.02-68. AREVA NP submitted Supplement 10 on February 11, 2011, to revise the schedule for Question 03.04.02-13. On March 1, 2011, AREVA NP submitted Supplement 11 to provide a revised schedule for Question 03.09.02-68. On March 22, 2011, AREVA NP submitted Supplement 12 to provide a final response to Question 03.09.02-68.

The attached file, "RAI 384 Supplement 13 Response US EPR DC.pdf" provides a technically correct and complete FINAL response to the Question 03.04.02-13, as committed.

The following table indicates the page in the response document, "RAI 384 Supplement 13 Response US EPR DC.pdf" that contains AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 384 – 03.04.02-13	2	2

This concludes the formal AREVA NP response to RAI 384, and there are no questions from this RAI for which AREVA NP has not provided responses.

*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*

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**From:** WELLS Russell (RS/NB)  
**Sent:** Tuesday, March 22, 2011 2:59 PM  
**To:** 'Tesfaye, Getachew'  
**Cc:** HAMMOND Philip (RS/PT); CORNELL Veronica (External RS/NB); BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 384, FSAR Ch. 3, Supplement 12

Getachew,

AREVA NP Inc. letter NRC 11:025 dated March 22, 2011 provides a technically correct and complete response to 1 of the 2 remaining questions (i.e., Question 03.09.02-68) for RAI 384. AREVA NP considers some of the material contained in the response to be proprietary information. As required by 10 CFR 2.390(b), an affidavit is provided to support the withholding of the proprietary information from public disclosure. Proprietary and non-proprietary versions of the enclosure to this letter are provided separately.

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

Question #	Start Page	End Page
RAI 384 — 03.09.02-68	2	29

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

Question #	Response Date
RAI 384 — 03.04.02-13	April 8, 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 01, 2011 9:15 AM  
**To:** 'Tesfaye, Getachew'  
**Cc:** CORNELL Veronica (External RS/NB); BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); HAMMOND Philip (RS/PT)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 384, FSAR Ch. 3, Supplement 11

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for responses to 9 of the 9 questions of RAI No. 384 on June 22, 2010. AREVA NP submitted Supplement 1 on July 29, 2010, to provide a FINAL response to 1 of the remaining 9 questions. AREVA NP submitted Supplement 2 on July 29, 2010, to provide an INTERIM response to Question 03.04.02-13. AREVA NP submitted Supplement 3 on August 12, 2010, to provide a FINAL response to Question 03.04.02-14. AREVA NP submitted Supplement 4 on August 30, 2010, to provide a FINAL response to 4 of the 7 remaining questions (i.e., Questions 03.08.04-11 through 03.08.04-14). AREVA NP submitted Supplement 5 on September 7, 2010 to provide a FINAL response to 1 of the 3 remaining questions (i.e., Question 03.10-31). AREVA NP submitted Supplement 6 on November 10, 2010 to revise the schedule for Question 03.09.02-68 to allow additional time to interact with the NRC. AREVA NP submitted Supplement 7 on December 7, 2010 to revise the schedule for Question 03.09.02-68 to allow additional time to interact with the NRC. AREVA NP submitted Supplement 8 on January 12, 2011 to revise the schedule for Question 03.04.02-13 to allow additional time to interact with the NRC. AREVA NP submitted Supplement 9 on January 20, 2011, to revise the schedule for Question 03.09.02-68. AREVA NP submitted Supplement 10 on February 11, 2011, to revise the schedule for Question 03.04.02-13.

The schedule for a technically correct and complete response to Question 03.09.02-68 is revised to allow additional time for AREVA NP to interact with the NRC. The schedule for the remaining question is unchanged.

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

Question #	Interim Response Date	Response Date
RAI 384 — 03.04.02-13	July 29, 2010 (Actual)	April 8, 2011
RAI 384 — 03.09.02-68	N/A	<b>April 13, 2011</b>

*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 11, 2011 2:55 PM

**To:** 'Tesfaye, Getachew'

**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); CORNELL Veronica (External RS/NB)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 384, FSAR Ch. 3, Supplement 10

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for responses to 9 of the 9 questions of RAI No. 384 on June 22, 2010. AREVA NP submitted Supplement 1 on July 29, 2010, to provide a FINAL response to 1 of the remaining 9 questions. AREVA NP submitted Supplement 2 on July 29, 2010, to provide an INTERIM response to Question 03.04.02-13. AREVA NP submitted Supplement 3 on August 12, 2010, to provide a FINAL response to Question 03.04.02-14. AREVA NP submitted Supplement 4 on August 30, 2010, to provide

a FINAL response to 4 of the 7 remaining questions (i.e., Questions 03.08.04-11 through 03.08.04-14). AREVA NP submitted Supplement 5 on September 7, 2010 to provide a FINAL response to 1 of the 3 remaining questions (i.e., Question 03.10-31). AREVA NP submitted Supplement 6 on November 10, 2010 to revise the schedule for Question 03.09.02-68 to allow additional time to interact with the NRC. AREVA NP submitted Supplement 7 on December 7, 2010 to revise the schedule for Question 03.09.02-68 to allow additional time to interact with the NRC. AREVA NP submitted Supplement 8 on January 12, 2011 to revise the schedule for Question 03.04.02-13 to allow additional time to interact with the NRC. AREVA NP submitted Supplement 9 on January 20, 2011, to revise the schedule for Question 03.09.02-68

