

## ArevaEPRDCPEm Resource

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**From:** WELLS Russell (AREVA) [Russell.Wells@areva.com]  
**Sent:** Friday, July 29, 2011 6:00 PM  
**To:** Tesfaye, Getachew  
**Cc:** WILLIFORD Dennis (AREVA); ROMINE Judy (AREVA); LENTZ Tony (EXTERNAL AREVA); BENNETT Kathy (AREVA); DELANO Karen (AREVA); RYAN Tom (AREVA)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 376, FSAR Ch. 3, Supplement 27 (Part 3 of 3)  
**Attachments:** RAI 376 Supplement 27 Response US EPR DC\_Part 3 of 3.pdf

Getachew

Attached is part 3 of 3 for the response of RAI No. 376, FSAR Ch 3, Supplement 27.

Sincerely,

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

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

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**From:** WELLS Russell (RS/NB)  
**Sent:** Friday, July 29, 2011 5:59 PM  
**To:** 'Getachew Tesfaye'  
**Cc:** WILLIFORD Dennis (RS/NB); ROMINE Judy (RS/NB); LENTZ Tony (External RS/NB); BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); RYAN Tom (RS/NB)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 376, FSAR Ch. 3, Supplement 27 (Part 2 of 3)

Getachew

Attached is part 2 of 3 for the response of RAI No. 376, FSAR Ch 3, Supplement 27.

Sincerely,

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

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

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**From:** WELLS Russell (RS/NB)  
**Sent:** Friday, July 29, 2011 5:57 PM  
**To:** 'Getachew Tesfaye'  
**Cc:** WILLIFORD Dennis (RS/NB); ROMINE Judy (RS/NB); LENTZ Tony (External RS/NB); BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); RYAN Tom (RS/NB)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 376, FSAR Ch. 3, Supplement 27 (Part 1 of 3)

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, to provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010, to provide a FINAL response to 3 of the remaining 13 question, as committed. AREVA NP submitted Supplement 7 on July 29, 2010, to provide a FINAL response to 2 of the remaining 10 question, as committed. AREVA NP submitted Supplement 8 on August 9, 2010, to provide a revised schedule for INTERIM response to question 03.08.05-29. AREVA NP submitted Supplement 9 on August 16, 2010, to provide INTERIM responses for Questions 03.08.05-26 and 03.08.05-27 and a revised schedule for INTERIM response to question 03.08.05-25. On August 27, 2010, AREVA NP submitted Supplement 10 to provide INTERIM responses for Questions 03.08.05-25 and 03.08.05-29. AREVA NP submitted a revised schedule for the final response to question 03.08.05-30 in Supplements 11 and 12 on September 15, 2010 and October 7, 2010, respectively. On October 25, 2010, AREVA NP submitted Supplement 13 to provide INTERIM responses for Questions 03.08.05-28 and 03.08.05-31. AREVA NP submitted Supplement 14 on October 25, 2010, to provide a revised schedule for Question 03.08.05-29. On November 22, 2011, AREVA NP submitted Supplement 15 to provide FINAL responses to Questions 03.08.05-27 and 03.08.05-30. AREVA NP submitted Supplement 16 on February 8, 2011, to provide a revised schedule for Question 03.08.05-25 and FINAL responses to Questions 03.08.05-24, 03.08.05-26 and 03.08.05-29. On February 11, 2011, AREVA NP submitted Supplement 17, to provide a revised schedule for Question 03.08.05-28 and Question 03.08.05-31. AREVA NP submitted a revised schedule for Question 03.08.05-25 in Supplements 18 and 19 on March 18, 2011 and April 19, 2011, respectively. On May 2, 2011, AREVA NP submitted Supplement 20, to provide a revised schedule for Question 03.08.05-28 and Question 03.08.05-31. AREVA NP submitted a revised schedule for Question 03.08.05-25 in Supplement 21 on May 20, 2011. On June 9, 2011, AREVA NP submitted Supplement 22, to provide a final response to Question 03.08.05-25. On June 27, 2011, AREVA NP submitted Supplement 23 to provide a revised INTERIM response for Question 03.08.05-28. On July 7, 2011, AREVA NP submitted Supplement 24 to provide an INTERIM response for Question 03.08.05-31. On July 20, 2011, AREVA NP submitted Supplement 24 to provide a revised INTERIM response for Question 03.08.05-31. On July 20, 2011, AREVA NP submitted Supplement 25 to provide a revised INTERIM response for Question 03.08.05-31. On July 22, 2011, AREVA NP submitted Supplement 25 to provide a AREVA NP submitted Supplement 26 to provide a revised INTERIM response to Question 03.08.05-31.

The attached file, "RAI 376 Supplement 27 Response US EPR DC (Part 1 of 3).pdf" provides the technically correct and revised INTERIM response to Question 03.08.05-28. Appended to this file are the affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 376 Question 03.08.05-28. The remaining parts will be provided in subsequent e-mails.

The following table indicates the page in the response document, "RAI 376 Supplement 27 Response US EPR DC (Part 1 of 3).pdf" that contains AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 376 — 03.08.05-28	2	50

The schedule for the final response to Question 03.08.05-28 and Question 03.08.05-31 remains unchanged. The schedule for technically correct and complete responses to the remaining questions is provided below:

Question #	Interim Response Date	Response Date
RAI 376-03.08.05-28	October 25, 2010 (Actual) <b>July 29, 2011 (Actual)</b>	October 10, 2011
RAI 376-03.08.05-31	October 25, 2010 July 22, 2011 (Actual)	November 30, 2011

Sincerely,

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

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**From:** WELLS Russell (RS/NB)  
**Sent:** Friday, July 22, 2011 1:03 PM  
**To:** Tesfaye, Getachew  
**Cc:** WILLIFORD Dennis (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); RYAN Tom (RS/NB)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 376, FSAR Ch. 3, Supplement 26 (Part 2 of 2)

Getachew  
Attached is part 2 of 2 for the response of RAI No. 376, FSAR Ch 3, Supplement 26.

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

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**From:** WELLS Russell (RS/NB)  
**Sent:** Friday, July 22, 2011 1:01 PM  
**To:** 'Tesfaye, Getachew'  
**Cc:** WILLIFORD Dennis (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); RYAN Tom (RS/NB)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 376, FSAR Ch. 3, Supplement 26 (Part 1 of 2)

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to

provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, to provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010, to provide a FINAL response to 3 of the remaining 13 question, as committed. AREVA NP submitted Supplement 7 on July 29, 2010, to provide a FINAL response to 2 of the remaining 10 question, as committed. AREVA NP submitted Supplement 8 on August 9, 2010, to provide a revised schedule for INTERIM response to question 03.08.05-29. AREVA NP submitted Supplement 9 on August 16, 2010, to provide INTERIM responses for Questions 03.08.05-26 and 03.08.05-27 and a revised schedule for INTERIM response to question 03.08.05-25. On August 27, 2010, AREVA NP submitted Supplement 10 to provide INTERIM responses for Questions 03.08.05-25 and 03.08.05-29. AREVA NP submitted a revised schedule for the final response to question 03.08.05-30 in Supplements 11 and 12 on September 15, 2010 and October 7, 2010, respectively. On October 25, 2010, AREVA NP submitted Supplement 13 to provide INTERIM responses for Questions 03.08.05-28 and 03.08.05-31. AREVA NP submitted Supplement 14 on October 25, 2010, to provide a revised schedule for Question 03.08.05-29. On November 22, 2011, AREVA NP submitted Supplement 15 to provide FINAL responses to Questions 03.08.05-27 and 03.08.05-30. AREVA NP submitted Supplement 16 on February 8, 2011, to provide a revised schedule for Question 03.08.05-25 and FINAL responses to Questions 03.08.05-24, 03.08.05-26 and 03.08.05-29. On February 11, 2011, AREVA NP submitted Supplement 17, to provide a revised schedule for Question 03.08.05-28 and Question 03.08.05-31. AREVA NP submitted a revised schedule for Question 03.08.05-25 in Supplements 18 and 19 on March 18, 2011 and April 19, 2011, respectively. On May 2, 2011, AREVA NP submitted Supplement 20, to provide a revised schedule for Question 03.08.05-28 and Question 03.08.05-31. AREVA NP submitted a revised schedule for Question 03.08.05-25 in Supplement 21 on May 20, 2011. On June 9, 2011, AREVA NP submitted Supplement 22, to provide a final response to Question 03.08.05-25. On June 27, 2011, AREVA NP submitted Supplement 23 to provide a revised INTERIM response for Question 03.08.05-28. On July 7, 2011, AREVA NP submitted Supplement 24 to provide an INTERIM response for Question 03.08.05-31. On July 20, 2011, AREVA NP submitted Supplement 24 to provide a revised INTERIM response for Question 03.08.05-31.

The attached file, “RAI 376 Supplement 26 Response US EPR DC – PUBLIC (Part 1 of 2).pdf” and the file “RAI 376 Supplement 26 Response US EPR DC - PUBLIC (Part 2 of 2).pdf” in a subsequent email provide a technically correct revised INTERIM response to Question 03.08.05-31 to correct an editorial error on FSAR mark-up page 2.1-5 (on U.S. EPR FSAR Tier 2, Table 2.1-1 (the value showed u = .36, instead of u > and = to .36).

Appended to these files are the affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 376 Question 03.08.05-31. Because the response contains security-related sensitive information that should be withheld from public disclosure in accordance with 10 CFR 2.390, a public version is provided with the security-related sensitive information redacted. This email and attached file do not contain any security-related information. An unredacted security-related version will be provided in a separate email.

The following table indicates the pages in the response document, “RAI 376 Supplement 26 Response US EPR DC - PUBLIC (Part 1 of 2).pdf” and the file “RAI 376 Supplement 26 Response US EPR DC - PUBLIC (Part 2 of 2).pdf” that contain AREVA NP’s response to the subject question.

Question #	Start Page	End Page
RAI 376 — 03.08.05-31	2	4

The schedule for the final responses to the remaining questions is unchanged as provided below:

Question #	Interim Response Date	Response Date
RAI 376-03.08.05-28	October 25, 2010 (Actual) June 27, 2011 (Actual)	October 10, 2011
RAI 376-03.08.05-31	October 25, 2010 (Actual) <b>July 22, 2011 (Actual)</b>	November 30, 2011

Sincerely,

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

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

---

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

**Sent:** Wednesday, July 20, 2011 10:27 AM

**To:** Tesfaye, Getachew

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

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 376, FSAR Ch. 3, Supplement 25 (Part 1 of 2)

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, to provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010, to provide a FINAL response to 3 of the remaining 13 question, as committed. AREVA NP submitted Supplement 7 on July 29, 2010, to provide a FINAL response to 2 of the remaining 10 question, as committed. AREVA NP submitted Supplement 8 on August 9, 2010, to provide a revised schedule for INTERIM response to question 03.08.05-29. AREVA NP submitted Supplement 9 on August 16, 2010, to provide INTERIM responses for Questions 03.08.05-26 and 03.08.05-27 and a revised schedule for INTERIM response to question 03.08.05-25. On August 27, 2010, AREVA NP submitted Supplement 10 to provide INTERIM responses for Questions 03.08.05-25 and 03.08.05-29. AREVA NP submitted a revised schedule for the final response to question 03.08.05-30 in Supplements 11 and 12 on September 15, 2010 and October 7, 2010, respectively. On October 25, 2010, AREVA NP submitted Supplement 13 to provide INTERIM responses for Questions 03.08.05-28 and 03.08.05-31. AREVA NP submitted Supplement 14 on October 25, 2010, to provide a revised schedule for Question 03.08.05-29. On November 22, 2011, AREVA NP submitted Supplement 15 to provide FINAL responses to Questions 03.08.05-27 and 03.08.05-30. AREVA NP submitted Supplement 16 on February 8, 2011, to provide a revised schedule for Question 03.08.05-25 and FINAL responses to Questions 03.08.05-24, 03.08.05-26 and 03.08.05-29. On February 11, 2011, AREVA NP submitted Supplement 17, to provide a revised schedule for Question 03.08.05-28 and Question 03.08.05-31. AREVA NP submitted a revised schedule for Question 03.08.05-25 in Supplements 18 and 19 on March 18, 2011 and April 19, 2011, respectively. On May 2, 2011, AREVA NP submitted Supplement 20, to provide a revised schedule for Question 03.08.05-28 and Question 03.08.05-31. AREVA NP submitted a revised schedule for Question 03.08.05-25 in Supplement 21 on May 20, 2011. On June 9, 2011, AREVA NP submitted Supplement 22, to provide a final response to Question 03.08.05-25. On June 27, 2011, AREVA NP

submitted Supplement 23 to provide a revised INTERIM response for Question 03.08.05-28. On July 7, 2011, AREVA NP submitted Supplement 24 to provide an INTERIM response for Question 03.08.05-31.

The attached file, "RAI 376 Supplement 25 Response US EPR DC – PUBLIC (Part 1 of 2).pdf" and the file "RAI 376 Supplement 25 Response US EPR DC - PUBLIC (Part 2 of 2).pdf" in a subsequent email provide a technically correct revised INTERIM response to Question 03.08.05-31. Appended to these files are the affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 376 Question 03.08.05-31. Because the response contains security-related sensitive information that should be withheld from public disclosure in accordance with 10 CFR 2.390, a public version is provided with the security-related sensitive information redacted. This email and attached file do not contain any security-related information. An unredacted security-related version will be provided in a separate email.

The following table indicates the pages in the response document, "RAI 376 Supplement 25 Response US EPR DC - PUBLIC (Part 1 of 2).pdf" and the file "RAI 376 Supplement 25 Response US EPR DC - PUBLIC (Part 2 of 2).pdf" that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 376 — 03.08.05-31	2	4

The schedule for the final responses to the remaining questions is unchanged as provided below:

Question #	Interim Response Date	Response Date
RAI 376-03.08.05-28	October 25, 2010 (Actual) June 27, 2011 (Actual)	October 10, 2011
RAI 376-03.08.05-31	October 25, 2010 (Actual) <b>July 20, 2011 (Actual)</b>	November 30, 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)

---

**From:** WILLIFORD Dennis (RS/NB)  
**Sent:** Thursday, July 07, 2011 1:49 PM  
**To:** Tesfaye, Getachew  
**Cc:** BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); Miernicki, Michael  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 376, FSAR Ch. 3, Supplement 24

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, to provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010, to provide a FINAL response to 3 of the remaining 13 question, as committed. AREVA NP submitted Supplement 7 on July 29, 2010, to provide a FINAL response to 2 of the remaining 10 question, as committed.



AREVA NP submitted Supplement 8 on August 9, 2010, to provide a revised schedule for INTERIM response to question 03.08.05-29. AREVA NP submitted Supplement 9 on August 16, 2010, to provide INTERIM responses for Questions 03.08.05-26 and 03.08.05-27 and a revised schedule for INTERIM response to question 03.08.05-25. On August 27, 2010, AREVA NP submitted Supplement 10 to provide INTERIM responses for Questions 03.08.05-25 and 03.08.05-29. AREVA NP submitted a revised schedule for the final response to question 03.08.05-30 in Supplements 11 and 12 on September 15, 2010 and October 7, 2010, respectively. On October 25, 2010, AREVA NP submitted Supplement 13 to provide INTERIM responses for Questions 03.08.05-28 and 03.08.05-31. AREVA NP submitted Supplement 14 on October 25, 2010, to provide a revised schedule for Question 03.08.05-29. On November 22, 2011, AREVA NP submitted Supplement 15 to provide FINAL responses to Questions 03.08.05-27 and 03.08.05-30. AREVA NP submitted Supplement 16 on February 8, 2011, to provide a revised schedule for Question 03.08.05-25 and FINAL responses to Questions 03.08.05-24, 03.08.05-26 and 03.08.05-29. On February 11, 2011, AREVA NP submitted Supplement 17, to provide a revised schedule for Question 03.08.05-28 and Question 03.08.05-31. AREVA NP submitted a revised schedule for Question 03.08.05-25 in Supplements 18 and 19 on March 18, 2011 and April 19, 2011, respectively. On May 2, 2011, AREVA NP submitted Supplement 20, to provide a revised schedule for Question 03.08.05-28 and Question 03.08.05-31. AREVA NP submitted a revised schedule for Question 03.08.05-25 in Supplement 21 on May 20, 2011. On June 9, 2011, AREVA NP submitted Supplement 22, to provide a final response to Question 03.08.05-25. On June 27, 2011, AREVA NP submitted Supplement 23 to provide a revised INTERIM response for Question 03.08.05-28.

The attached file, "RAI 376 Supplement 24 Response US EPR DC - PUBLIC (Part 1 of 2).pdf" and the file "RAI 376 Supplement 24 Response US EPR DC - PUBLIC (Part 2 of 2).pdf" in a subsequent email provides a technically correct INTERIM response to Question 03.08.05-31. Appended to these files are the affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 376 Question 03.08.05-31. Because the response contains security-related sensitive information that should be withheld from public disclosure in accordance with 10 CFR 2.390, a public version is provided with the security-related sensitive information redacted. This email and attached file do not contain any security-related information. An unredacted security-related version will be provided in a separate email.

The following table indicates the page in the response document, "RAI 376 Supplement 24 Response US EPR DC - PUBLIC (Part 1 of 2).pdf" and the file "RAI 376 Supplement 24 Response US EPR DC - PUBLIC (Part 2 of 2).pdf" that contains AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 376 — 03.08.05-31	2	4

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

Question #	Interim Response Date	Response Date
RAI 376-03.08.05-28	October 25, 2010 (Actual) June 27, 2011 (Actual)	October 10, 2011
RAI 376-03.08.05-31	October 25, 2010 <b>July 7, 2011 (Actual)</b>	November 30, 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)

---

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

**Sent:** Monday, June 27, 2011 4:47 PM

**To:** Tesfaye, Getachew

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

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 376, FSAR Ch. 3, Supplement 23

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, to provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010, to provide a FINAL response to 3 of the remaining 13 question, as committed. AREVA NP submitted Supplement 7 on July 29, 2010, to provide a FINAL response to 2 of the remaining 10 question, as committed. AREVA NP submitted Supplement 8 on August 9, 2010, to provide a revised schedule for INTERIM response to question 03.08.05-29. AREVA NP submitted Supplement 9 on August 16, 2010, to provide INTERIM responses for Questions 03.08.05-26 and 03.08.05-27 and a revised schedule for INTERIM response to question 03.08.05-25. On August 27, 2010, AREVA NP submitted Supplement 10 to provide INTERIM responses for Questions 03.08.05-25 and 03.08.05-29. AREVA NP submitted a revised schedule for the final response to question 03.08.05-30 in Supplements 11 and 12 on September 15, 2010 and October 7, 2010, respectively. On October 25, 2010, AREVA NP submitted Supplement 13 to provide INTERIM responses for Questions 03.08.05-28 and 03.08.05-31. AREVA NP submitted Supplement 14 on October 25, 2010, to provide a revised schedule for Question 03.08.05-29. On November 22, 2011, AREVA NP submitted Supplement 15 to provide FINAL responses to Questions 03.08.05-27 and 03.08.05-30. AREVA NP submitted Supplement 16 on February 8, 2011, to provide a revised schedule for Question 03.08.05-25 and FINAL responses to Questions 03.08.05-24, 03.08.05-26 and 03.08.05-29. On February 11, 2011, AREVA NP submitted Supplement 17, to provide a revised schedule for Question 03.08.05-28 and Question 03.08.05-31. AREVA NP submitted a revised schedule for Question 03.08.05-25 in Supplements 18 and 19 on March 18, 2011 and April 19, 2011, respectively. On May 2, 2011, AREVA NP submitted Supplement 20, to provide a revised schedule for Question 03.08.05-28 and Question 03.08.05-31. AREVA NP submitted a revised schedule for Question 03.08.05-25 in Supplement 21 on May 20, 2011. On June 9, 2011, AREVA NP submitted Supplement 22 to provide a final response to Question 03.08.05-25.