The schedule for Question 03.04.02-13 has changed. The schedule for the remaining question is unchanged.

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

Question #	Interim Response Date	Response Date
RAI 384 — 03.04.02-13	July 29, 2010 (Actual)	April 8, 2011
RAI 384 — 03.09.02-68	N/A	March 9, 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 20, 2011 10:56 AM  
**To:** 'Tefsaye, Getachew'  
**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); HAMMOND Philip (RS/PT)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 384, FSAR Ch. 3, Supplement 9

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for responses to 9 of the 9 questions of RAI No. 384 on June 22, 2010. AREVA NP submitted Supplement 1 on July 29, 2010, to provide a FINAL response to 1 of the remaining 9 questions. AREVA NP submitted Supplement 2 on July 29, 2010, to provide an INTERIM response to Question 03.04.02-13. AREVA NP submitted Supplement 3 on August 12, 2010, to provide a FINAL response to Question 03.04.02-14. AREVA NP submitted Supplement 4 on August 30, 2010, to provide a FINAL response to 4 of the 7 remaining questions (i.e., Questions 03.08.04-11 through 03.08.04-14). AREVA NP submitted Supplement 5 on September 7, 2010 to provide a FINAL response to 1 of the 3 remaining questions (i.e., Question 03.10-31). AREVA NP submitted Supplement 6 on November 10, 2010 to revise the schedule for Question 03.09.02-68 to allow additional time to interact with the NRC. AREVA NP submitted Supplement 7 on December 7, 2010 to revise the schedule for Question 03.09.02-68 to allow additional time to interact with the NRC. AREVA NP submitted Supplement 8 on January 12, 2011 to revise the schedule for Question 03.04.02-13 to allow additional time to interact with the NRC. The schedule for Question 03.09.02-68 is being revised to allow additional time for AREVA NP to address NRC comments.

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

Question #	Interim Response Date	Response Date
RAI 384 — 03.04.02-13	July 29, 2010 (Actual)	February 24, 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)

**From:** BRYAN Martin (External RS/NB)  
**Sent:** Wednesday, January 12, 2011 6:16 PM  
**To:** 'Tsfaye, Getachew'  
**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); CORNELL Veronica (External RS/NB)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 384, FSAR Ch. 3, Supplement 8

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for responses to 9 of the 9 questions of RAI No. 384 on June 22, 2010. AREVA NP submitted Supplement 1 on July 29, 2010, to provide a FINAL response to 1 of the remaining 9 questions. AREVA NP submitted Supplement 2 on July 29, 2010, to provide an INTERIM response to Question 03.04.02-13. AREVA NP submitted Supplement 3 on August 12, 2010, to provide a FINAL response to Question 03.04.02-14. AREVA NP submitted Supplement 4 on August 30, 2010, to provide a FINAL response to 4 of the 7 remaining questions (i.e., Questions 03.08.04-11 through 03.08.04-14). AREVA NP submitted Supplement 5 on September 7, 2010 to provide a FINAL response to 1 of the 3 remaining questions (i.e., Question 03.10-31). AREVA NP submitted Supplement 6 and Supplement 7 on November 10, 2010 and December 7, 2010, respectively to revise the schedule for Question 03.09.02-68 to allow additional time to interact with the NRC.

The schedule for Question 03.04.02-13 is being revised to allow additional time for AREVA NP to interact with the NRC.

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

Question #	Interim Response Date	Response Date
RAI 384 — 03.04.02-13	July 29, 2010 (Actual)	February 24, 2011
RAI 384 — 03.09.02-68	N/A	January 26, 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)

**From:** BRYAN Martin (External RS/NB)  
**Sent:** Tuesday, December 07, 2010 1:50 PM  
**To:** 'Tesfaye, Getachew'  
**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); HAMMOND Philip (RS/PT)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 384, FSAR Ch. 3, Supplement 7

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for responses to 9 of the 9 questions of RAI No. 384 on June 22, 2010. AREVA NP submitted Supplement 1 on July 29, 2010, to provide a FINAL response to 1 of the remaining 9 questions. AREVA NP submitted Supplement 2 on July 29, 2010, to provide an INTERIM response to Question 03.04.02-13. AREVA NP submitted Supplement 3 on August 12, 2010, to provide a FINAL response to Question 03.04.02-14. AREVA NP submitted Supplement 4 on August 30, 2010, to provide a FINAL response to 4 of the 7 remaining questions (i.e., Questions 03.08.04-11 through 03.08.04-14). AREVA NP submitted Supplement 5 on September 7, 2010 to provide a FINAL response to 1 of the 3 remaining questions (i.e., Question 03.10-31). AREVA NP submitted Supplement 6 on November 10, 2010 to revise the schedule for Question 03.09.02-68 to allow additional time to interact with the NRC. The schedule for Question 03.09.02-68 is being revised again to allow additional time for AREVA NP to interact with the NRC.

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

Question #	Interim Response Date	Response Date
RAI 384 — 03.04.02-13	July 29, 2010 (Actual)	January 17, 2011
RAI 384 — 03.09.02-68	N/A	January 26, 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:** Wednesday, November 10, 2010 10:08 AM  
**To:** 'Tesfaye, Getachew'  
**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); HAMMOND Philip (RS/PT)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 384, FSAR Ch. 3, Supplement 6

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for responses to 9 of the 9 questions of RAI No. 384 on June 22, 2010. AREVA NP submitted Supplement 1 on July 29, 2010, to provide a FINAL response to 1 of the remaining 9 questions. AREVA NP submitted Supplement 2 on July 29, 2010, to provide an INTERIM response to Question 03.04.02-13. AREVA NP submitted Supplement 3 on August 12, 2010, to provide a FINAL response to Question 03.04.02-14. AREVA NP submitted Supplement 4 on August 30, 2010, to provide a FINAL response to 4 of the 7 remaining questions (i.e., Questions 03.08.04-11 through 03.08.04-14). AREVA NP submitted Supplement 5 on September 7, 2010 to provide a FINAL response to 1 of the 3

remaining questions (i.e., Question 03.10-31). The schedule for Question 03.09.02-68 is being revised to allow additional time for AREVA NP to interact with the NRC.

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

Question #	Interim Response Date	Response Date
RAI 384 — 03.04.02-13	July 29, 2010 (Actual)	January 17, 2011
RAI 384 — 03.09.02-68	N/A	December 15, 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)

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**From:** BRYAN Martin (External RS/NB)  
**Sent:** Tuesday, September 07, 2010 5:57 PM  
**To:** Tesfaye, Getachew  
**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); WELLS Russell (RS/NB); Miernicki, Michael  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 384, FSAR Ch. 3, Supplement 5

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for responses to 9 of the 9 questions of RAI No. 384 on June 22, 2010. AREVA NP submitted Supplement 1 on July 29, 2010, to provide a FINAL response to 1 of the remaining 9 questions. AREVA NP submitted Supplement 2 on July 29, 2010, to provide an INTERIM response to Question 03.04.02-13. AREVA NP submitted Supplement 3 on August 12, 2010, to provide a FINAL response to Question 03.04.02-14. AREVA NP submitted Supplement 4 on August 30, 2010, to provide a FINAL response to 4 of the 7 remaining questions (i.e., Questions 03.08.04-11 through 03.08.04-14).

The attached file, "RAI 384 Supplement 5 Response US EPR DC.pdf" provides a technically correct and complete FINAL response to 1 of the 3 remaining questions (i.e., Question 03.10-31), as committed.

The following table indicates the respective pages in the response document, RAI 384 Supplement 5 Response US EPR DC.pdf," that contains AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 384 — 03.10-31	2	3

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

Question #	Interim Response Date	Response Date
RAI 384 — 03.04.02-13	July 29, 2010 (Actual)	January 17, 2011
RAI 384 — 03.09.02-68	N/A	November 15, 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)

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**From:** BRYAN Martin (External RS/NB)  
**Sent:** Monday, August 30, 2010 3:41 PM  
**To:** 'Tesfaye, Getachew'  
**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); CORNELL Veronica (External RS/NB)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 384, FSAR Ch. 3, Supplement 4

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for responses to 9 of the 9 questions of RAI No. 384 on June 22, 2010. AREVA NP submitted Supplement 1 on July 29, 2010, to provide a FINAL response to 1 of the remaining 9 questions. AREVA NP submitted Supplement 2 on July 29, 2010, to provide an INTERIM response to Question 03.04.02-13. AREVA NP submitted Supplement 3 on August 12, 2010, to provide a FINAL response to Question 03.04.02-14.

The attached file, "RAI 384 Supplement 4 Response US EPR DC.pdf" provides technically correct and complete FINAL responses to Questions 03.08.04-11 to 03.08.04-14, as committed.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 384 Supplement 4.