The attached file, "RAI 376 Supplement 23 Response US EPR DC - INTERIM.pdf (Part 1 of 2).pdf" and the file "RAI 376 Supplement 23 Response US EPR DC - INTERIM.pdf (Part 2 of 2).pdf" in a subsequent email, provide a technically correct INTERIM response to Question 03.08.05-28, as committed. Appended to the file "RAI 376 Supplement 23 Response US EPR DC - INTERIM.pdf (Part 2 of 2).pdf" are the affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 376 Question 03.08.05-28.

The following table indicates the respective pages in the response document, "RAI 376 Supplement 23 Response US EPR DC - INTERIM.pdf (Part 1 of 2).pdf" and "RAI 376 Supplement 23 Response US EPR DC - INTERIM.pdf (Part 2 of 2).pdf" that contain AREVA NP's INTERIM response to Question 03.08.05-28.

Question #	Start Page	End Page
RAI 376 — 03.08.05-28	2	50



The schedule for the final response to Question 03.08.05-28 and Question 03.08.05-31 is being revised. The schedule for technically correct and complete responses to the remaining questions is provided below:

Question #	Interim Response Date	Response Date
RAI 376-03.08.05-28	October 25, 2010 (Actual) <b>June 27, 2011 (Actual)</b>	<b>October 10, 2011</b>
RAI 376-03.08.05-31	October 25, 2010	<b>November 30, 2011</b>

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:** Thursday, June 09, 2011 12:46 PM  
**To:** 'Tesfaye, Getachew'  
**Cc:** BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); CORNELL Veronica (External RS/NB)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 376, FSAR Ch. 3, Supplement 22

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, to provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010, to provide a FINAL response to 3 of the remaining 13 question, as committed. AREVA NP submitted Supplement 7 on July 29, 2010, to provide a FINAL response to 2 of the remaining 10 question, as committed. AREVA NP submitted Supplement 8 on August 9, 2010, to provide a revised schedule for INTERIM response to question 03.08.05-29. AREVA NP submitted Supplement 9 on August 16, 2010, to provide INTERIM responses for Questions 03.08.05-26 and 03.08.05-27 and a revised schedule for INTERIM response to question 03.08.05-25. On August 27, 2010, AREVA NP submitted Supplement 10 to provide INTERIM responses for Questions 03.08.05-25 and 03.08.05-29. AREVA NP submitted a revised schedule for the final response to question 03.08.05-30 in Supplements 11 and 12 on September 15, 2010 and October 7, 2010, respectively. On October 25, 2010, AREVA NP submitted Supplement 13 to provide INTERIM responses for Questions 03.08.05-28 and 03.08.05-31. AREVA NP submitted Supplement 14 on October 25, 2010, to provide a revised schedule for Question 03.08.05-29. On November 22, 2011, AREVA NP submitted Supplement 15 to provide FINAL responses to Questions 03.08.05-27 and 03.08.05-30. AREVA NP submitted Supplement 16 on February 8, 2011, to provide a revised schedule for Question 03.08.05-25 and FINAL responses to Questions 03.08.05-24, 03.08.05-26 and 03.08.05-29. On February 11, 2011, AREVA NP submitted Supplement 17, to provide a revised schedule for Question 03.08.05-28 and Question 03.08.05-31. AREVA NP submitted a revised schedule for Question 03.08.05-25 in Supplements 18 and 19 on March 18, 2011 and April 19, 2011, respectively. On May 2, 2011, AREVA NP submitted Supplement 20, to provide a revised schedule for Question 03.08.05-28 and Question 03.08.05-31. AREVA NP submitted a revised schedule for Question 03.08.05-25 in Supplement 21 on May 20, 2011.

The attached file, "RAI 376 Supplement 22 Response US EPR DC.pdf" provides a technically correct and complete FINAL response to Question 03.08.05-25. Appended to this file are the affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 376 Question 03.08.05-25.

The following table indicates the pages in the response document, "RAI 376 Supplement 22 Response US EPR DC.pdf" that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 376 — 03.08.05-25	2	5

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

Question #	Interim Response Date	Response Date
RAI 376—03.08.05-28	October 25, 2010 (Actual)	July 8, 2011
RAI 376—03.08.05-31	October 25, 2010 (Actual)	July 8, 2011

Sincerely,

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

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

**From:** WILLIFORD Dennis (RS/NB)  
**Sent:** Friday, May 20, 2011 5:19 PM  
**To:** 'Tesfaye, Getachew'  
**Cc:** BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); CORNELL Veronica (External RS/NB)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 376, FSAR Ch. 3, Supplement 21

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, to provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010, to provide a FINAL response to 3 of the remaining 13 question, as committed. AREVA NP submitted Supplement 7 on July 29, 2010, to provide a FINAL response to 2 of the remaining 10 question, as committed. AREVA NP submitted Supplement 8 on August 9, 2010, to provide a revised schedule for INTERIM response to question 03.08.05-29. AREVA NP submitted Supplement 9 on August 16, 2010, to provide INTERIM responses for Questions 03.08.05-26 and 03.08.05-27 and a revised schedule for INTERIM response to question 03.08.05-25. On August 27, 2010, AREVA NP submitted Supplement 10 to provide INTERIM responses for Questions 03.08.05-25 and 03.08.05-29. AREVA NP submitted a revised schedule for the final response to question 03.08.05-30 in Supplements 11 and 12 on September 15, 2010 and October 7, 2010, respectively. On October 25, 2010, AREVA NP submitted Supplement 13 to provide INTERIM responses for Questions 03.08.05-28 and 03.08.05-31. AREVA NP submitted Supplement 14 on October 25, 2010, to provide a revised schedule for Question 03.08.05-29. On November 22, 2011, AREVA NP submitted

Supplement 15 to provide FINAL responses to Questions 03.08.05-27 and 03.08.05-30. AREVA NP submitted Supplement 16 on February 8, 2011, to provide a revised schedule for Question 03.08.05-25 and FINAL responses to Questions 03.08.05-24, 03.08.05-26 and 03.08.05-29. On February 11, 2011, AREVA NP submitted Supplement 17, to provide a revised schedule for Question 03.08.05-28 and Question 03.08.05-31. AREVA NP submitted a revised schedule for Question 03.08.05-25 in Supplements 18 and 19 on March 18, 2011 and April 19, 2011, respectively. On May 2, 2011, AREVA NP submitted Supplement 20 to provide a revised schedule for Question 03.08.05-28 and Question 03.08.05-31.

The schedule for Question 03.08.05-25 is being revised. The schedule for the remaining questions is unchanged.

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

Question #	Interim Response Date	Response Date
RAI 376-03.08.05-25	August 27, 2010 (Actual)	<b>July 8, 2011</b>
RAI 376-03.08.05-28	October 25, 2010 (Actual)	July 8, 2011
RAI 376-03.08.05-31	October 25, 2010 (Actual)	July 8, 2011

Sincerely,

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

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

---

**From:** WELLS Russell (RS/NB)  
**Sent:** Monday, May 02, 2011 10:30 AM  
**To:** Tesfaye, Getachew  
**Cc:** 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. 376, FSAR Ch. 3, Supplement 20

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, to provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010, to provide a FINAL response to 3 of the remaining 13 question, as committed. AREVA NP submitted Supplement 7 on July 29, 2010, to provide a FINAL response to 2 of the remaining 10 question, as committed. AREVA NP submitted Supplement 8 on August 9, 2010, to provide a revised schedule for INTERIM response to question 03.08.05-29. AREVA NP submitted Supplement 9 on August 16, 2010, to provide INTERIM responses for Questions 03.08.05-26 and 03.08.05-27 and a revised schedule for INTERIM response to question 03.08.05-25. On August 27, 2010, AREVA NP submitted Supplement 10 to provide INTERIM responses for Questions 03.08.05-25 and 03.08.05-29. AREVA NP submitted a revised schedule for the final response to question 03.08.05-30 in Supplements 11 and 12 on September 15, 2010 and October 7, 2010, respectively. On October 25, 2010, AREVA NP submitted Supplement 13 to provide INTERIM responses for

Questions 03.08.05-28 and 03.08.05-31. AREVA NP submitted Supplement 14 on October 25, 2010, to provide a revised schedule for Question 03.08.05-29. On November 22, 2011, AREVA NP submitted Supplement 15 to provide FINAL responses to Questions 03.08.05-27 and 03.08.05-30. AREVA NP submitted Supplement 16 on February 8, 2011, to provide a revised schedule for Question 03.08.05-25 and FINAL responses to Questions 03.08.05-24, 03.08.05-26 and 03.08.05-29. On February 11, 2011, AREVA NP submitted Supplement 17, to provide a revised schedule for Question 03.08.05-28 and Question 03.08.05-31. AREVA NP submitted a revised schedule for Question 03.08.05-25 in Supplements 18 and 19 on March 18, 2011 and April 19, 2011, respectively.

Due to changes in the schedule for FSAR Sections 3.7 and 3.8 as discussed with NRC, the schedule for Questions 03.08.05-28 and 03.08.05-31 is being revised. The schedule for the remaining question is unchanged.

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

Question #	Interim Response Date	Response Date
RAI 376-03.08.05-25	August 27, 2010 (Actual)	May 26, 2011
RAI 376-03.08.05-28	October 25, 2010 (Actual)	<b>July 8, 2011</b>
RAI 376-03.08.05-31	October 25, 2010 (Actual)	<b>July 8, 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)

---

**From:** WELLS Russell (RS/NB)

**Sent:** Tuesday, April 19, 2011 7:39 AM

**To:** 'Tsfaye, Getachew'

**Cc:** 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. 376, FSAR Ch. 3, Supplement 19

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, to provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010, to provide a FINAL response to 3 of the remaining 13 question, as committed. AREVA NP submitted Supplement 7 on July 29, 2010, to provide a FINAL response to 2 of the remaining 10 question, as committed. AREVA NP submitted Supplement 8 on August 9, 2010, to provide a revised schedule for INTERIM response

to question 03.08.05-29. AREVA NP submitted Supplement 9 on August 16, 2010, to provide INTERIM responses for Questions 03.08.05-26 and 03.08.05-27 and a revised schedule for INTERIM response to question 03.08.05-25. On August 27, 2010, AREVA NP submitted Supplement 10 to provide INTERIM responses for Questions 03.08.05-25 and 03.08.05-29. AREVA NP submitted a revised schedule for the final response to question 03.08.05-30 in Supplements 11 and 12 on September 15, 2010 and October 7, 2010, respectively. On October 25, 2010, AREVA NP submitted Supplement 13 to provide INTERIM responses for Questions 03.08.05-28 and 03.08.05-31. AREVA NP submitted Supplement 14 on October 25, 2010, to provide a revised schedule for Question 03.08.05-29. On November 22, 2011, AREVA NP submitted Supplement 15 to provide FINAL responses to Questions 03.08.05-27 and 03.08.05-30. AREVA NP submitted Supplement 16 on February 8, 2011, to provide a revised schedule for Question 03.08.05-25 and FINAL responses to Questions 03.08.05-24, 03.08.05-26 and 03.08.05-29. On February 11, 2011, AREVA NP submitted Supplement 17, to provide a revised schedule for Question 03.08.05-28 and Question 03.08.05-31. AREVA NP submitted Supplement 18 on March 18, 2011, to provide a revised schedule for Question 03.08.05-25.

The schedule for Question 03.08.05-25 is being revised to allow AREVA NP additional time to address NRC comments. The schedule for the remaining questions is unchanged.

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

Question #	Interim Response Date	Response Date
RAI 376-03.08.05-25	August 27, 2010 (Actual)	<b>May 26, 2011</b>
RAI 376-03.08.05-28	October 25, 2010 (Actual)	May 4, 2011
RAI 376-03.08.05-31	October 25, 2010 (Actual)	May 26, 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)

---

**From:** WELLS Russell (RS/NB)

**Sent:** Friday, March 18, 2011 4:43 PM

**To:** 'Tefaye, 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. 376, FSAR Ch. 3, Supplement 18

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, to provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010,



to provide a FINAL response to 3 of the remaining 13 question, as committed. AREVA NP submitted Supplement 7 on July 29, 2010, to provide a FINAL response to 2 of the remaining 10 question, as committed. AREVA NP submitted Supplement 8 on August 9, 2010, to provide a revised schedule for INTERIM response to question 03.08.05-29. AREVA NP submitted Supplement 9 on August 16, 2010, to provide INTERIM responses for Questions 03.08.05-26 and 03.08.05-27 and a revised schedule for INTERIM response to question 03.08.05-25. On August 27, 2010, AREVA NP submitted Supplement 10 to provide INTERIM responses for Questions 03.08.05-25 and 03.08.05-29. AREVA NP submitted a revised schedule for the final response to question 03.08.05-30 in Supplements 11 and 12 on September 15, 2010 and October 7, 2010, respectively. On October 25, 2010, AREVA NP submitted Supplement 13 to provide INTERIM responses for Questions 03.08.05-28 and 03.08.05-31. AREVA NP submitted Supplement 14 on October 25, 2010, to provide a revised schedule for Question 03.08.05-29. On November 22, 2011, AREVA NP submitted Supplement 15 to provide FINAL responses to Questions 03.08.05-27 and 03.08.05-30. AREVA NP submitted Supplement 16 on February 8, 2011, to provide a revised schedule for Question 03.08.05-25 and FINAL responses to Questions 03.08.05-24, 03.08.05-26 and 03.08.05-29. On February 11, 2011, AREVA NP submitted Supplement 17, to provide a revised schedule for Question 03.08.05-28 and Question 03.08.05-31.

The schedule for Question 03.08.05-25 is being revised to allow AREVA NP additional time to interact with the NRC. The schedule for the remaining questions is unchanged.

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

Question #	Interim Response Date	Response Date
RAI 376-03.08.05-25	August 27, 2010 (Actual)	<b>April 21, 2011</b>
RAI 376-03.08.05-28	October 25, 2010 (Actual)	May 4, 2011
RAI 376-03.08.05-31	October 25, 2010 (Actual)	May 26, 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)

---

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

**Sent:** Friday, February 11, 2011 2:51 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. 376, FSAR Ch. 3, Supplement 17

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, to



provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010, to provide a FINAL response to 3 of the remaining 13 question, as committed. AREVA NP submitted Supplement 7 on July 29, 2010, to provide a FINAL response to 2 of the remaining 10 question, as committed. AREVA NP submitted Supplement 8 on August 9, 2010, to provide a revised schedule for INTERIM response to question 03.08.05-29. AREVA NP submitted Supplement 9 on August 16, 2010, to provide INTERIM responses for Questions 03.08.05-26 and 03.08.05-27 and a revised schedule for INTERIM response to question 03.08.05-25. On August 27, 2010, AREVA NP submitted Supplement 10 to provide INTERIM responses for Questions 03.08.05-25 and 03.08.05-29. AREVA NP submitted a revised schedule for the final response to question 03.08.05-30 in Supplements 11 and 12 on September 15, 2010 and October 7, 2010, respectively. On October 25, 2010, AREVA NP submitted Supplement 13 to provide INTERIM responses for Questions 03.08.05-28 and 03.08.05-31. AREVA NP submitted Supplement 14 on October 25, 2010, to provide a revised schedule for Question 03.08.05-29. On November 22, 2011, AREVA NP submitted Supplement 15 to provide FINAL responses to Questions 03.08.05-27 and 03.08.05-30. AREVA NP submitted Supplement 16 on February 8, 2011, to provide a revised schedule for Question 03.08.05-25 and FINAL responses to Questions 03.08.05-24, 03.08.05-26 and 03.08.05-29.

The schedule for Question 03.08.05-28 and Question 03.08.05-31 has changed. The schedule for the remaining question is unchanged.

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

Question #	Interim Response Date	Response Date
RAI 376-03.08.05-25	August 27, 2010 (Actual)	March 30, 2011
RAI 376-03.08.05-28	October 25, 2010 (Actual)	May 4, 2011
RAI 376-03.08.05-31	October 25, 2010 (Actual)	May 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, February 08, 2011 5:23 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. 376, FSAR Ch. 3, Supplement 16

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, to provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010, to provide a FINAL response to 3 of the remaining 13 question, as committed. AREVA NP submitted Supplement 7 on July 29, 2010, to provide a FINAL response to 2 of the remaining 10 question, as committed. AREVA NP submitted Supplement 8 on August 9, 2010, to provide a revised schedule for INTERIM response to question 03.08.05-29. AREVA NP submitted Supplement 9 on August 16, 2010, to provide INTERIM

responses for Questions 03.08.05-26 and 03.08.05-27 and a revised schedule for INTERIM response to question 03.08.05-25. On August 27, 2010, AREVA NP submitted Supplement 10 to provide INTERIM responses for Questions 03.08.05-25 and 03.08.05-29. AREVA NP submitted a revised schedule for the final response to question 03.08.05-30 in Supplements 11 and 12 on September 15, 2010 and October 7, 2010, respectively. On October 25, 2010, AREVA NP submitted Supplement 13 to provide INTERIM responses for Questions 03.08.05-28 and 03.08.05-31. AREVA NP submitted Supplement 14 on October 25, 2010, to provide a revised schedule for Question 03.08.05-29. On November 22, 2011, AREVA NP submitted Supplement 15 to provide FINAL responses to Questions 03.08.05-27 and 03.08.05-30.

The attached file, "RAI 376 Supplement 16 Response US EPR DC.pdf" provides technically correct and complete FINAL responses to Questions 03.08.05-24, 03.08.05-26 and 03.08.05-29, as committed.

The following table indicates the respective pages in the response document, RAI 376 Supplement 16 Response US EPR DC.pdf," that contains AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 376 – 03.08.05-24	2	5
RAI 376 – 03.08.05-26	6	6
RAI 376 – 03.08.05-29	7	7

The schedule for Question 03.08.05-25 is being revised to allow additional time for AREVA NP to address NRC comments. The schedule for the remaining questions is unchanged.

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

Question #	Interim Response Date	Response Date
RAI 376-03.08.05-25	August 27, 2010 (Actual)	March 30, 2011
RAI 376-03.08.05-28	October 25, 2010 (Actual)	February 17, 2011
RAI 376-03.08.05-31	October 25, 2010 (Actual)	February 17, 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:** Monday, November 22, 2010 7:33 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. 376, FSAR Ch. 3, Supplement 15

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, to provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010,

to provide a FINAL response to 3 of the remaining 13 question, as committed. AREVA NP submitted Supplement 7 on July 29, 2010, to provide a FINAL response to 2 of the remaining 10 question, as committed. AREVA NP submitted Supplement 8 on August 9, 2010, to provide a revised schedule for INTERIM response to question 03.08.05-29. AREVA NP submitted Supplement 9 on August 16, 2010, to provide INTERIM responses for Questions 03.08.05-26 and 03.08.05-27 and a revised schedule for INTERIM response to question 03.08.05-25. On August 27, 2010, AREVA NP submitted Supplement 10 to provide INTERIM responses for Questions 03.08.05-25 and 03.08.05-29. AREVA NP submitted a revised schedule for the final response to question 03.08.05-30 in Supplements 11 and 12 on September 15, 2010 and October 7, 2010, respectively. On October 25, 2010, AREVA NP submitted Supplement 13 to provide INTERIM responses for Questions 03.08.05-28 and 03.08.05-31. AREVA NP submitted Supplement 14 on October 27, 2010, to provide a revised schedule for Question 03.08.05-29.

The attached file, "RAI 376 Supplement 15 Response US EPR DC.pdf" provides technically correct and complete FINAL responses to Questions 03.08.05-27 and 03.08.05-30, 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 376 Question 03.08.05-27.

The following table indicates the respective pages in the response document, RAI 376 Supplement 15 Response US EPR DC.pdf," that contains AREVA NP's response to the subject questions. Please note that the similar table for RAI 376 Supplement 13 listed the RAI question as 354 when it should have been 376. The schedule for the remaining questions is unchanged.