The schedule for Question 03.09.02-68 is being revised to allow additional time for AREVA NP to address NRC comments. The schedule for the remaining 2 questions is unchanged.

The following table indicates the respective pages in the response document, RAI 384 Supplement 4 Response US EPR DC.pdf," that contains AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 384 — 03.08.04-11	2	5
RAI 384 — 03.08.04-12	6	11
RAI 384 — 03.08.04-13	12	12
RAI 384 — 03.08.04-14	13	14

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

Question #	Interim Response Date	Response Date
RAI 384 — 03.04.02-13	July 29, 2010 (Actual)	January 17, 2011
RAI 384 — 03.09.02-68	N/A	November 15, 2010
RAI 384 — 03.10-31	N/A	September 7, 2010

Sincerely,

Martin (Marty) C. Bryan  
U.S. EPR Design Certification Licensing Manager  
AREVA NP Inc.  
Tel: (434) 832-3016

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**From:** BRYAN Martin (EXT)  
**Sent:** Thursday, August 12, 2010 6:44 PM  
**To:** 'Tefaye, Getachew'  
**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); CORNELL Veronica (EXT)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 384, FSAR Ch. 3, Supplement 3

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for responses to 9 of the 9 questions of RAI No. 384 on June 22, 2010. AREVA NP submitted Supplement 1 to the response on July 29, 2010, to provide a FINAL response to 1 of the remaining 9 questions. AREVA NP submitted Supplement 2 to the response on July 29, 2010, to provide an INTERIM response to Question 03.04.02-13.

The attached file, "RAI 384 Supplement 3 Response US EPR DC.pdf" provides a technically correct and complete FINAL response to 1 of the remaining 9 questions, as committed.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 384 Question 03.04.02-14.

The following table indicates the respective pages in the response document, RAI 384 Supplement 3 Question 03.04.02-14 Response US EPR DC.pdf," that contains AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 384 — 03.04.02-14	2	3

The schedule for technically correct and complete responses to the remaining 7 questions is unchanged and provided below:

Question #	Interim Response Date	Response Date
RAI 384 — 03.04.02-13	July 29, 2010 (Actual)	January 17, 2011
RAI 384 — 03.08.04-11	N/A	August 30, 2010
RAI 384 — 03.08.04-12	N/A	August 30, 2010
RAI 384 — 03.08.04-13	N/A	August 30, 2010
RAI 384 — 03.08.04-14	N/A	August 30, 2010
RAI 384 — 03.09.02-68	N/A	August 30, 2010
RAI 384 — 03.10-31	N/A	September 7, 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:** Thursday, July 29, 2010 8:49 PM

**To:** 'Tesfaye, Getachew'

**Cc:** DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); VAN NOY Mark (EXT); CORNELL Veronica (EXT)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 384, FSAR Ch. 3, Supplement 2 - Interim

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for responses to 9 of the 9 questions of RAI No. 384 on June 22, 2010. A correction to the table was made on July 7, 2010. AREVA NP submitted Supplement 1 to the response on July 29, 2010, to provide a final response to 1 of the remaining 8 questions. The attached file, "RAI 384 Supplement 2 Question 03.04.02-13 INTERIM Response US EPR DC.pdf" provides a technically correct and complete INTERIM response to 1 of the remaining 8 questions, as committed.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 384 Question 03.04.02-13.

The following table indicates the respective pages in the response document, RAI 384 Supplement 2 Question 03.04.02-13 INTERIM Response US EPR DC.pdf," that contains AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 384 — 03.04.02-13	2	2

The schedule for technically correct and complete responses to the remaining 9 questions is unchanged and provided below:

Question #	Interim Response Date	Response Date
RAI 384 — 03.04.02-13	July 29, 2010 (Actual)	January 17, 2011
RAI 384 — 03.04.02-14	N/A	August 12, 2010
RAI 384 — 03.08.04-11	N/A	August 30, 2010
RAI 384 — 03.08.04-12	N/A	August 30, 2010
RAI 384 — 03.08.04-13	N/A	August 30, 2010
RAI 384 — 03.08.04-14	N/A	August 30, 2010
RAI 384 — 03.09.02-68	N/A	August 30, 2010
RAI 384 — 03.10-31	N/A	September 7, 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)

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**From:** BRYAN Martin (EXT)

**Sent:** Thursday, July 29, 2010 6:21 PM

**To:** 'Tesfaye, Getachew'

**Cc:** DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); CORNELL Veronica (EXT); VAN NOY Mark (EXT)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 384, FSAR Ch. 3, Supplement 1

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for responses to 9 of the 9 questions of RAI No. 384 on June 22, 2010. An editorial correction to the table was provided on July 7, 2010.