Question #	Start Page	End Page
RAI 376 - 03.08.05-27	2	4
RAI 376 - 03.08.05-30	5	5

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

Question #	Interim Response Date	Response Date
RAI 376-03.08.05-24	July 15, 2010 (Actual)	February 17, 2011
RAI 376-03.08.05-25	August 27, 2010 (Actual)	February 8, 2011
RAI 376-03.08.05-26	August 16, 2010 (Actual)	February 8, 2011
RAI 376-03.08.05-28	October 25, 2010 (Actual)	February 17, 2011
RAI 376-03.08.05-29	August 27, 2010 (Actual)	February 28, 2011
RAI 376-03.08.05-31	October 25, 2010 (Actual)	February 17, 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, October 27, 2010 1:24 PM

**To:** 'Tefaye, 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. 376, FSAR Ch. 3, Supplement 14

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, to provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010, to provide a FINAL response to 3 of the remaining 13 question, as committed. AREVA NP submitted Supplement 7 on July 29, 2010, to provide a FINAL response to 2 of the remaining 10 question, as committed. AREVA NP submitted Supplement 8 on August 9, 2010, to provide a revised schedule for INTERIM response to question 03.08.05-29. AREVA NP submitted Supplement 9 on August 16, 2010, to provide INTERIM responses for Questions 03.08.05-26 and 03.08.05-27 and a revised schedule for INTERIM response to question 03.08.05-25. On August 27, 2010, AREVA NP submitted Supplement 10 to provide INTERIM responses for Questions 03.08.05-25 and 03.08.05-29. AREVA NP submitted a revised schedule for the final response to question 03.08.05-30 in Supplements 11 and 12 on September 15, 2010 and October 7, 2010, respectively. On October 25, 2010, AREVA NP submitted Supplement 13 to provide INTERIM responses for Questions 03.08.05-28 and 03.08.05-31.

The schedule for Question 03.08.05-29 is being revised to allow additional time for AREVA NP to address NRC comments. The schedule for the remaining questions is unchanged.

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

Question #	Interim Response Date	Response Date
RAI 376-03.08.05-24	July 15, 2010 (Actual)	February 17, 2011
RAI 376-03.08.05-25	August 27, 2010 (Actual)	February 8, 2011
RAI 376-03.08.05-26	August 16, 2010 (Actual)	February 8, 2011
RAI 376-03.08.05-27	August 16, 2010 (Actual)	February 8, 2011
RAI 376-03.08.05-28	October 25, 2010 (Actual)	February 17, 2011
RAI 376-03.08.05-29	August 27, 2010 (Actual)	February 28, 2011
RAI 376-03.08.05-30	N/A	November 22, 2010
RAI 376-03.08.05-31	October 25, 2010 (Actual)	February 17, 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:** Monday, October 25, 2010 4:37 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. 376, FSAR Ch. 3, Supplement 13

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, to provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010, to provide a FINAL response to 3 of the remaining 13 question, as committed. AREVA NP submitted Supplement 7 on July 29, 2010, to provide a FINAL response to 2 of the remaining 10 question, as committed. AREVA NP submitted Supplement 8 on August 9, 2010, to provide a revised schedule for INTERIM response to question 03.08.05-29. AREVA NP submitted Supplement 9 on August 16, 2010, to provide INTERIM responses for Questions 03.08.05-26 and 03.08.05-27 and a revised schedule for INTERIM response to question 03.08.05-25. On August 27, 2010, AREVA NP submitted Supplement 10 to provide INTERIM responses for Questions 03.08.05-25 and 03.08.05-29. AREVA NP submitted a revised schedule for the final response to question 03.08.05-30 in Supplements 11 and 12 on September 15, 2010 and October 7, 2010, respectively.

The attached file, "RAI 376 Supplement 13 Response US EPR DC-INTERIM.pdf" provides a technically correct and complete INTERIM response to Questions 03.08.05-28 and 03.08.05-31, as committed.

The following table indicates the respective pages in the response document, RAI 376 Supplement 13 Response US EPR DC - INTERIM.pdf," that contains AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 354 - 03.08.05-28	2	10
RAI 354 - 03.08.05-31	11	12

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

Question #	Interim Response Date	Response Date
RAI 376-03.08.05-24	July 15, 2010 (Actual)	February 17, 2011
RAI 376-03.08.05-25	August 27, 2010 (Actual)	February 8, 2011
RAI 376-03.08.05-26	August 16, 2010 (Actual)	February 8, 2011
RAI 376-03.08.05-27	August 16, 2010 (Actual)	February 8, 2011
RAI 376-03.08.05-28	October 25, 2010 (Actual)	February 17, 2011
RAI 376-03.08.05-29	August 27, 2010 (Actual)	October 29, 2010
RAI 376-03.08.05-30	N/A	November 22, 2010
RAI 376-03.08.05-31	October 25, 2010 (Actual)	February 17, 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:** Thursday, October 07, 2010 2:50 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. 376, FSAR Ch. 3, Supplement 12

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, to provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010, to provide a FINAL response to 3 of the remaining 13 question, as committed. AREVA NP submitted Supplement 7 on July 29, 2010, to provide a FINAL response to 2 of the remaining 10 question, as committed. AREVA NP submitted Supplement 8 on August 9, 2010, to provide a revised schedule for INTERIM response to question 03.08.05-29. AREVA NP submitted Supplement 9 on August 16, 2010, to provide INTERIM responses for Questions 03.08.05-26 and 03.08.05-27 and a revised schedule for INTERIM response to question 03.08.05-25. On August 27, 2010, AREVA NP submitted Supplement 10 to provide INTERIM responses for Questions 03.08.05-25 and 03.08.05-29. AREVA NP submitted Supplement 11 on September 15, 2010, to provide a revised schedule for the final response to question 03.08.05-30

The schedule for Question 03.08.05-30 is being revised to allow additional time for AREVA NP to address NRC comments. The schedule for the remaining questions is unchanged.

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

Question #	Interim Response Date	Response Date
RAI 376-03.08.05-24	July 15, 2010 (Actual)	February 17, 2011
RAI 376-03.08.05-25	August 27, 2010 (Actual)	February 8, 2011
RAI 376-03.08.05-26	August 16, 2010 (Actual)	February 8, 2011
RAI 376-03.08.05-27	August 16, 2010 (Actual)	February 8, 2011
RAI 376-03.08.05-28	October 25, 2010	February 17, 2011
RAI 376-03.08.05-29	August 27, 2010 (Actual)	October 29, 2010
RAI 376-03.08.05-30	N/A	<b>November 22, 2010</b>
RAI 376-03.08.05-31	October 25, 2010	February 17, 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, September 15, 2010 9:21 AM

**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. 376, FSAR Ch. 3, Supplement 11

Getachew,



AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, to provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010, to provide a FINAL response to 3 of the remaining 13 question, as committed. AREVA NP submitted Supplement 7 on July 29, 2010, to provide a FINAL response to 2 of the remaining 10 question, as committed. AREVA NP submitted Supplement 8 on August 9, 2010, to provide a revised schedule for INTERIM response to question 03.08.05-29. AREVA NP submitted Supplement 9 on August 16, 2010, to provide INTERIM responses for Questions 03.08.05-26 and 03.08.05-27 and a revised schedule for INTERIM response to question 03.08.05-25. On August 27, 2010, AREVA NP submitted Supplement 10 to provide INTERIM responses for Questions 03.08.05-25 and 03.08.05-29.

The schedule for Question 03.08.05-30 is being revised to allow additional time for AREVA NP to interact with the NRC. The schedule for the remaining questions is unchanged.

The schedule for technically correct and complete responses to the remaining 8 questions is unchanged and provided below:

Question #	Interim Response Date	Response Date
RAI 376-03.08.05-24	July 15, 2010 (Actual)	February 17, 2011
RAI 376-03.08.05-25	August 27, 2010 (Actual)	February 8, 2011
RAI 376-03.08.05-26	August 16, 2010 (Actual)	February 8, 2011
RAI 376-03.08.05-27	August 16, 2010 (Actual)	February 8, 2011
RAI 376-03.08.05-28	October 25, 2010	February 17, 2011
RAI 376-03.08.05-29	August 27, 2010 (Actual)	October 29, 2010
RAI 376-03.08.05-30	N/A	October 14, 2010
RAI 376-03.08.05-31	October 25, 2010	February 17, 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:** Friday, August 27, 2010 4:58 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. 376, FSAR Ch. 3, Supplement 10-INTERIM

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, to

provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010, to provide a FINAL response to 3 of the remaining 13 question, as committed. AREVA NP submitted Supplement 7 on July 29, 2010, to provide a FINAL response to 2 of the remaining 10 question, as committed. AREVA NP submitted Supplement 8 on August 9, 2010, to provide a revised schedule for INTERIM response to question 03.08.05-29. AREVA NP submitted Supplement 9 on August 16, 2010, to provide INTERIM responses for Questions 03.08.05-26 and 03.08.05-27 and a revised schedule for INTERIM response to question 03.08.05-25.

The attached file, "RAI 376 Supplement 10 Response US EPR DC- INTERIM.pdf" provides a technically correct and complete INTERIM response to 2 of the remaining 8 questions, as committed.

The following table indicates the respective pages in the response document, "RAI 376 Supplement 10 Response US EPR DC- INTERIM.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 376 — 03.08.05-25	2	3
RAI 376 — 03.08.05-29	4	5

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

Question #	Interim Response Date	Response Date
RAI 376-03.08.05-24	July 15, 2010 (Actual)	February 17, 2011
RAI 376-03.08.05-25	August 27, 2010 (Actual)	February 8, 2011
RAI 376-03.08.05-26	August 16, 2010 (Actual)	February 8, 2011
RAI 376-03.08.05-27	August 16, 2010 (Actual)	February 8, 2011
RAI 376-03.08.05-28	October 25, 2010	February 17, 2011
RAI 376-03.08.05-29	August 27, 2010 (Actual)	October 29, 2010
RAI 376-03.08.05-30	N/A	September 16, 2010
RAI 376-03.08.05-31	October 25, 2010	February 17, 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:** Monday, August 16, 2010 12:34 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. 376, FSAR Ch. 3, Supplement 9

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, to

provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010, to provide a FINAL response to 3 of the remaining 13 question, as committed. AREVA NP submitted Supplement 7 on July 29, 2010, to provide a FINAL response to 2 of the remaining 10 question, as committed. AREVA NP submitted Supplement 8 on August 9, 2010, to provide a revised schedule for INTERIM response to question 03.08.05-29.

The schedule for INTERIM response to Question 03.08.05-25 is revised to allow AREVA NP additional time to prepare the response. The FINAL response date for Question 03.08.05-25 has not changed. The FINAL response date for Question 03.08.05-30 is being changed to account for the interaction with NRC being scheduled at a later date than the existing FINAL response date.

The attached file, "RAI 376 Supplement 9 Response - INTERIM.pdf" provides a technically correct and complete INTERIM response to 2 of the remaining 8 questions, as committed.

The following table indicates the respective pages in the response document, "RAI 376 Supplement 9 Response - INTERIM.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 376 — 03.08.05-26	2	2
RAI 376 — 03.08.05-27	3	5

The schedule for technically correct and complete responses to the remaining 8 questions is changed and provided below:

Question #	Interim Response Date	Response Date
RAI 376-03.08.05-24	July 15, 2010 (Actual)	February 17, 2011
RAI 376-03.08.05-25	<b>September 8, 2010</b>	February 8, 2011
RAI 376-03.08.05-26	August 16, 2010 (Actual)	February 8, 2011
RAI 376-03.08.05-27	August 16, 2010 (Actual)	February 8, 2011
RAI 376-03.08.05-28	October 25, 2010	February 17, 2011
RAI 376-03.08.05-29	August 27, 2010	October 29, 2010
RAI 376-03.08.05-30	N/A	<b>September 16, 2010</b>
RAI 376-03.08.05-31	October 25, 2010	February 17, 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 (EXT)  
**Sent:** Monday, August 09, 2010 5:45 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. 376, FSAR Ch. 3, Supplement 8

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, to provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010, to provide a FINAL response to 3 of the remaining 13 question, as committed. AREVA NP submitted Supplement 7 on July 29, 2010, to provide a FINAL response to 2 of the remaining 10 question, as committed.

The schedule for INTERIM response to Question 03.08.05-29 is revised to allow AREVA NP additional time to prepare the interim response. The final response date for Question 03.08.05-29 has not changed.

The schedule for technically correct and complete responses to the remaining 8 questions is unchanged and provided below:

Question #	Interim Response Date	Response Date
RAI 376-03.08.05-24	July 15, 2010 (Actual)	February 17, 2011
RAI 376-03.08.05-25	August 16, 2010	February 8, 2011
RAI 376-03.08.05-26	August 16, 2010	February 8, 2011
RAI 376-03.08.05-27	August 16, 2010	February 8, 2011
RAI 376-03.08.05-28	October 25, 2010	February 17, 2011
RAI 376-03.08.05-29	August 27, 2010	October 29, 2010
RAI 376-03.08.05-30	N/A	August 16, 2010
RAI 376-03.08.05-31	October 25, 2010	February 17, 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 (EXT)  
**Sent:** Thursday, July 29, 2010 7:56 PM  
**To:** 'Tefaye, 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. 376, FSAR Ch. 3, Supplement 7

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010 to provide an INTERIM response to question 03.08.05-24. AREVA NP submitted Supplement 6 on July 26, 2010, to provide a FINAL response to 3 of the remaining 13 question, as committed.

The attached file, "RAI 376 Supplement 7 FINAL Response US EPR DC.pdf" provides technically correct and complete responses to 2 of the remaining 10 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 376 Questions 03.08.01-48 and 03.08.03-24.

The following table indicates the respective pages in the response document, RAI 376 Supplement 7 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 376 — 03.08.01-48	2	3
RAI 376 — 03.08.03-24	4	8

The schedule for technically correct and complete responses to the remaining 8 questions is unchanged and provided below:

Question #	Interim Response Date	Response Date
RAI 376-03.08.05-24	July 15, 2010 (Actual)	February 17, 2011
RAI 376-03.08.05-25	August 16, 2010	February 8, 2011
RAI 376-03.08.05-26	August 16, 2010	February 8, 2011
RAI 376-03.08.05-27	August 16, 2010	February 8, 2011
RAI 376-03.08.05-28	October 25, 2010	February 17, 2011
RAI 376-03.08.05-29	August 9, 2010	October 29, 2010
RAI 376-03.08.05-30	N/A	August 16, 2010
RAI 376-03.08.05-31	October 25, 2010	February 17, 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 (EXT)  
**Sent:** Monday, July 26, 2010 4:00 PM  
**To:** 'Tefaye, 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. 376, FSAR Ch. 3, Supplement 6

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted a revised schedule for the remaining 13 questions in Supplements 2 and 3 on June 8, 2010, and June 24, 2010, respectively. AREVA NP submitted Supplement 4 on July 13, 2010, to provide a revised schedule for question 03.08.05-30. AREVA NP submitted Supplement 5 on July 15, 2010, an INTERIM response to question 03.08.05-24.

The attached file, "RAI 376 Supplement 6 Response U.S. EPR DC.pdf" provides a technically correct and complete FINAL response to 3 of the remaining 13 questions, as committed. The schedule for the remaining 10 questions is unchanged.

The following table indicates the respective pages in the response document, "RAI 376 Supplement 6 Response U.S. EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 376 — 03.08.01-47	2	3
RAI 376 — 03.08.03-21	4	5
RAI 376 — 03.08.03-22	6	7

The schedule for technically correct and complete responses to the remaining 13 questions is provided below.

Question #	Interim Response Date	Response Date
RAI 376-03.08.01-48	N/A	July 29, 2010
RAI 376-03.08.03-24	N/A	July 29, 2010
RAI 376-03.08.05-24	July 15, 2010 (Actual)	February 17, 2011
RAI 376-03.08.05-25	August 16, 2010	February 8, 2011
RAI 376-03.08.05-26	August 16, 2010	February 8, 2011
RAI 376-03.08.05-27	August 16, 2010	February 8, 2011
RAI 376-03.08.05-28	October 25, 2010	February 17, 2011
RAI 376-03.08.05-29	August 9, 2010	October 29, 2010
RAI 376-03.08.05-30	N/A	August 16, 2010
RAI 376-03.08.05-31	October 25, 2010	February 17, 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 (EXT)  
**Sent:** Thursday, July 15, 2010 7:13 PM  
**To:** 'Tesyfaye, 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. 376, FSAR Ch. 3, Supplement 5 - Interim

Getachew,

AREVA NP Inc. provided a schedule for a technically correct and complete response to RAI No. 376 on April 26, 2010. AREVA NP submitted Supplement 1 to the response on May 20, 2010 to address 1 of the remaining 14 questions. AREVA NP submitted Supplement 2 to the response on June 8, 2010, to change the schedule for responding to Question 03.08.05-30. AREVA NP submitted Supplement 3 to the response on June 24,



2010, to provide a changed schedule based upon the civil/structural re-planning activities and revised RAI response schedule presented to the NRC during the June 9, 2010, Public Meeting, and to allow time to interact with the NRC on the responses. AREVA NP submitted Supplement 4 on July 13, 2010 to provide a revised schedule for question 03.08.05-30. The attached file, "RAI 376 Question 03.08.05-24 Response - INTERIM.pdf" provides a technically correct and complete INTERIM response to 1 of the remaining 13 questions, as committed.

The following table indicates the respective pages in the response document, "RAI 376 Question 03.08.05-24 Response - INTERIM.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 376 — 03.08.05-24	2	5

The schedule for technically correct and complete FINAL responses to the remaining 13 questions is unchanged and provided below:

Question #	Interim Response Date	Response Date
RAI 376-03.08.01-47	N/A	August 17, 2010
RAI 376-03.08.01-48	N/A	July 29, 2010
RAI 376-03.08.03-21	N/A	July 26, 2010
RAI 376-03.08.03-22	N/A	July 26, 2010
RAI 376-03.08.03-24	N/A	July 29, 2010
RAI 376-03.08.05-24	July 15, 2010 <b>Actual</b>	February 17, 2011
RAI 376-03.08.05-25	August 16, 2010	February 8, 2011
RAI 376-03.08.05-26	August 16, 2010	February 8, 2011
RAI 376-03.08.05-27	August 16, 2010	February 8, 2011
RAI 376-03.08.05-28	October 25, 2010	February 17, 2011
RAI 376-03.08.05-29	August 9, 2010	October 29, 2010
RAI 376-03.08.05-30	N/A	August 16, 2010
RAI 376-03.08.05-31	October 25, 2010	February 17, 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 (EXT)  
**Sent:** Tuesday, July 13, 2010 6:08 PM  
**To:** 'Tefaye, 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. 376, FSAR Ch. 3, Supplement 4

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted Supplement 2 to the response on June 8, 2010, to provide a schedule for the remaining 13 questions, which were affected by the work underway to address NRC comments from the April 26, 2010, audit. AREVA NP submitted RAI No. 376 Supplement 3 on June 24, 2010, to reflect the revised RAI response schedule as a result of the civil/structural re-planning activities.

RAI 376 Supplement 4 revises the schedule for the response to Question 03.08.05-30 to allow time to interact with the NRC on the draft response. The schedule for the remaining 12 questions is unchanged.

The schedule for technically correct and complete responses to the remaining 13 questions is provided below.

Question #	Interim Response Date	Response Date
RAI 376-03.08.01-47	N/A	August 17, 2010
RAI 376-03.08.01-48	N/A	July 29, 2010
RAI 376-03.08.03-21	N/A	July 26, 2010
RAI 376-03.08.03-22	N/A	July 26, 2010
RAI 376-03.08.03-24	N/A	July 29, 2010
RAI 376-03.08.05-24	July 15, 2010	February 17, 2011
RAI 376-03.08.05-25	August 16, 2010	February 8, 2011
RAI 376-03.08.05-26	August 16, 2010	February 8, 2011
RAI 376-03.08.05-27	August 16, 2010	February 8, 2011
RAI 376-03.08.05-28	October 25, 2010	February 17, 2011
RAI 376-03.08.05-29	August 9, 2010	October 29, 2010
RAI 376-03.08.05-30	N/A	August 16, 2010
RAI 376-03.08.05-31	October 25, 2010	February 17, 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 (EXT)

**Sent:** Thursday, June 24, 2010 11:56 AM

**To:** 'Tefaye, 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); VAN NOY Mark (EXT); CORNELL Veronica (EXT); GARDNER George Darrell (AREVA NP INC)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 376, FSAR Ch. 3, Supplement 3

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions. AREVA NP submitted Supplement 2 to the response on June 8, 2010, to provide a schedule for the remaining 13 questions, which were affected by the work underway to address NRC comments from the April 26, 2010, audit.

Based upon the civil/structural re-planning activities and revised RAI response schedule presented to the NRC during the June 9, 2010, Public Meeting, and to allow time to interact with the NRC on the responses, the schedule has been changed. The schedule for 03.08.05-30 remains unchanged.

Prior to submittal of the final RAI response, AREVA NP will provide an interim RAI response that includes:

- (1) a description of the technical work (e.g., methodology)
- (2) U.S. EPR FSAR revised pages, as applicable

The revised schedule for an interim response and the technically correct and complete response to these questions is provided below.

Question #	Interim Response Date	Response Date
RAI 376-03.08.01-47	N/A	August 17, 2010
RAI 376-03.08.01-48	N/A	July 29, 2010
RAI 376-03.08.03-21	N/A	July 26, 2010
RAI 376-03.08.03-22	N/A	July 26, 2010
RAI 376-03.08.03-24	N/A	July 29, 2010
RAI 376-03.08.05-24	July 15, 2010	February 17, 2011
RAI 376-03.08.05-25	August 16, 2010	February 8, 2011
RAI 376-03.08.05-26	August 16, 2010	February 8, 2011
RAI 376-03.08.05-27	August 16, 2010	February 8, 2011
RAI 376-03.08.05-28	October 25, 2010	February 17, 2011
RAI 376-03.08.05-29	August 9, 2010	October 29, 2010
RAI 376-03.08.05-30	N/A	July 14, 2010
RAI 376-03.08.05-31	October 25, 2010	February 17, 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 (EXT)  
**Sent:** Tuesday, June 08, 2010 3:32 PM  
**To:** 'Tefaye, 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. 376, FSAR Ch. 3, Supplement 2

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 376 on April 26, 2010. RAI 376 Supplement 1 provided a technically correct and complete response to 1 of 14 questions.

The schedule for the response to Question 03.08.05-30 has been changed. The final schedule for this question as well as the remaining questions below will be evaluated based on the information that will be presented at the June 9, 2010, public meeting and subsequent NRC feedback.

Question #	Response Date
RAI 376-03.08.01-47	July 14, 2010
RAI 376-03.08.01-48	August 3, 2010
RAI 376-03.08.03-21	June 24, 2010
RAI 376-03.08.03-22	June 24, 2010
RAI 376-03.08.03-24	August 3, 2010
RAI 376-03.08.05-24	August 3, 2010
RAI 376-03.08.05-25	August 3, 2010
RAI 376-03.08.05-26	August 3, 2010
RAI 376-03.08.05-27	July 14, 2010
RAI 376-03.08.05-28	August 3, 2010
RAI 376-03.08.05-29	August 3, 2010
RAI 376-03.08.05-30	July 14, 2010
RAI 376-03.08.05-31	August 3, 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, May 20, 2010 4:24 PM  
**To:** 'Tefaye, 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. 376, FSAR Ch. 3, Supplement 1

Getachew,

AREVA NP Inc. provided a schedule for a technically correct and complete response to RAI No. 376 on April 26, 2010. The attached file, "RAI 376 Supplement 1 Response US EPR DC.pdf," provides technically correct and complete responses to 1 of the remaining 14 questions.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 376 Question 03.08.03-23.

The response to one question, 03.08.05-30, cannot be provided at this time due to its dependence on path-to-closure related work-planning currently being rescheduled and reviewed by the NRC.

The following table indicates the respective pages in the response document, "RAI 376 Supplement 1 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
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RAI 376-03.08.03-23	2	2
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A complete answer is not provided for 13 of the 14 questions. The schedule for a technically correct and complete response to these questions has been changed and is provided below.

Question #	Response Date
RAI 376-03.08.01-47	July 14, 2010
RAI 376-03.08.01-48	August 3, 2010
RAI 376-03.08.03-21	June 24, 2010
RAI 376-03.08.03-22	June 24, 2010
RAI 376-03.08.03-24	August 3, 2010
RAI 376-03.08.05-24	August 3, 2010
RAI 376-03.08.05-25	August 3, 2010
RAI 376-03.08.05-26	August 3, 2010
RAI 376-03.08.05-27	July 14, 2010
RAI 376-03.08.05-28	August 3, 2010
RAI 376-03.08.05-29	August 3, 2010
RAI 376-03.08.05-30	June 10, 2010
RAI 376-03.08.05-31	August 3, 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:** Monday, April 26, 2010 12:49 PM  
**To:** 'Tefsaye, 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); VAN NOY Mark (EXT)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 376 (4355,4367,4377), FSAR Ch. 3

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 376 Response US EPR DC.pdf" provides a schedule since a technically correct and complete response to the 14 questions is not provided.

The following table indicates the respective pages in the response document, "RAI 376 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 376-03.08.01-47	2	2
RAI 376-03.08.01-48	3	4
RAI 376-03.08.03-21	5	6
RAI 376-03.08.03-22	7	7
RAI 376-03.08.03-23	8	8

RAI 376-03.08.03-24	9	10
RAI 376-03.08.05-24	11	12
RAI 376-03.08.05-25	13	13
RAI 376-03.08.05-26	14	14
RAI 376-03.08.05-27	15	16
RAI 376-03.08.05-28	17	19
RAI 376-03.08.05-29	20	20
RAI 376-03.08.05-30	21	21
RAI 376-03.08.05-31	22	22

A complete answer is not provided for 14 of the 14 questions. The schedule for a technically correct and complete response to these questions is provided below.

Question #	Response Date
RAI 376-03.08.01-47	July 14, 2010
RAI 376-03.08.01-48	August 3, 2010
RAI 376-03.08.03-21	June 24, 2010
RAI 376-03.08.03-22	June 24, 2010
RAI 376-03.08.03-23	May 20, 2010
RAI 376-03.08.03-24	August 3, 2010
RAI 376-03.08.05-24	August 3, 2010
RAI 376-03.08.05-25	August 3, 2010
RAI 376-03.08.05-26	August 3, 2010
RAI 376-03.08.05-27	July 14, 2010
RAI 376-03.08.05-28	August 3, 2010
RAI 376-03.08.05-29	August 3, 2010
RAI 376-03.08.05-30	May 20, 2010
RAI 376-03.08.05-31	August 3, 2010

Sincerely,  
Martin (Marty) C. Bryan  
U.S. EPR Design Certification Licensing Manager  
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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:** Thursday, March 25, 2010 2:13 PM  
**To:** ZZ-DL-A-USEPR-DL  
**Cc:** Xu, Jim; Hawkins, Kimberly; Miernicki, Michael; Colaccino, Joseph; ArevaEPRDCPEm Resource  
**Subject:** U.S. EPR Design Certification Application RAI No. 376 (4355,4367,4377), FSAR Ch. 3

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on March 11, 2010, and on March 24, 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:** 3298

**Mail Envelope Properties** (1F1CC1BBDC66B842A46CAC03D6B1CD4104ACAFBF)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 376, FSAR Ch. 3, Supplement 27 (Part 3 of 3)  
**Sent Date:** 7/29/2011 5:59:46 PM  
**Received Date:** 7/29/2011 6:00:12 PM  
**From:** WELLS Russell (AREVA)

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

**Recipients:**

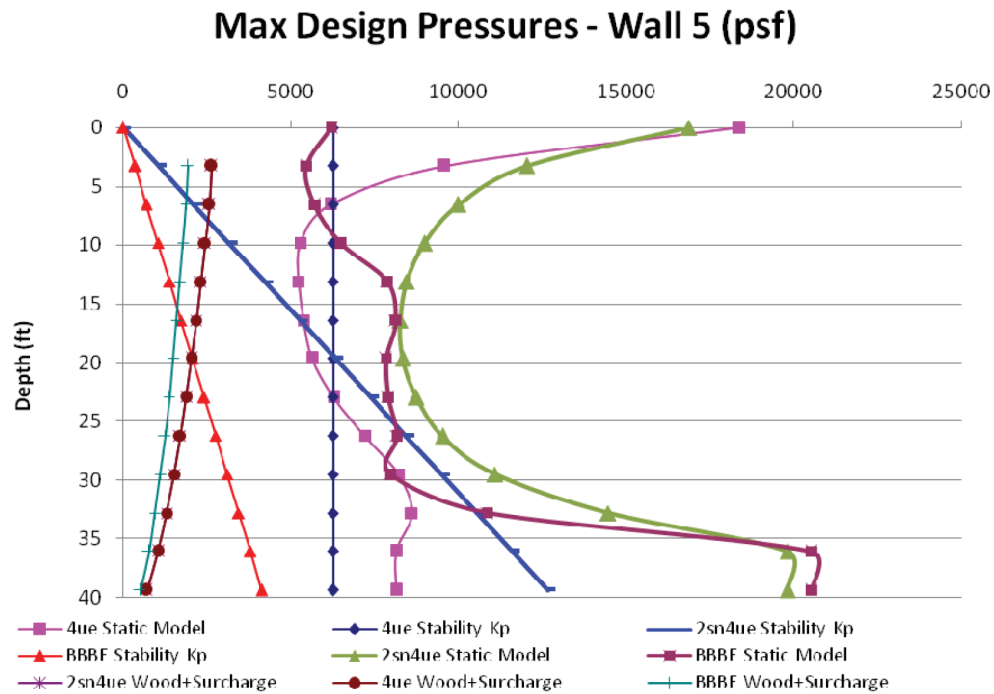
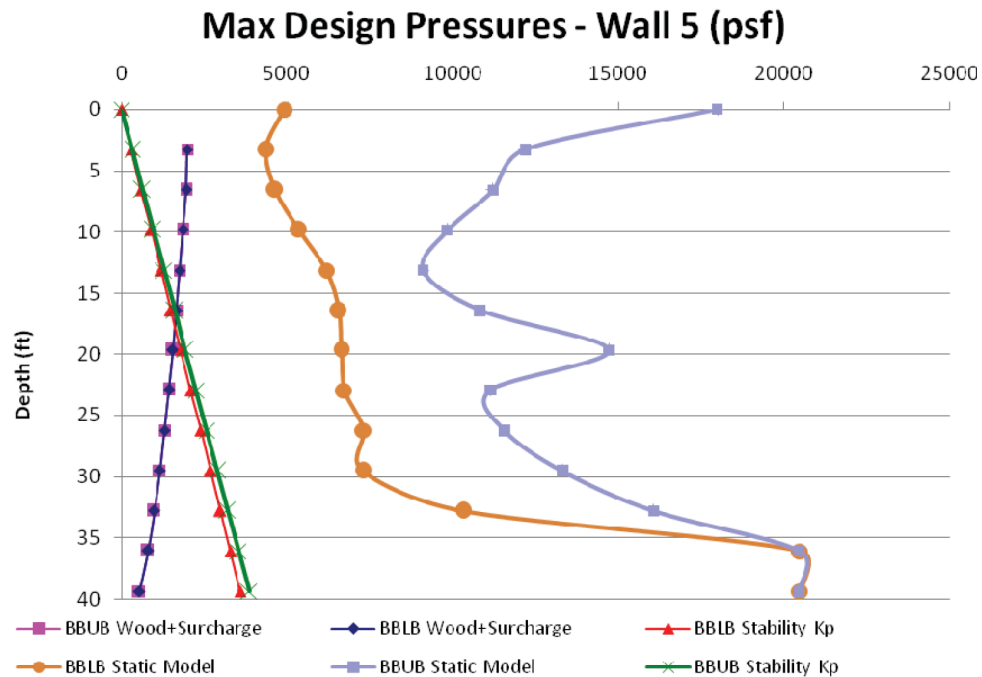
"WILLIFORD Dennis (AREVA)" <Dennis.Williford@areva.com>  
Tracking Status: None  
"ROMINE Judy (AREVA)" <Judy.Romine@areva.com>  
Tracking Status: None  
"LENTZ Tony (EXTERNAL AREVA)" <Tony.Lentz.ext@areva.com>  
Tracking Status: None  
"BENNETT Kathy (AREVA)" <Kathy.Bennett@areva.com>  
Tracking Status: None  
"DELANO Karen (AREVA)" <Karen.Delano@areva.com>  
Tracking Status: None  
"RYAN Tom (AREVA)" <Tom.Ryan@areva.com>  
Tracking Status: None  
"Teschaye, Getachew" <Getachew.Teschaye@nrc.gov>  
Tracking Status: None

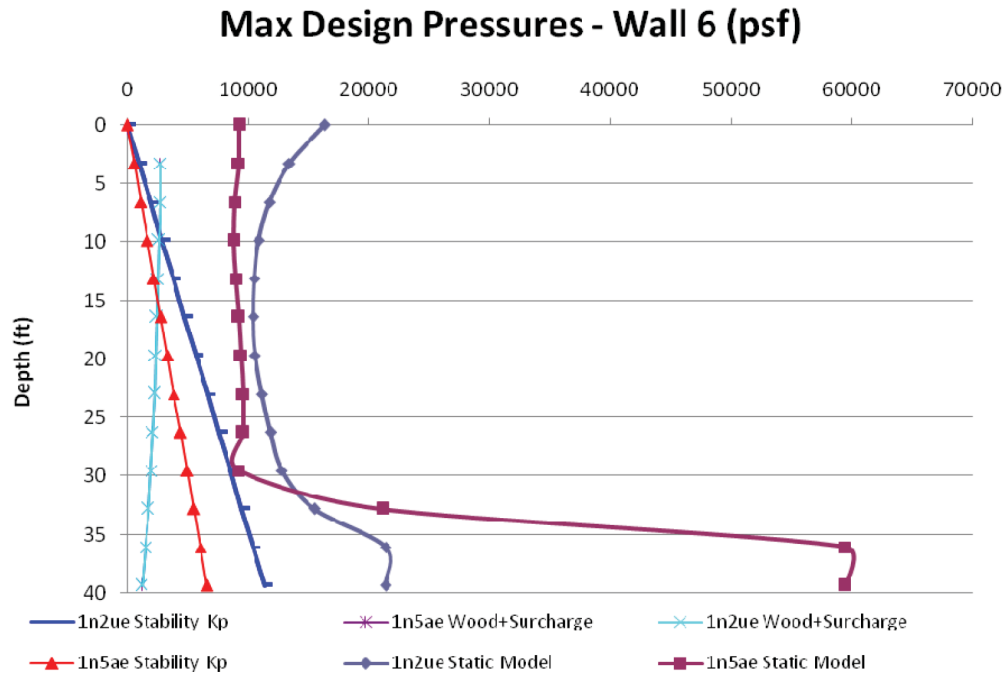
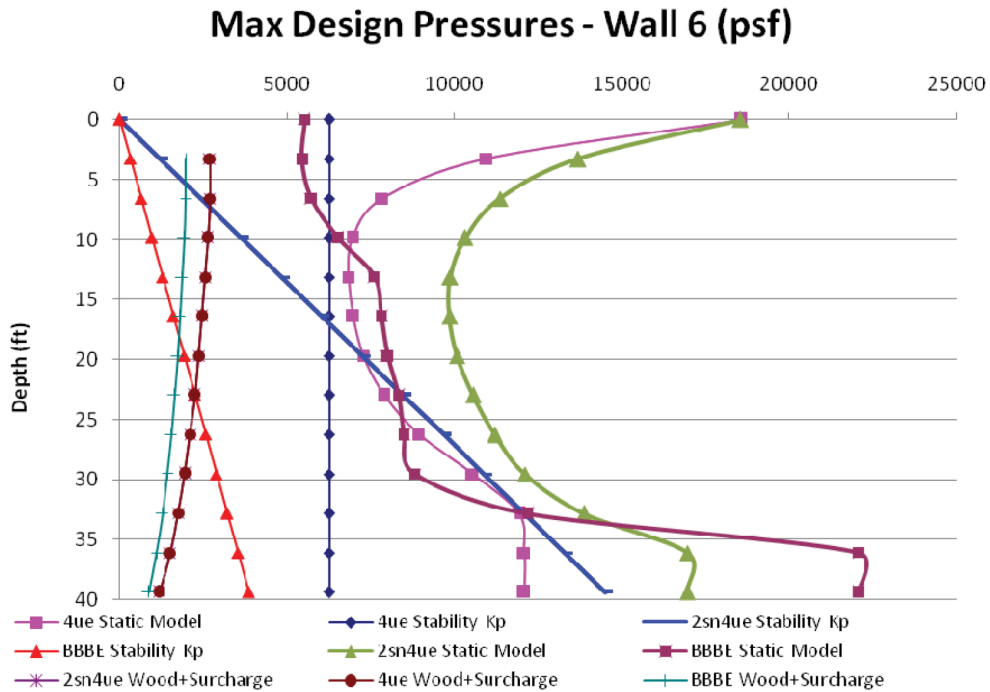
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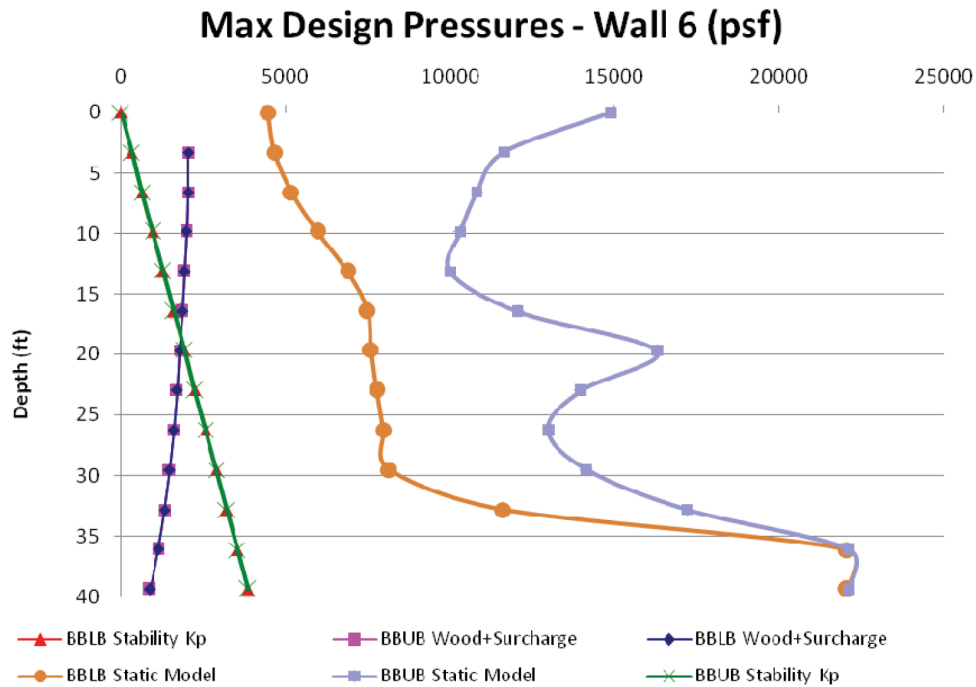
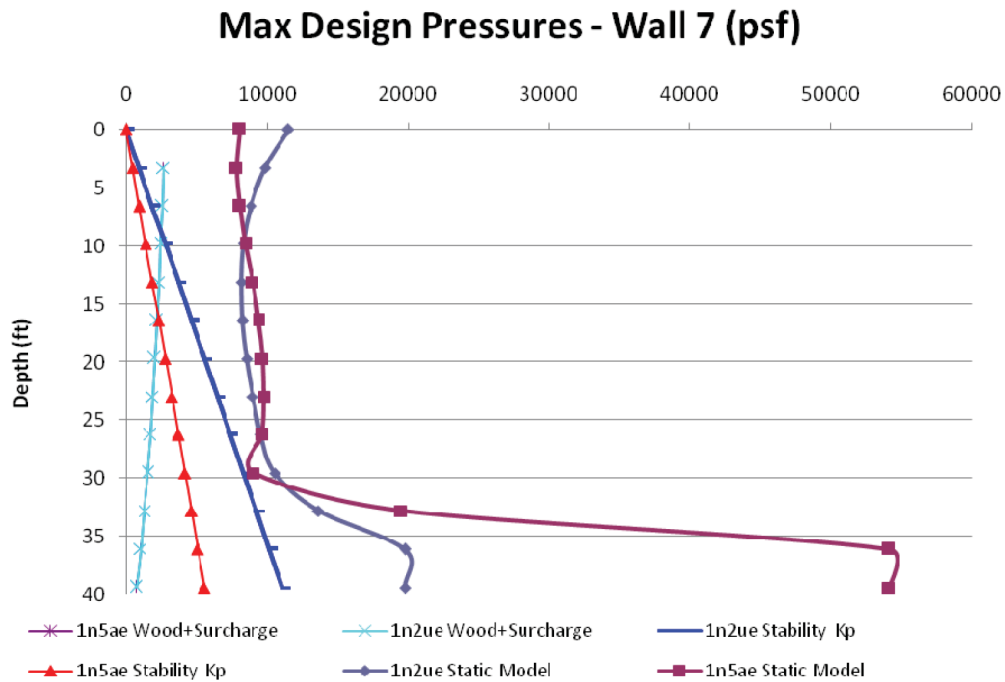
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RAI 376 Supplement 27 Response US EPR DC_Part 3 of 3.pdf		4975639