The attached file, "RAI 384 Supplement 1 Response U.S. EPR DC.pdf" provides technically correct and complete response to Question 03.03.02-05.

The following table indicates the respective pages in the response document, "RAI 384 Supplement 1 Response U.S. EPR DC - .pdf," that contain AREVA NP's final response to the subject question.

Question #	Start Page	End Page
RAI 384 — 03.03-02-05	2	3

The schedule for technically correct and complete INTERIM (1) and FINAL (8) responses to the remaining questions is unchanged and provided below:

Question #	Interim Response Date	Response Date
RAI 384 — 03.04.02-13	July 29, 2010	January 17, 2011
RAI 384 — 03.04.02-14	N/A	August 12, 2010
RAI 384 — 03.08.04-11	N/A	August 30, 2010
RAI 384 — 03.08.04-12	N/A	August 30, 2010
RAI 384 — 03.08.04-13	N/A	August 30, 2010
RAI 384 — 03.08.04-14	N/A	August 30, 2010
RAI 384 — 03.09.02-68	N/A	August 30, 2010
RAI 384 — 03.10-31	N/A	September 7, 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)

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**From:** BRYAN Martin (EXT)

**Sent:** Wednesday, July 07, 2010 1:46 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); CORNELL Veronica (EXT); VAN NOY Mark (EXT)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 384, FSAR Ch. 3

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 384 Response US EPR DC.pdf" provides a schedule since a technically correct and complete response to the 9 questions is not provided.

The following table indicates the respective pages in the response document, "RAI 384 Response US EPR DC.pdf" that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 384 — 03.03.02-05	2	2
RAI 384 — 03.04.02-13	3	3
RAI 384 — 03.04.02-14	4	4
RAI 384 — 03.08.04-11	5	5
RAI 384 — 03.08.04-12	6	7
RAI 384 — 03.08.04-13	8	8
RAI 384 — 03.08.04-14	9	9
RAI 384 — 03.09.02-68	10	10
RAI 384 — 03.10-31	11	11

A complete answer is not provided for 9 of the 9 questions. The schedule for a technically correct and complete response to these questions is provided below.

Question #	Interim Response Date	Response Date
RAI 384 — 03.03.02-05	N/A	July 29, 2010
RAI 384 — 03.04.02-13	July 29, 2010	January 17, 2011
RAI 384 — 03.04.02-14	N/A	August 12, 2010
RAI 384 — 03.08.04-11	N/A	August 30, 2010
RAI 384 — 03.08.04-12	N/A	August 30, 2010
RAI 384 — 03.08.04-13	N/A	August 30, 2010
RAI 384 — 03.08.04-14	N/A	August 30, 2010
RAI 384 — 03.09.02-68	N/A	August 30, 2010
RAI 384 — 03.10-31	N/A	September 7, 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)

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

**Sent:** Thursday, May 20, 2010 11:38 AM

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

**Cc:** Jeng, David; Kazi, Abdul; Hawkins, Kimberly; Wong, Yuken; Chen, Pei-Ying; Dixon-Herrity, Jennifer; Miernicki, Michael; Patel, Jay; Carneal, Jason; Colaccino, Joseph; ArevaEPRDCPEm Resource

**Subject:** U.S. EPR Design Certification Application RAI No. 384(4350,4351,4469,4498,4527), FSAR Ch. 3

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on March 23, 2010, and on May 18, 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 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:** 2774

**Mail Envelope Properties** (1F1CC1BBDC66B842A46CAC03D6B1CD4104284A78)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 384, FSAR Ch. 3, Supplement 13  
**Sent Date:** 3/30/2011 12:47:08 PM  
**Received Date:** 3/30/2011 12:47:17 PM  
**From:** WELLS Russell (AREVA)

**Created By:** Russell.Wells@areva.com

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Tracking Status: None

"Tsfaye, Getachew" <Getachew.Tsfaye@nrc.gov>

Tracking Status: None

**Post Office:** AUSLYNCMX02.adom.ad.corp

<b>Files</b>	<b>Size</b>	<b>Date &amp; Time</b>
MESSAGE	31251	3/30/2011 12:47:17 PM
RAI 384 Supplement 13 Response US EPR DC.pdf		110395