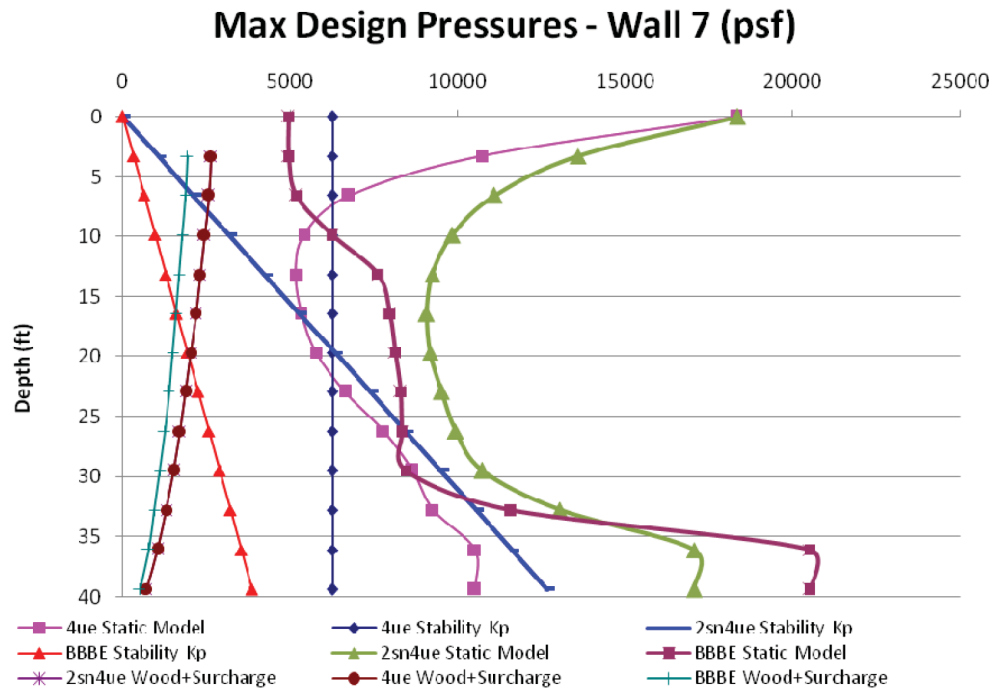
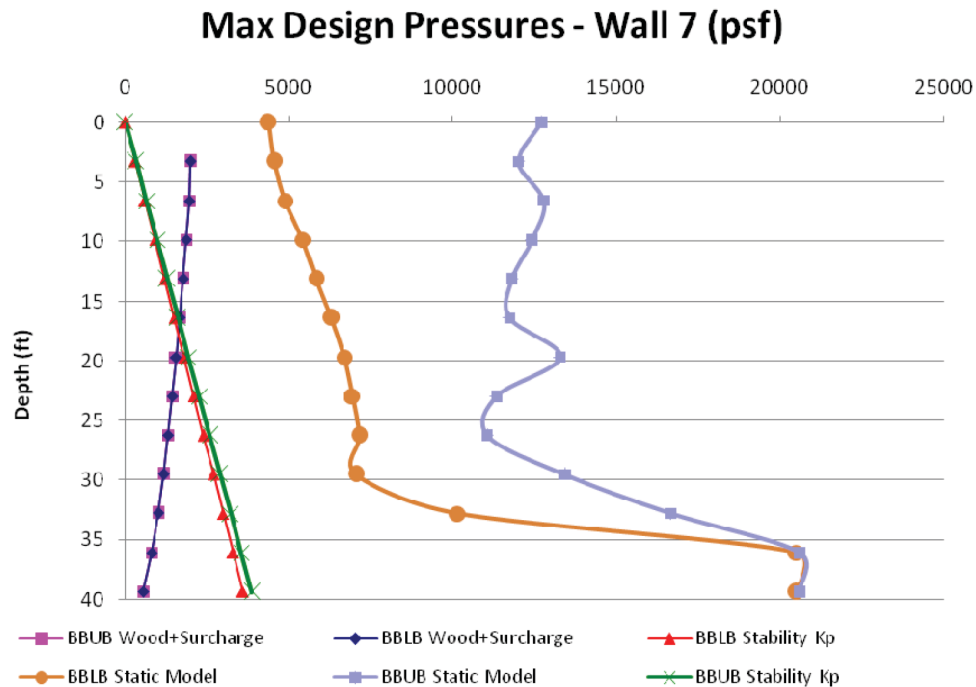
**Options**

**Priority:** Standard  
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**Sensitivity:** Normal  
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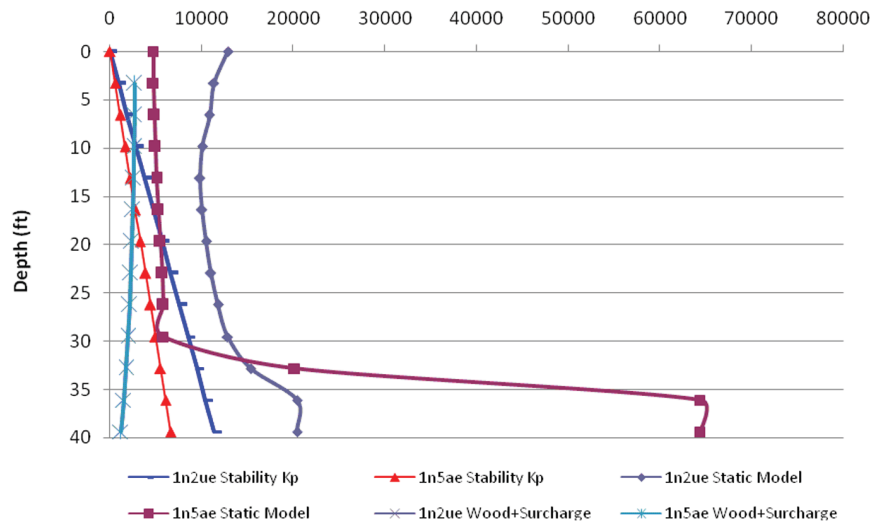
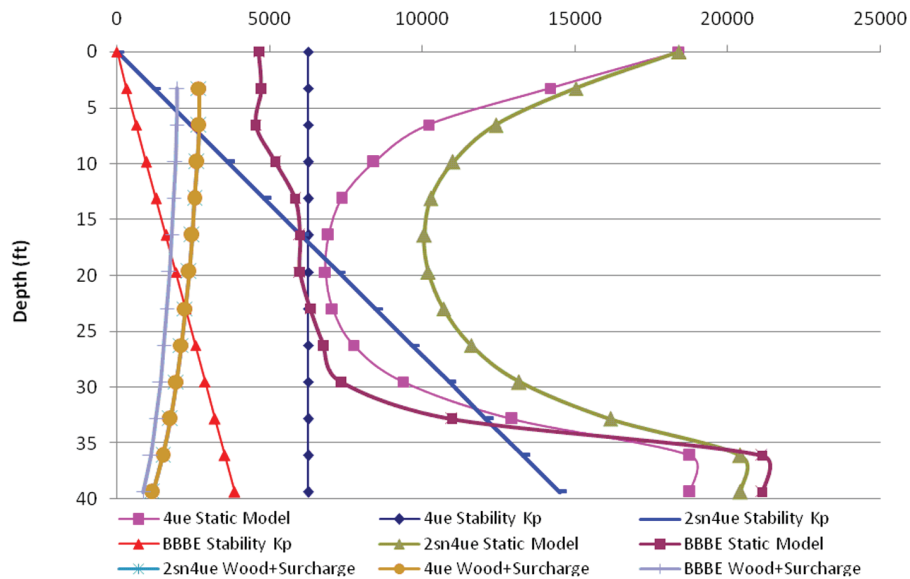
**Figure 03.08.05-28-53—Wall 5 - Soil 2sn4ue, 4ue and hfbf (Uncracked Concrete)****Figure 03.08.05-28-54—Wall 5 - Soil hflb and hfub (Uncracked Concrete)**

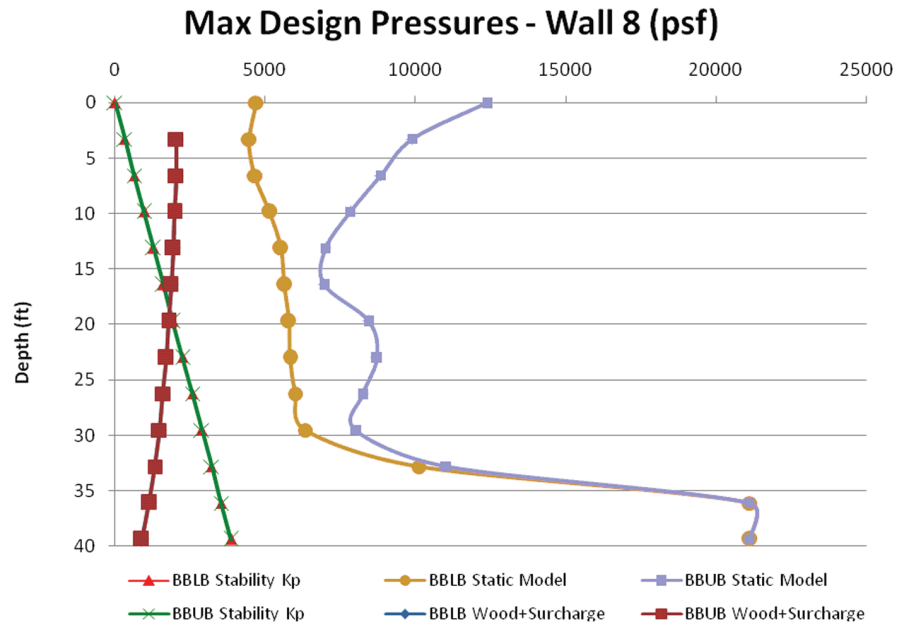
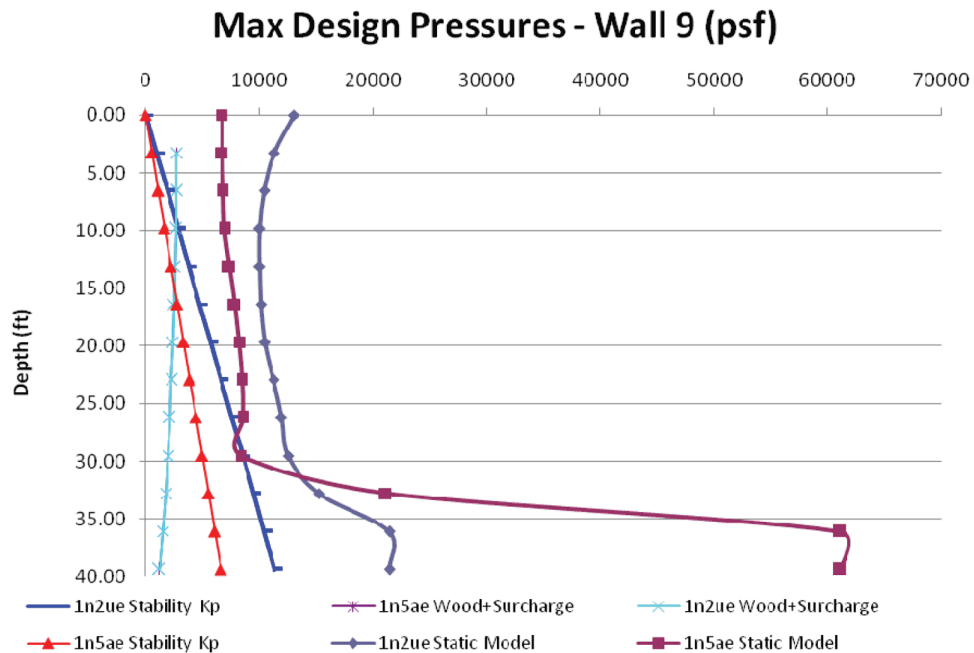
**Figure 03.08.05-28-55—Wall 6 - Soil 1n2ue and 1n5ae (Uncracked Concrete)****Figure 03.08.05-28-56—Wall 6 - Soil 2sn4ue, 4ue and hfbe (Uncracked Concrete)**

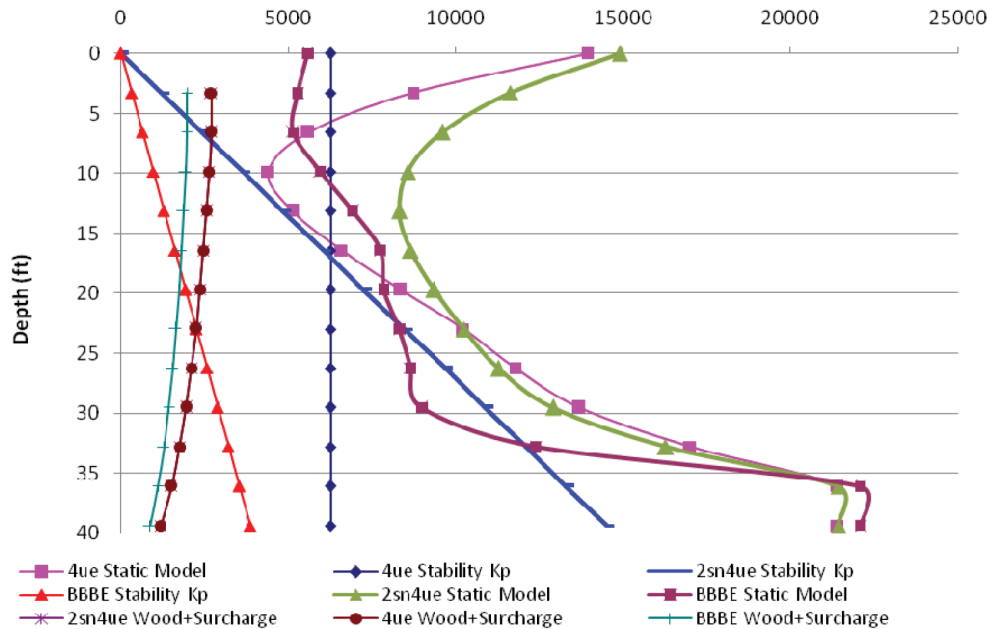
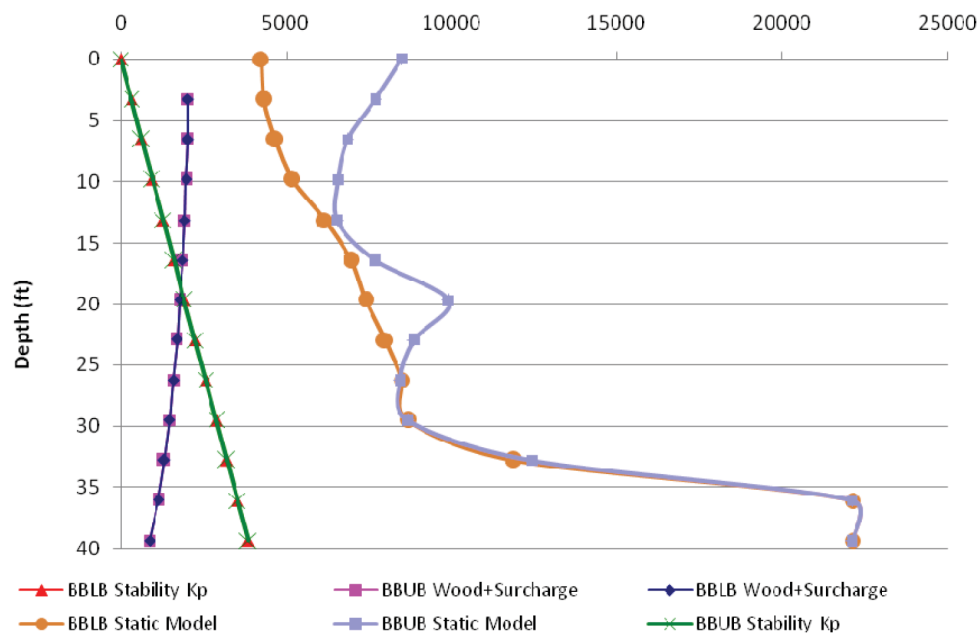
**Figure 03.08.05-28-57—Wall 6 - Soil hflb and hfub (Uncracked Concrete)****Figure 03.08.05-28-58—Wall 7 - Soil 1n2ue and 1n5ae (Uncracked Concrete)**