**Options**

**Priority:** Standard

**Return Notification:** No

**Reply Requested:** No

**Sensitivity:** Normal

**Expiration Date:**

**Recipients Received:**

**Response to**

**Request for Additional Information No. 384 (4350, 4351, 4469, 4498, 4527),  
Revision 0, Supplement 13**

**5/20/10**

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

**AREVA NP Inc.**

**Docket No. 52-020**

**SRP Section: 03.03.02 - Tornado Loads**

**SRP Section: 03.04.02 - Analysis Procedures**

**SRP Section: 03.08.04 - Other Seismic Category I Structures**

**SRP Section: 03.09.02 - Dynamic Testing and Analysis of Systems Structures and  
Components**

**SRP Section: 03.10 - Seismic and Dynamic Qualification of Mechanical and  
Electrical Equipment**

**Application Section: FSAR Chapter 3**

**QUESTIONS for Structural Engineering Branch 2 (ESBWR/ABWR Projects) (SEB2)**

**QUESTIONS for Engineering Mechanics Branch 2 (ESBWR/ABWR Projects)  
(EMB2)**

**Question 03.04.02-13:**

**Follow-up to RAI 162, Question 03.04.02-1**

U.S. EPR FSAR Section 2.5.4.2 identifies the coefficient of friction between concrete and dry soil as 0.7. However in response to RAI 162, Question 03.04.02-1, the applicant stated that to check the upper limit of sliding and uplift (including the effects of maximum water table and dynamic versus static coefficient of friction) the angle of internal friction is reduced to 27 degrees which corresponds to a coefficient of friction of 0.5. As this is a key parameter used in determining the stability of Seismic Category I structures, U.S. EPR FSAR Section 2.5.4.2 should be revised to include this value.

**Response to Question 03.04.02-13:**

The U.S. EPR design uses a coefficient of friction of 0.5 for Seismic Category I structures. The 0.5 coefficient of friction is applicable to all interfaces between the foundation and the soil. COL Information Item 2.0-1 requires the COL applicant that references the U.S. EPR design to compare the site characteristics with the site parameters in U.S. EPR FSAR Tier 2, Table 2.1-1.

U.S. EPR FSAR Tier 2, Table 2.1-1, Sections 2.5.4.2, 2.5.4.3 and 3.8.5.6.1 will be revised to include a coefficient of friction of 0.5.

**FSAR Impact:**

U.S. EPR FSAR Tier 2, Table 2.1-1, Sections 2.5.4.2, 2.5.4.3 and 3.8.5.6.1 will be revised as described in the response and indicated on the enclosed markup.

# U.S. EPR Final Safety Analysis Report Markups

**Table 1.8-2—U.S. EPR Combined License Information Items  
Sheet 2 of 39**

Item No.	Description	Section
1.8-2	A COL applicant that references the U. S. EPR design certification will identify the FSAR section, or provide a list, that demonstrates how the COL information items have been addressed.	1.8.1
1.8-3	A COL applicant that references the U. S. EPR design certification will provide a list of any departures from the FSAR in the COL FSAR.	1.8.2
1.9-1	A COL applicant that references the U.S. EPR design certification will review and address the conformance with Regulatory Criteria in effect six months before the docket date of the COL application for the site-specific portions and operational aspects of the facility design.	1.9
2.0-1	A COL applicant that references the U.S. EPR design certification will compare the characteristics of its proposed site to the site parameters in Table 2.1-1. If the characteristics of the site fall within the assumed site parameters in Table 2.1-1, then the U.S. EPR standard design is bounding for the site. For site-specific characteristics that are outside the bounds of the assumptions presented in Table 2.1-1, the COL applicant will demonstrate that the U.S. EPR design acceptably meets the regulatory requirements, given the <u>more limiting</u> site-specific characteristic. In such an instance, the COL applicant will also demonstrate that the design commitments and acceptance criteria described in the FSAR do not need to be changed, or will propose new design commitments or acceptance criteria, or both.	2.0
2.1-1	A COL applicant that references the U.S. EPR design certification will provide site-specific information related to site location and description, exclusion area authority and control, and population distribution.	2.1
2.2-1	A COL applicant that references the U.S. EPR design certification will provide site-specific information related to the identification of potential hazards stemming from nearby industrial, transportation, and military facilities within the site vicinity, including an evaluation of potential accidents (such as explosions, toxic chemicals, and fires).	2.2
2.2-2	A COL applicant that references the U.S. EPR design certification will provide information concerning site- specific evaluations to determine the consequences that potential accidents at nearby industrial, transportation, and military facilities could have on the site. The information provided by the COL applicant will include specific changes made to the U.S. EPR design to qualify the design of the site against potential external accidents with an unacceptable probability of severe consequences.	2.2.3

## 2.0 Site Characteristics

The U.S. EPR standard design is based on a set of conservatively established site parameters. These site parameters represent more demanding site conditions than normally expected for most U.S. nuclear power plant sites. These site-related design basis parameters are provided in Table 2.1-1—U.S. EPR Site Design Envelope.