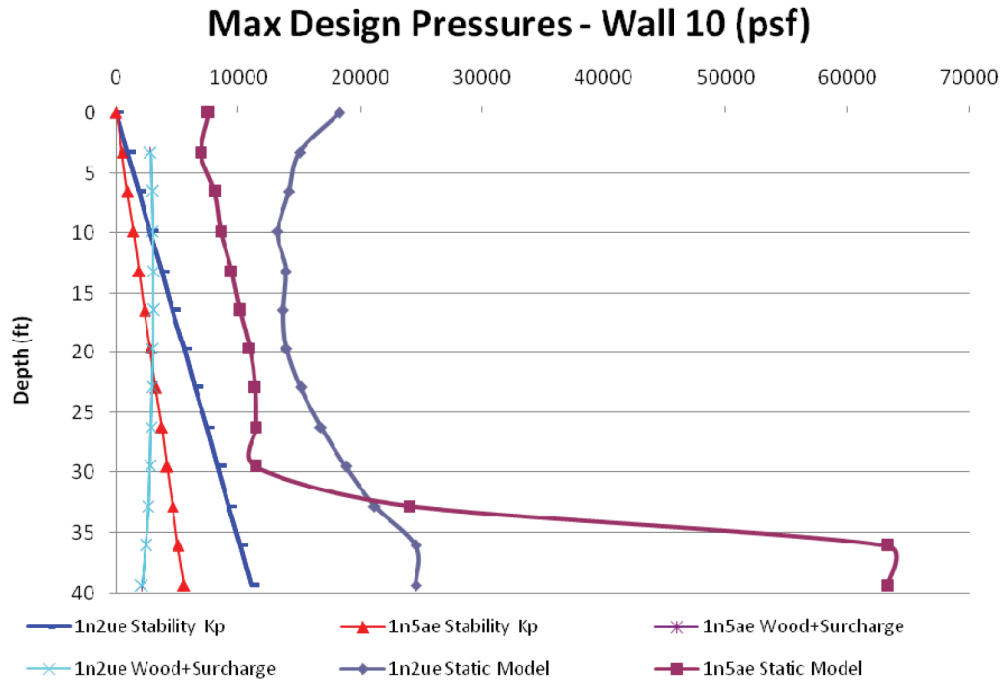
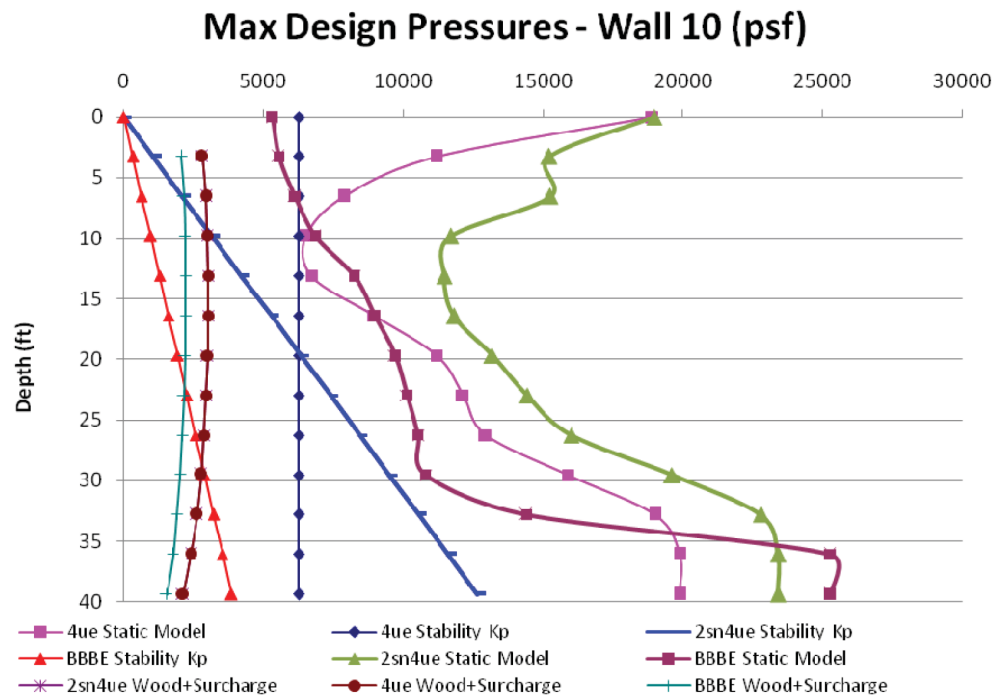
**Figure 03.08.05-28-59—Wall 7 - Soil 2sn4ue, 4ue and hfbe (Uncracked Concrete)****Figure 03.08.05-28-60—Wall 7 - Soil hflb and hfub (Uncracked Concrete)**

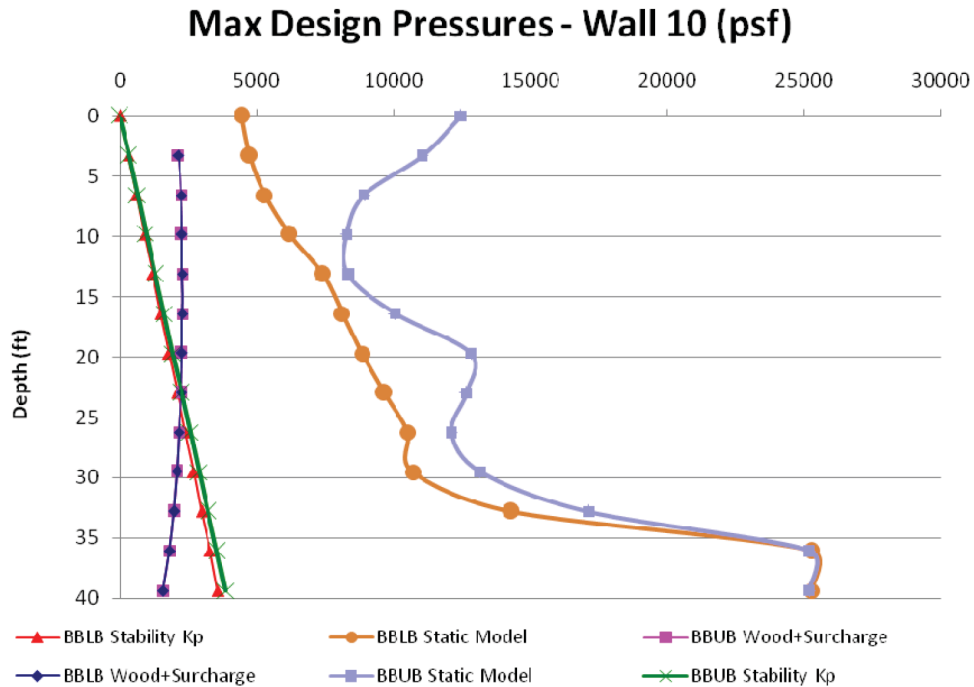
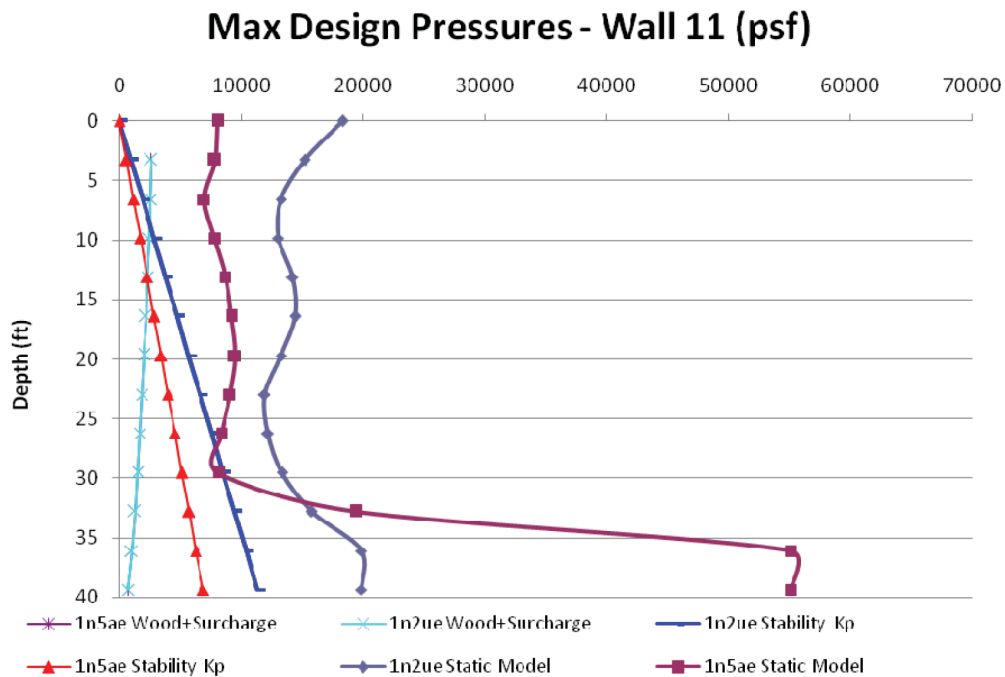


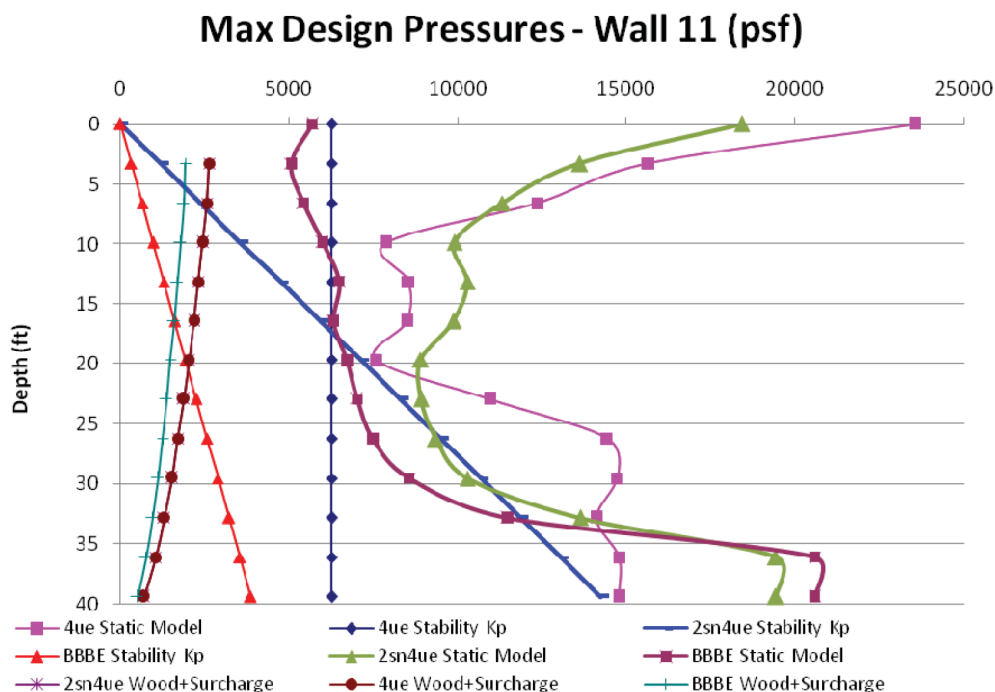
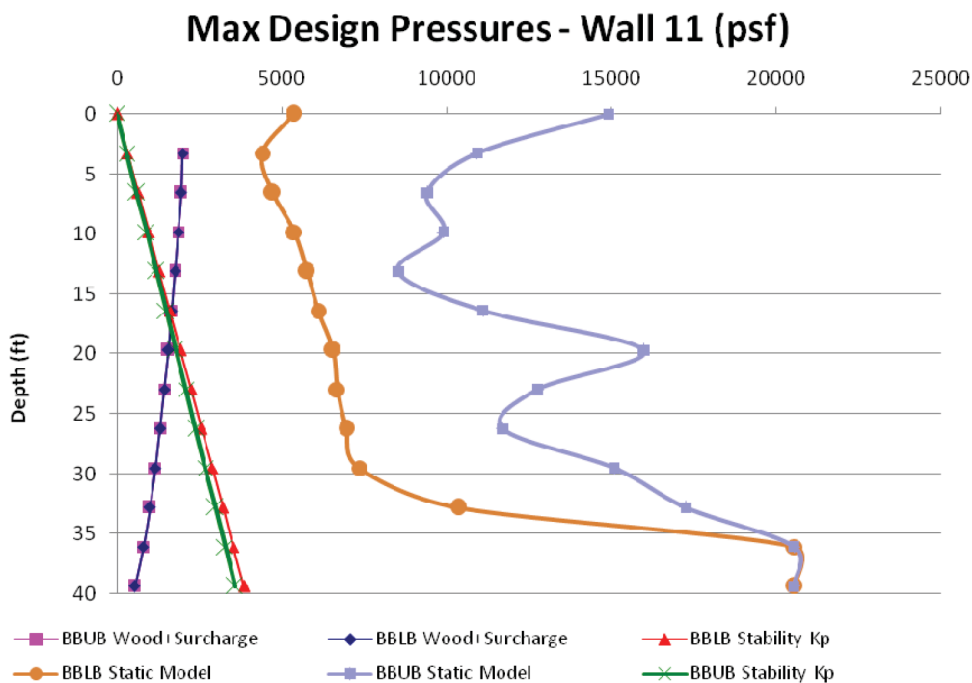
**Figure 03.08.05-28-61—Wall 8 - Soil 1n2ue and 1n5ae (Uncracked Concrete)****Max Design Pressures - Wall 8 (psf)****Figure 03.08.05-28-62—Wall 8 - Soil 2sn4ue, 4ue and hfb (Uncracked Concrete)****Max Design Pressures - Wall 8 (psf)**

**Figure 03.08.05-28-63—Wall 8 - Soil hflb and hfub (Uncracked Concrete)****Figure 03.08.05-28-64—Wall 9 - Soil 1n2ue and 1n5ae (Uncracked Concrete)**

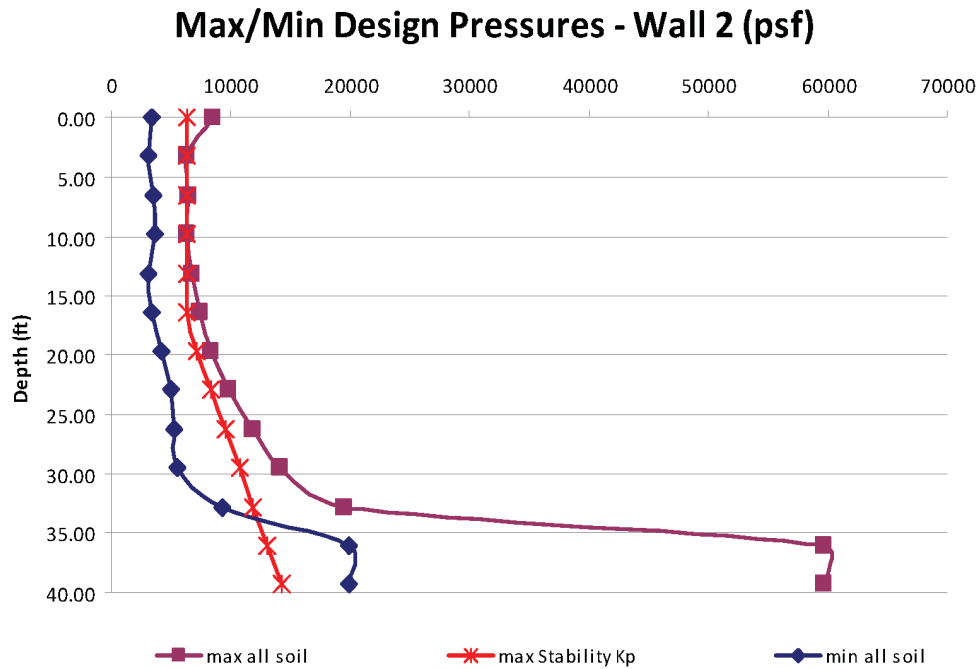
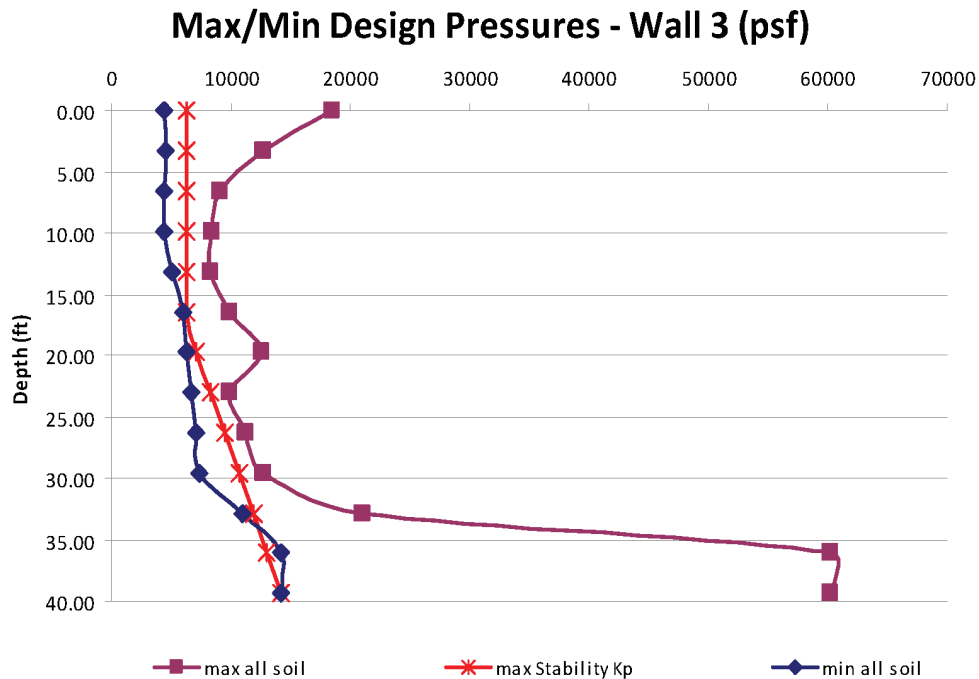
**Figure 03.08.05-28-65—Wall 9 - Soil 2sn4ue, 4ue and hfbe (Uncracked Concrete)****Max Design Pressures - Wall 9 (psf)****Figure 03.08.05-28-66—Wall 9 - Soil hf1b and hfub (Uncracked Concrete)****Max Design Pressures - Wall 9 (psf)**

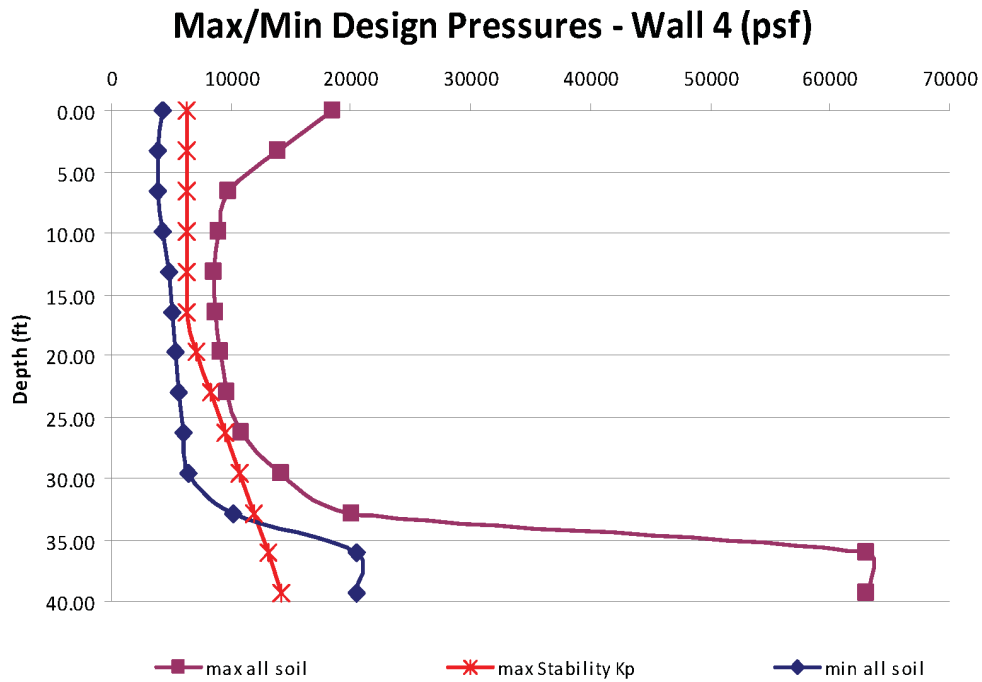
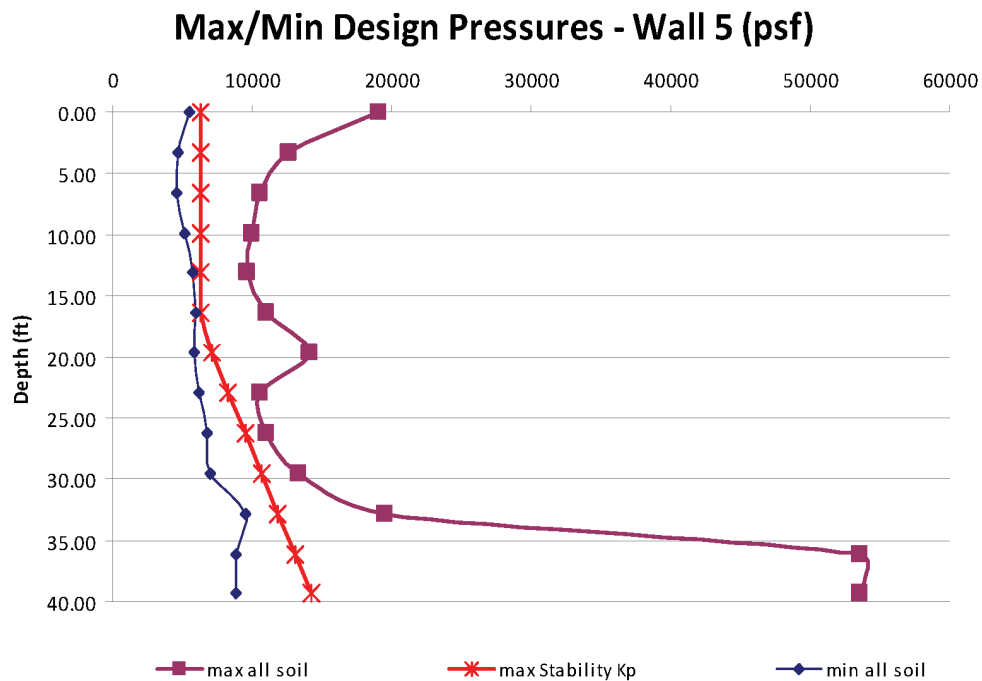
**Figure 03.08.05-28-67—Wall 10 - Soil 1n2ue & 1n5ae (Uncracked Concrete)****Figure 03.08.05-28-68—Wall 10 - Soil 2sn4ue, 4ue and hfbе (Uncracked Concrete)**

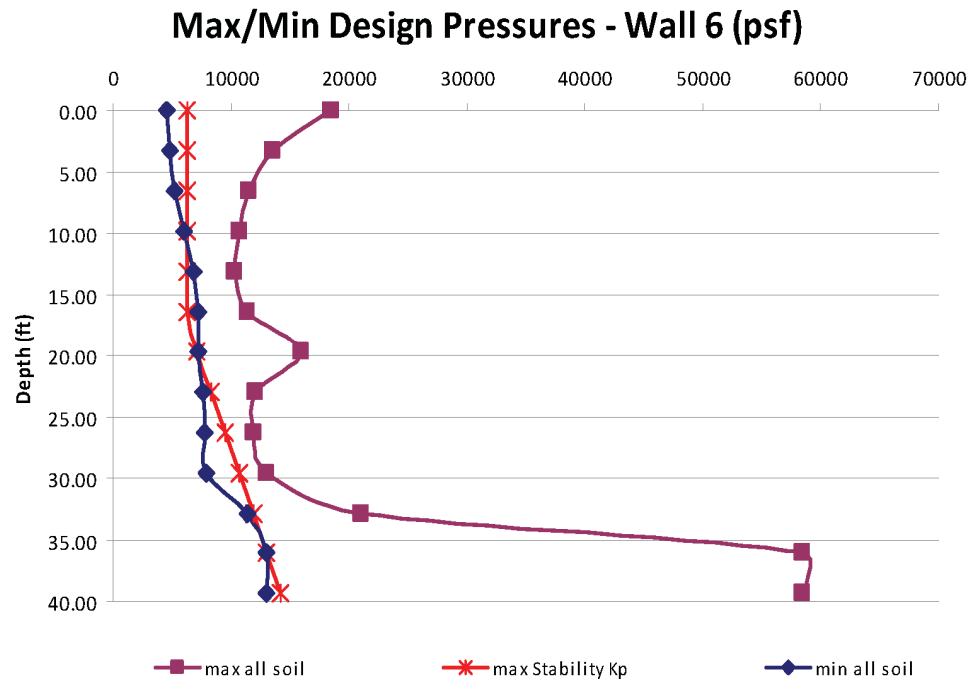
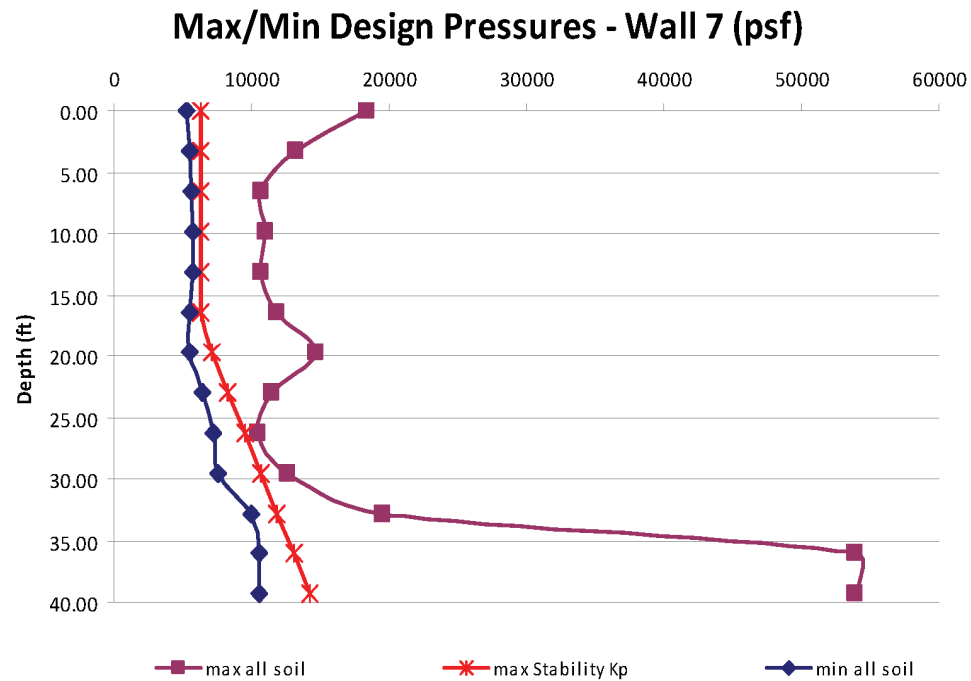
**Figure 03.08.05-28-69—Wall 10 - Soil hflb and hfub (Uncracked Concrete)****Figure 03.08.05-28-70—Wall 11 - Soil 1n2ue and 1n5ae (Uncracked Concrete)**

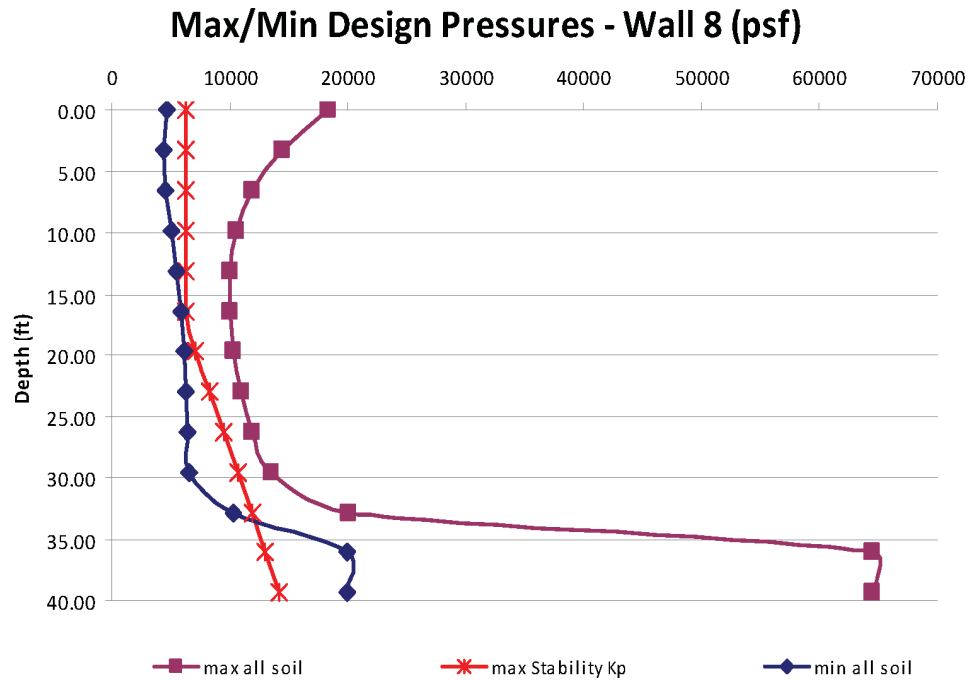
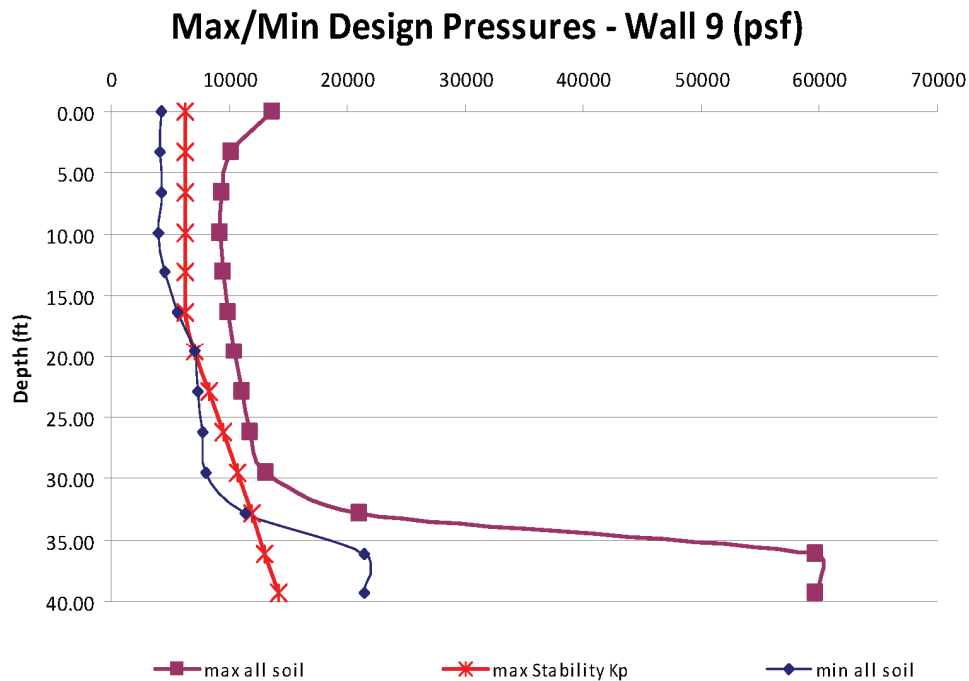
**Figure 03.08.05-28-71—Wall 11 - Soil 2sn4ue, 4ue and hfbe  
(Uncracked Concrete)****Figure 03.08.05-28-72—Wall 11 - Soil hflb and hfub (Uncracked Concrete)**

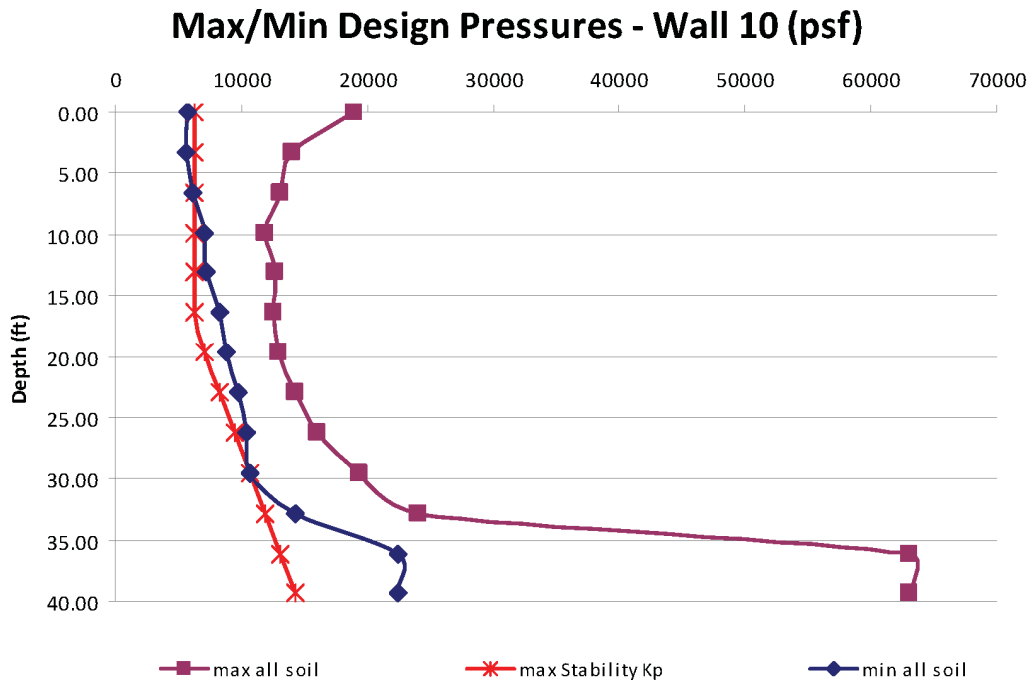
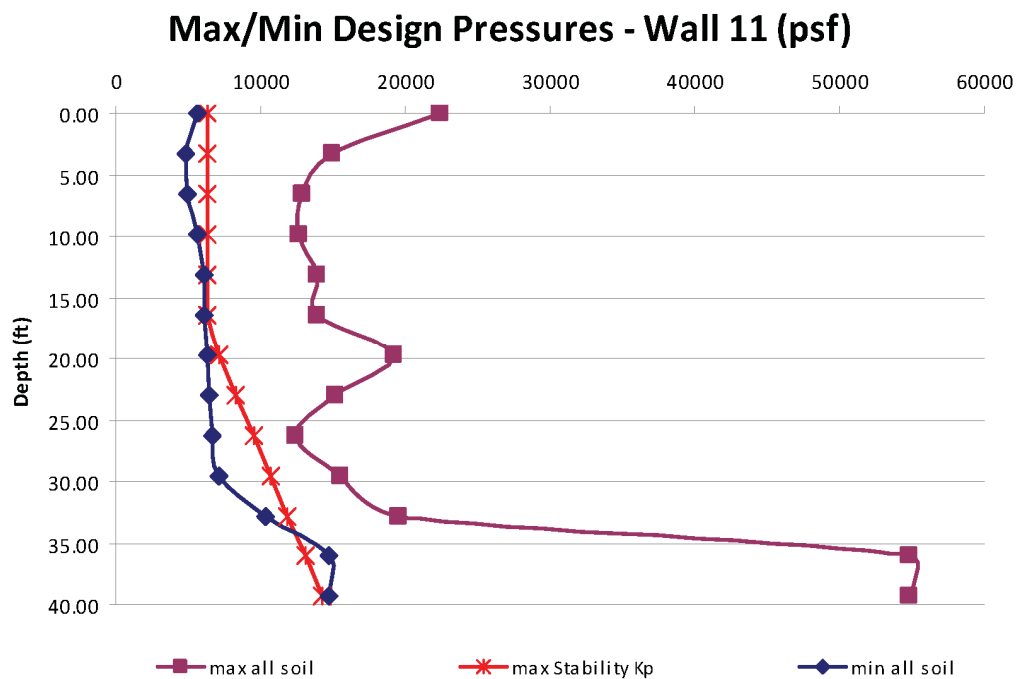


**Figure 03.08.05-28-73—Wall 2 – Upper/Lower Bound of all Soil Cases  
(Uncracked Concrete)****Figure 03.08.05-28-74—Wall 3 – Upper/Lower Bound of all Soil Cases  
(Uncracked Concrete)**

**Figure 03.08.05-28-75—Wall 4 – Upper/Lower Bound of all Soil Cases  
(Uncracked Concrete)****Figure 03.08.05-28-76—Wall 5 – Upper/Lower Bound of all Soil Cases  
(Uncracked Concrete)**

**Figure 03.08.05-28-77—Wall 6 – Upper/Lower Bound of all Soil Cases  
(Uncracked Concrete)****Figure 03.08.05-28-78—Wall 7 – Upper/Lower Bound of all Soil Cases  
(Uncracked Concrete)**

**Figure 03.08.05-28-79—Wall 8 – Upper/Lower Bound of all Soil Cases  
(Uncracked Concrete)****Figure 03.08.05-28-80—Wall 9 – Upper/Lower Bound of all Soil Cases  
(Uncracked Concrete)**

**Figure 03.08.05-28-81—Wall 10 – Upper/Lower Bound of all Soil Cases  
(Uncracked Concrete)****Figure 03.08.05-28-82—Wall 11 – Upper/Lower Bound of all Soil Cases  
(Uncracked Concrete)**

# U.S. EPR Final Safety Analysis Report Markups



**Table 1.8-2—U.S. EPR Combined License Information Items**  
**Sheet 6 of 40**

Item No.	Description	Section
2.5-3	A COL applicant that references the U.S. EPR design certification will compare the final <del>site-specific soil characteristics</del> <u>strain-dependent soil profile</u> with the U.S. EPR design soil parameters and verify that the site-specific seismic <del>characteristics are</del> <u>response is</u> enveloped by the CSDRS and the soil profiles discussed in Sections 2.5.2, 2.5.4.7 and 3.7.1 and summarized in Table 3.7.1-6, <u>Table 3.7.1-8 and Table 3.7.1-9</u> .	2.5.2.6 2.5.4.7
2.5-4	A COL applicant that references the U.S. EPR design certification will verify that site-specific foundation soils beneath the foundation basemats of Seismic Category I structures have the capacity to support the bearing pressure with a factor of safety of 3.0 under static conditions <u>or 2.0 under dynamic conditions, whichever is greater.</u>	2.5.4.10.1  03.08.05-28
2.5-5	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.	2.5.3
2.5-6	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
2.5-7	A COL applicant that references the U.S. EPR design certification will verify that the predicted <u>tilt</u> settlement value of ½ in per 50 ft in any direction across the foundation basemat of a Seismic Category I structure is not exceeded. Settlement values larger than this may be demonstrated acceptable by performing additional site-specific evaluations.	2.5.4.10.2
2.5-8	A COL applicant that references the U.S. EPR design certification will evaluate site-specific information concerning the stability of earth and rock slopes, both natural and manmade (e.g., cuts, fill, embankments, dams, etc.), of which failure could adversely affect the safety of the plant.	2.5.5

Table 2.1-1—U.S. EPR Site Design Envelope  
Sheet 2 of 7

U.S. EPR Site Design Envelope	
Soil (Refer to Section 2.5)	
Minimum Static Bearing Capacity	<p>03.08.05-28 →</p> <p>Maximum static bearing demand is 22,000 lbs/ft<sup>2</sup> ksf in localized areas at the bottom of the Nuclear Island basemat and 15 ksf on average across the total area of the bottom of the Nuclear Island basemat.</p> <p>The ultimate static bearing capacity divided by 3.0 is greater than or equal to the maximum static bearing demand.</p> <ul style="list-style-type: none"> <li>3,800 lbs/ft<sup>2</sup> in localized areas at the bottom of the EPGB basemat and 2,700 lbs/ft<sup>2</sup> on average across total area at the bottom of the EPGB basemat.</li> <li>17,800 lbs/ft<sup>2</sup> in localized areas at the bottom of the ESWB basemat and 5,500 lbs/ft<sup>2</sup> on average across total area at the bottom of the ESWB basemat.</li> </ul>
Minimum Dynamic Bearing Capacity	<p>Maximum dynamic bearing demand is 35,000 lbs/ft<sup>2</sup> 26,000 psf at the bottom toe of the Nuclear Island basemat.</p> <p>The ultimate dynamic bearing capacity divided by 2.0 is greater than or equal to the maximum dynamic bearing demand.</p> <ul style="list-style-type: none"> <li>10,800 lbs/ft<sup>2</sup> at the bottom of the EPGB basemat.</li> <li>28,200 lbs/ft<sup>2</sup> at the bottom of the ESWB basemat.</li> </ul>
Minimum Shear Wave Velocity (Low strain best estimate average value at bottom of basemat)	1000 fps
Liquefaction	None

#### 2.5.4.7 Response of Soil and Rock to Dynamic Loading

Section 2.5.2 notes that the design of the U.S. EPR is based on the assumption that the shear wave velocities assumed for the ~~10-generic~~ soil profiles described in Section 3.7.1.3 are strain-compatible properties. For SSI analysis for the U.S. EPR, assumed relationships to depict the strain-dependent modulus-reduction and hysteretic damping properties are not explicitly considered. The COL applicant will address site-specific response of soil and rock to dynamic loading, including the determination of strain-dependent modulus-reduction and hysteretic damping properties.

#### 2.5.4.8 Liquefaction Potential

The design of the U.S. EPR assumes that the plant is not founded on liquefiable materials (GDC 2).