A COL applicant that references the U.S. EPR design certification will compare the characteristics of its proposed site to the site parameters in Table 2.1-1. If the characteristics of the site fall within the assumed site parameters in Table 2.1-1, then the U.S. EPR standard design is bounding for the site. For site-specific characteristics that are outside the bounds of the assumptions presented in Table 2.1-1, the COL applicant will demonstrate that the U.S. EPR design acceptably meets the regulatory requirements, given the **more limiting** site-specific characteristic. In such an instance, the COL applicant will also demonstrate that the design commitments and acceptance criteria described in the FSAR do not need to be changed, or will propose new design commitments or acceptance criteria, or both.

03.04.02-13

### 2.1 Geography and Demography

A COL applicant that references the U.S. EPR design certification will provide site-specific information related to site location and description, exclusion area authority and control, and population distribution.

#### 2.1.1 Site Location and Description

The site location and description is site-specific and will be addressed by the COL applicant, including:

- Specific location by longitude and latitude, Universal Transverse Mercator (UTM) coordinates, and political subdivisions; the site's relative location with respect to natural and man-made features of the area such as highways, railways, and waterways; and local population distribution.
- A map of the site area of suitable scale (with explanatory text as necessary) showing relevant features such as the plant property lines, site and exclusion area boundaries (EAB), location and orientation of principal plant structures within the site area, and highways, railways and waterways that traverse or are adjacent to the site.

#### 2.1.2 Exclusion Area Authority and Control

The authority for control of activities in the site exclusion area is site-specific and will be addressed by the COL applicant. This information will describe activities unrelated to plant operation that are permitted within the exclusion area.

Table 2.1-1—U.S. EPR Site Design Envelope  
Sheet 3 of 7

U.S. EPR Site Design Envelope	
Maximum <del>Differential</del> Settlement (across the basemat)	
<u>Differential Settlement</u> <u>Tilt Settlement</u>	Figure 3.8-124 through Figure 3.8-136 1/2 inch in 50 feet in any direction
Slope Failure Potential	No slope failure potential is considered in the design of safety-related SSC for U.S. EPR design certification.
<u>Angle of Internal Friction (in situ and backfill)</u>	26.6 degrees (minimum)
<u>Soil Density (<math>\gamma</math>)</u>	110 lb/ft <sup>3</sup> $\leq \gamma \leq$ 134 lb/ft <sup>3</sup>
Maximum Ground Water	3.3 ft below grade
Minimum Coefficient of Static Friction (representative of all interfaces between basemat and soil) ( <del>representative of soil-basemat interface</del> )	0.75 ← 03.04.02-13
<b>Inventory of Radionuclides Which Could Potentially Seep Into the Groundwater</b>	
See Table 2.1-2—Bounding Values for Component Radionuclide Inventory	
<b>Flood Level (Refer to Section 2.4)</b>	
Maximum Flood (or Tsunami)	1 ft below grade
<b>Wind (Refer to Section 3.3)</b>	
Maximum Speed (Other than Tornado)	145 mph (Based on 3-second gust at 33 ft above ground level and factored for 50-yr mean recurrence interval)

A COL applicant that references the U.S. EPR design certification will investigate site-specific surface and subsurface geologic, seismic, geophysical, and geotechnical aspects within 25 miles around the site and evaluate any impact to the design. The COL applicant will demonstrate that no capable faults exist at the site in accordance with the requirements of 10 CFR 100.23 and of 10 CFR 50, Appendix S. If non-capable surface faulting is present under foundations for safety-related structures, the COL applicant will demonstrate that the faults have no significant impact on the structural integrity of safety-related structures, systems, or components.

## 2.5.4 Stability of Subsurface Materials and Foundations

The stability of subsurface materials under the ~~and~~ foundations for Seismic Category I structures is demonstrated in Section 3.8.5 for the U.S. EPR ~~10-generic~~ soil profiles described in Section 3.7.1 and Section 3.7.2. As described in Section 3.8.5, lateral soil pressure loads under saturated conditions are considered for the design of below-grade walls. Soil loads are based on the parameters described in Section 2.5.4.2.

A COL applicant that references the U.S. EPR design certification will present site-specific information about the properties and stability of soils and rocks that may affect the nuclear power plant facilities under both static and dynamic conditions, including the vibratory ground motions associated with the CSDRS and the site-specific SSE.

### 2.5.4.1 Geologic Features

Geologic features are site specific and will be addressed by the COL applicant.

### 2.5.4.2 Properties of Subsurface Materials

The following soil properties are used for design of U.S. EPR Seismic Category I structures.

- Soil density:
  - Saturated soil = 134 lb/ft<sup>3</sup>.
  - Moist soil = 128 lb/ft<sup>3</sup>.
  - Dry soil = 110 lb/ft<sup>3</sup>.
- Angle of internal friction = ~~35~~26.6 degrees minimum.
- ~~Coefficient of friction acting on foundation basemats and near surface foundations for Seismic Category I structures = 0.7.~~ Coefficient of friction for all interfaces between the foundation basemat and soil for Seismic Category I structures is 0.5 minimum.

03.04.02-13



For a cohesionless soil site, the soil below and adjacent to the safety-related foundation basemat will have a minimum friction angle ~~in excess of 3526.6~~ degrees. For a cohesive soil site, the soil will have an undrained strength equivalent to or exceeding a drained strength of ~~3526.6~~ degrees (yielding a friction coefficient greater than or equal to 0.75).

03.04.02-13

Section 2.5.4.5 discusses the use of mud mats under the foundation basemats to facilitate construction. When used, the governing friction value at the interface zone is determined by a thin soil layer (soil-on-soil) under the mud mat. As indicated above, the underlying soil (expected to be compacted backfill or lean concrete) will have a friction angle greater than ~~3526.6~~ degrees. Typical values of friction coefficient between concrete and dry soil and rock are in the range of approximately 0.75. Due to the interlock of concrete with soil as the concrete is placed, the friction between the mud mat and underlying soil media is generally higher than the friction resistance of soil-on-soil so that continuity of load transfer across the interface is maintained. Waterproofing systems are addressed in Section 3.4.2.

03.04.02-13

Earthquake induced soil pressures for the design of the U.S. EPR are developed in accordance with Section 3.5.3 of ASCE 4-98 (Reference 2). Maximum ground water and maximum flood elevations used for determining lateral soil loads for the U.S. EPR are as specified in Table 2.1-1.

A COL applicant that references the U.S. EPR design certification will reconcile the site-specific soil and backfill properties with those used for design of U.S. EPR Seismic Category I structures and foundations described in Section 3.8.

### 2.5.4.3 Foundation Interfaces

03.04.02-13

Foundation interfaces with underlying materials are site specific and will be addressed by the COL applicant. The COL applicant will confirm that the site soils have (1) minimum sliding coefficient of friction of equal to at least 0.75, (2) adequate shear strength to provide adequate static and dynamic bearing capacity, (3) adequate elastic and consolidation properties to satisfy the limits on settlement described in Section 2.5.4.10.2, and (4) adequate dynamic properties (i.e., shear wave velocity and strain-dependent modulus-reduction and hysteretic damping properties) to support the Seismic Category I structures of the U.S. EPR under earthquake loading.

### 2.5.4.4 Geophysical Surveys

Geophysical surveys are site specific and will be addressed by the COL applicant.

### 2.5.4.5 Excavations and Backfill

Excavations and backfill are site-specific and will be addressed by the COL applicant. Additional backfill requirements are identified in Section 3.8.5.4. Mud mats may be

subjected to aggressive environments. For epoxy coated reinforcing steel, the required splice length is increased in accordance with ACI 349-01 specifications.

- The waterproofing and dampproofing system of all below-grade Seismic Category I structures subjected to aggressive environments, as defined according to ACI 349-01, Chapter 4, shall be evaluated for use in such environments.

The waterproofing and dampproofing system will provide adequate frictional characteristics, as specified in Table 2.1-1, at its interface with concrete. This characteristic will be demonstrated by vendor testing. The contact surface between the waterproofing or dampproofing system and the concrete will be finished in accordance with manufacturer recommendations. 03.04.02-13

A COL applicant that references the U.S. EPR design certification will evaluate the use of epoxy coated rebar for foundations subjected to aggressive environments, as defined in ACI 349-01, Chapter 4. In addition, ~~the~~ waterproofing and dampproofing systems of ~~all~~ Seismic Category I foundations subjected to aggressive environments will be evaluated for use in aggressive environments. Also, the concrete of Seismic Category I foundations subjected to aggressive environments will meet the durability requirements of ACI 349-01, Chapter 4 or ASME, Section III, Division 2, Article CC-2231.7, as applicable.

#### 3.8.5.6.2 Quality Control

Quality control procedures for Seismic Category I foundations are the same as described in Section 3.8.3.6 (GDC 1).

#### 3.8.5.6.3 Special Construction Techniques

Seismic Category I foundations are constructed using proven methods common to heavy industrial construction. No special, new, or unique construction techniques are used.

Modular construction methods are used to the extent practical for prefabricating portions of reinforcing and concrete formwork. Such methods have been used extensively in the construction industry. Rigging is pre-engineered for heavy lifts of modular sections.

#### 3.8.5.7 Testing and Inservice Inspection Requirements

Monitoring and maintenance of Seismic Category I foundations is performed in accordance with 10 CFR 50.65 and supplemented with the guidance in RG 1.160 (GDC 1).

Additional testing and surveillance requirements for the portion of the foundation basemat that supports the RCB/RSB are the same as described in Section 3.8.1.7.2.