The COL applicant will address site-specific liquefaction potential. As stated in Section 3.7.1, the evaluation of liquefaction is performed for the seismic level of the site-specific SSE.

#### 2.5.4.9 Earthquake Site Characteristics

Section 3.7.1 describes the seismic design basis for the U.S. EPR. Section 2.5.2 presents a brief summary of the seismic design basis.

Site-specific earthquake site characteristics will be described by the COL applicant.

#### 2.5.4.10 Static Stability

Static stability pertaining to bearing capacity and settlement for the U.S. EPR is described in the following section. Additional information is provided in Section 3.8.5 for the foundations of Seismic Category I structures.

##### 2.5.4.10.1 Bearing Capacity

The maximum bearing pressure under static loading conditions for the foundation basemat beneath the NI Common Basemat Structures is 22,000 lb/ft<sup>2</sup>, which includes the dead weight of the structure and components and 25 percent of the live load. The maximum bearing pressure under safe shutdown earthquake loads combined with other loads, as described in Section 3.8.5, is ~~26,000~~35,000 lb/ft<sup>2</sup>. Refer to Appendix 3E for details of these bearing pressures under the basemat (GDC 2).

03.08.05-28

A COL applicant that references the U.S. EPR design certification will verify that site-specific foundation soils beneath the foundation basemats of Seismic Category I structures have the capacity to support the bearing pressure with a factor of safety of 3.0 under static conditions, ~~or~~ 2.0 under dynamic conditions, whichever is greater.

Section 3.8.5.4 addresses the analyses performed for settlement loading on the Seismic Category I structures. Section 3.8.5.5 addresses the acceptance criteria for settlement on Seismic Category I structures. Section 3.8.5.7 addresses settlement monitoring.

#### 2.5.4.10.3 Uniformity and Variability of Foundation Support Media

The U.S.EPR design considers a broad range of subsurface conditions, and the effects of these various conditions were evaluated by an extensive series of SSI analyses which addressed subsurface stratigraphy, depth-to-bedrock, shear wave velocity, and its variation with depth. While the U.S. EPR design is intended to cover a broad range of soil conditions, it is recognized that it is impractical to address all possible subsurface variations. For this reason site specific subsurface conditions will be evaluated for applicability to the U.S. EPR.

The design of the U.S. EPR is based on analyses that assume the underlying layers of soil and rock are horizontal with uniform properties. The U.S. EPR analysis assumes backfill is uniform and the lateral extent of the backfill has no influence on the analysis. Furthermore, the U.S. EPR is designed for application at a site where the foundation conditions do not have extreme variation within the foundation footprints. However, the design does have margin that allows for adaptation to many sites that might be classified as non-uniform or having highly variable properties.

~~A COL applicant that references the U.S. EPR design certification will investigate and determine the uniformity of the underlying layers of site specific soil conditions beneath the foundation basemats. The classification of uniformity or non-uniformity will be established by a geotechnical engineer.~~ A COL applicant that references the U.S. EPR design certification will investigate and determine the uniformity of the soil layer(s) underlying the foundation basemats of Seismic Category I structures.

03.08.05-28

Soil structure interaction analysis, settlement analysis, and bearing capacity pressure analysis for the U.S. EPR assume that the soil layers are horizontal and effects of non-horizontal layering are ignored. However, the layers of soil and rock beneath a specific site may dip with respect to the horizontal. If the dip is less than or equal to 20 degrees, the layer is defined as horizontal and analyses using horizontal layers are applicable, as described in NUREG/CR-0693 (Reference 4).

Guidance for performing a site-specific evaluation of uniformity for soil profiles under the Seismic Category I structures is provided below. Alternate site-specific methodologies may be used with appropriate technical justification.

Uniformity within the layer may be checked by determining from the boring logs a series of “best-estimate” planes beneath the foundation footprint that define the top (and bottom) of each layer. Depending on specific site conditions, the planes can be based on stratigraphy, lithology, unconformities, intrusives, weathering, other geologic/geotechnical properties or characteristics or combinations of the above. The

A COL applicant that references the U.S. EPR design certification will describe site-specific foundations for Seismic Category I structures that are not described in this section.

### 3.8.5.1.1 Nuclear Island Common Basemat Structure Foundation Basemat

The NI Common Basemat Structure foundation basemat is a heavily reinforced concrete slab that supports the NI Common Basemat Structure Seismic Category I structures. The RCB and the RSB are located near the center of the NI Common Basemat Structure foundation basemat, and they are surrounded by the FB and the four SBs. The NI Common Basemat Structure foundation basemat is a cruciform shape that has outline dimensions of approximately 360 feet by 360 feet by 10 feet thick. The bottom of the NI Common Basemat Structure foundation basemat is founded approximately at elevation -41 feet and is embedded into the supporting soil approximately 40 feet. The NI Common Basemat Structure foundation basemat outline and section views are presented in Figures 3B-1, 3.8-11, 3.8-12, 3.8-13, 3.8-50, 3.8-51, 3.8-52, 3.8-63, 3.8-74, and 3.8-85.

The NI Common Basemat Structure foundation basemat provides anchorage of the vertical post-tensioning tendons in the RCB, which is described in Section 3.8.1. The portion of the NI Common Basemat Structure foundation basemat that is considered to provide support and anchorage for the RCB is the area under the circumference of the outer face of the RSB wall, as shown on Figure 3.8-11, Figure 3.8-12, Figure 3.8-13, and Figure 3.8-118. This portion of the NI Common Basemat Structure foundation basemat is designed in accordance with the ASME Code 2004 Edition, Section III, Division 2. A circular gallery is provided beneath the NI Common Basemat Structure foundation basemat for maintenance access to the bottom of the vertical post-tensioning tendons provided in the RCB shell wall. The tendon access gallery is approximately ~~11~~<sup>14</sup>~~20~~<sup>18</sup> feet wide by ~~14~~<sup>14</sup>~~18~~<sup>18</sup> feet high, including an approximately ~~36~~<sup>36</sup>~~72~~<sup>72</sup> inch thick foundation slab under the gallery structure. ~~No credit is taken in the design for the tendon gallery transmitting vertical loads into the soil. However, the tendon gallery, which is integrally cast with the basemat, acts as a shear key and transfers lateral and vertical loads from the basemat into the soil. The walls and slab of the tendon access gallery are designed according to ACI 349.~~

03.08.05-28

Sections 3.8.1 and 3.8.3 describe the interface of the RCB containment liner plate and upper internal basemat above the liner for supporting the RB internal structures. Sections 3.8.4 describes the interface of the RSB, FB, and SBs with the NI Common Basemat Structure foundation basemat. Concrete walls and columns of these NI Common Basemat Structure Seismic Category I structures are anchored into the NI Common Basemat Structure foundation basemat with reinforcing bars to transmit vertical, horizontal, and bending moment loads into the basemat and to enhance the rigidity of the basemat.

### 3.8.5.4.1 General Procedures Applicable to Seismic Category I Foundations

Concrete foundation basemats for Seismic Category I structures are analyzed as flat slabs on elastic supports to represent the underlying soil. ~~The underlying soil medium is represented by FEM for SSI analyses for the NI and by soil springs for other Category I structures as described in subsequent sections.~~ Loads are applied to the foundation basemats by the interfacing reinforced concrete walls and structural steel columns that comprise the building structures being supported, as well as by equipment supported directly on the foundations. Intersecting concrete walls also serve to stiffen the foundation basemat slabs to increase resistance to bending moments resulting from soil pressures under the slabs. Foundations are analyzed for the various factored loads and load combinations identified in Section 3.8.5.3.

Seismic Category I foundation basemat structures transfer vertical loads from the buildings to the subgrade by direct bearing of the basemats on the subgrade. Horizontal shears, such as those produced by wind, tornados, and earthquakes are transferred to the subgrade by friction along the bottom of the foundation basemat, shear key, or by passive earth pressure.

The stability evaluations for the NI, EPGB, and ESWB are based on SSI analysis results, as described in Section 3.7.2.3. The coefficient of passive soil pressure corresponding to the sidewall movements into the soil are estimated from the SSI analysis and are used to calculate the passive soil pressure resisting sidewall movement.

Passive soil pressure capacities are based on constitutive models, typically used for granular media, such as Drucker-Prager or Coulomb-Mohr. For soil sites, a granular backfill material is used against side walls and underneath the structures, if needed. Backfill shall be installed to meet 95 percent of the Modified Proctor density (ASTM D-1557). For rock sites, controlled low strength material, as described by ACI-229R, is specified on the faces of below grade walls. The tendon gallery acting as a shear key is backfilled with lean concrete. Cohesive materials will be addressed on a site-specific basis.

03.08.05-28

03.08.05-28

The wall pressures calculated from SSI analysis, elastic solution by Wood, and those required for sliding stability are considered in the design of embedded walls. Each soil case is analyzed, dynamically and statically, and design loads and controlling loads for each wall are used in the design.

The estimated maximum sidewall movement into the soil that results in the highest  $K_p$  value may not necessarily occur when the minimum factor of safety is calculated. Therefore, the minimum factor of safety is investigated using appropriate sidewall movements (using corresponding  $K_p$ ) at the time of minimum sliding factor of safety.



Design and analysis procedures for Seismic Category I foundations are the same as those described in Sections 3.8.1.4 and 3.8.4.4 for the respective structures that apply loads on the foundations.

Seismic Category I concrete foundations are designed in accordance with ACI 349-01 and its appendices (GDC 1). Exceptions to code requirements specified in RG 1.142 are incorporated into the design and are accommodated in the loading combinations described in Section 3.8.5.3. In addition, the portion of the NI Common Basemat Structure foundation basemat that supports the RCB/RSB is designed in accordance with the ASME Code–2004 Edition, Section III, Division 2 for support and anchorage of the concrete RCB as described in Section 3.8.1.

The design of concrete foundations for Seismic Category I structures is performed using the strength-design methods described in ACI 349-01. The ductility provisions of ACI 349-01 are satisfied to provide a steel reinforcing failure mode and to prevent concrete failure for design basis loadings.

Foundation design is performed for the spectrum of soil cases described in Section 3.7.1. Section 2.5 and Section 3.7 describe seismic parameters and design methods used for analyzing and designing Seismic Category I structures.

Soil-structure interaction and structure-soil-structure interaction effects are considered in the seismic analyses of Seismic Category I structures as described in Section 3.7.2. Figure 3B-1 illustrates separation distances between Seismic Category I structures upon which these interaction evaluations are based.

Dynamic bearing pressures are obtained from the SASSI analysis. Dynamic bearing pressures are calculated at each time step in the x and y input motion to satisfy the equilibrium of vertical forces and moments as a result of dead, live, buoyancy, precipitation, and seismic loads acting on the foundation for each soil case. Dead load pressures account for the deformation effect at the center and/or edges of the basemat.

03.08.05-28

The NI Common Basemat Structure is designed for ~~an average~~ the static soil bearing pressure ~~of 14,500 pounds per square foot~~ and ~~a dynamic maximum static~~ bearing pressure ~~of 34,560 pounds per square foot~~ in Table 2.1-1. Accordingly, Seismic Category I foundations are sized and reinforced to accommodate these bearing pressure values.

The following criteria apply for load combinations for concrete and steel Seismic Category I foundations:

- Where any load reduces the effects of other loads, the corresponding coefficient for that load is 0.9 if it can be demonstrated that the load is always present or occurs simultaneously with other loads.

which produces loadings on the same embedded members. The SSI analysis does not capture the nonlinear response of sliding and uplift. Any increases in loading due to sliding and uplift from the basemat model is added to the SSI results. The analytical methodology is described in Section 3.7.2.3.1.4.

03.08.05-28

The NI stability analysis using seismic reaction forces from the SSI model addressed in Section 3.7.2 considers the soil cases in Table 3.7.1-6.

~~A FEM model for SSI analysis of the embedded portions of the NI common basemat was used to evaluate the soil bearing pressures, sliding and overturning due to seismic events. This model explicitly represents the transient nature of the seismic loadings, the properties of the soils, and the dynamic characteristics of the structure. This approach produces a more realistic picture of the NI Common Basemat Structure response to seismic loadings than is possible using the static model alone.~~

~~The NI Common Basemat Structure superstructure is modeled using lumped-parameter systems identical to those used for the soil-structure interaction analysis. The masses, stiffnesses, and eccentricities of the buildings are mathematically computed, and spatially arranged to represent the dynamic characteristics of the NI Common Basemat structures.~~

~~The model is excited by simultaneous application of three EUR seismic transients (CSDRS) to the base of the foundation basemat for soil cases 2sn4u, 4u, and 5a representing soft, medium and hard soils. Transients are applied, one each, in the three principal building directions. The weight of the building, including the water in the in-containment refueling water storage tank (IRWST), fuel pool, and the four emergency feedwater storage tanks (because this water is always present within the NI Common Basemat Structure), and full buoyancy are the other loadings included in this analysis.~~

Section 3.8.1, Section 3.8.3, and Section 3.8.4 provide descriptions of interfacing structures that induce loads on the NI Common Basemat Structure foundation basemat. The figures in those sections illustrate the concrete shear walls and columns that transfer loads to the NI Common Basemat Structure foundation basemat. The tendon gallery beneath the NI Common Basemat Structure foundation basemat is relied upon as a shear key to aid in resisting lateral forces on the basemat.

A differential settlement evaluation is performed for the NI common basemat structure considering both short term (elastic) and long term (heave and consolidation) effects. The evaluation accounts for the construction sequence, building stiffness, and time duration for loading the NI common basemat structure. The evaluation considers a soft soil site consistent with the soft soil case, 1n2ue, addressed in Table 3.7.1-6. A comparison of the angular distortion (measure of

Table 3.8-12—Minimum Factors of Safety Against Overturning, Sliding, and Flotation for Foundations – NI Common Basemat Structure.

Acceptance criteria for soil conditions for the media supporting Seismic Category I foundations are addressed in Section 2.5.

Acceptance criteria for tilt settlement for Seismic Category I foundations are addressed in Section 2.5.

The acceptance criteria for differential settlement of Seismic Category I foundations are based on the site- specific predicted angular distortion, as described in U.S. Army Engineering Manual 1110-1-1904. Predicted angular distortion is compared to the angular distortion throughout the basemat in both the east-west and north-south directions in the differential settlement contours. If the predicted angular distortion of the basemat of Seismic Category I structures is less than the angular distortion shown, the site is considered acceptable. Otherwise, further analysis will be required to demonstrate that the structural design is adequate.

Additional acceptance criteria for critical areas of these structures are described in Appendix 3E.

An as-built report is prepared to summarize deviations from the approved design and confirm that the as-built Seismic Category I foundations are capable of withstanding the design basis loads described in Section 3.8.5.3 without loss of structural integrity or safety-related functions.

A COL applicant that references the U.S. EPR design certification will evaluate site-specific methods for shear transfer between the foundation basemats and underlying soil for site-specific soil characteristics that are not within the envelope of the soil parameters specified in Section 2.5.4.2.

#### 3.8.5.5.1 Nuclear Island Common Basemat Structure Foundation Basemat

Appendix 3E provides details of the design of the NI Common Basemat Structure foundation basemat critical areas.

03.08.05-28

The minimum static and dynamic bearing demand for the NI Common Basemat Structure foundation basemat is specified in Table 2.1-1.

Maximum soil bearing pressures under the NI Common Basemat Structure foundation basemat are 22,000 pounds per square foot for static loading conditions, and 26,000 pounds per square foot for dynamic loading conditions.

A differential settlement evaluation is performed for the NI common basemat structure considering both short term (elastic) and long term (heave and

Table 3.8-10—Structural Bolting Nut and Washer Materials

Item	ASTM Designation
Nuts	A194 (all grades) A563 (all grades) F1852
Washers	F436

**Note:**

1. Use of A563 nuts conforms to Appendix X1 of ASTM A563, which provides guidance on the suitability of A563 nuts for specific bolting materials.

Table 3.8-11—Minimum Required Factors of Safety Against Overturning, Sliding, and Flotation for Foundations

Load Combination	Minimum Factors of Safety		
	Overturing	Sliding	Flotation
D + H + W	1.5	1.5	-
D + H + W <sub>t</sub>	1.1	1.1	-
D + H + E'	1.1	1.1	-
D + F <sub>b</sub>	-	-	1.1

Table 3.8-12—Minimum Factors of Safety Against Overturning, Sliding, and Flotation for Foundations – NI Common Basemat Structure

Load Combination	Minimum Factors of Safety		
	Overturing	Sliding	Flotation
D + H + W	<del>4.5</del> 261 (E-W) 492 (N-S)	<del>5.2</del> 25.0 (E-W) 72.5 (N-S)	-
D + H + W <sub>t</sub>	<del>4.3</del> 216 (E-W) 274 (N-S)	<del>4.9</del> 24.1 (E-W) 66.5 (N-S)	-
D + H + E'	<del>1.7</del> 2.00 (E-W) <del>1.9</del> 1.78 (N-S)	<del>1.2</del> 1.16 (E-W) <del>1.1</del> 1.58 (N-S)	-
D + F <sub>b</sub>	-	-	<del>5.0</del> 4.9

03.08.05-28

Table 3.8-17—Design Report Cross-Reference Table  
Sheet 3 of 5

		U.S. EPR FSAR Sections			
		Concrete Containment (Section 3.8.1)	Steel Containment (Section 3.8.2) & Internal Structures (Section 3.8.3)	Other Seismic Category I Structures (Section 3.8.4)	Foundations (Section 3.8.5)
4. Prestressing Stage	SRP Section 3.8.4, Appendix C				
	A. Type of System	Section 3.8.1.1.2	N/A	N/A	N/A
	B. Description of Tendons	Sections 3.8.1.1.2, 3.8.1.6.3	N/A	N/A	N/A
	C. Description of Surcharge	Table 3.8-5	N/A	N/A	N/A
	D. Tendons and Sheeting Layout	Section 3.8.1.1.2, 3.8.1.6.3, Figures 3.8-18 and 3.8-19	N/A	N/A	N/A
5. Foundation Media	E. Dome Prestressing	Section 3.8.1.1.2	N/A	N/A	N/A
	A. General Description	Section 2.5, 3.7.1.3, Table 3.7.2-9			
	B. Unit Weight	Section 2.5.4.2; Table 2.1-1; Table 3.7.2-9			
	C. Shear Modulus	Table 3.7.2-9			
	D. Angle of Internal Friction	Section 2.5.4.2, Table 2.1-1			
	E. Cohesion	Section 2.5.4.2			
	F. Bearing Capacity Demand	Section 2.5.4.10.1, Table 2.1-1			
6. Special Considerations		None	None	None	None

Equipment hatch	64'-0"	154
Air lock	4'-11"; 64'-0"	61 each

### Foundation Stability

03.08.05-28

The Nuclear Island Common Basemat Structure is evaluated for stability against overturning, sliding, and floatation for the generic soil profiles used in establishing the certified plant design. The minimum factors of safety for the Nuclear Island Common Basemat Structure are listed in Table 3E.1-39. The calculated factors of safety against overturning, sliding, and floatation satisfy the acceptance criteria.-

Minimum Factors of Safety					
Sliding		Overturning		Floatation	
Required	Calculated	Required	Calculated	Required	Calculated
1.10	1.45	1.10	1.61	1.10	5.73

The sliding and overturning factors are determined using load combination containing dead load (D), lateral earth pressure (H), SSE (E'), hydrostatic load (F) and buoyant force (Fb). It is conservatively assumed that the E' and Fb occur simultaneously. The floatation factor of safety is determined based on dead load (D) and buoyant force (Fb). The dead load used in the analysis includes 25 percent of the live load, which is consistent with the generation of dynamic soil pressure due to SSE.

The maximum foundation edge pressure when seismic loads are included is found to be 31203 psf.

### Design Criteria

Sections 3.8.1.2, 3.8.2.2, 3.8.3.2, 3.8.4.2, and 3.8.5.2 describe codes, standards, and specifications applicable to the design of the RCB (Concrete), RCB (Steel), RB internal structures, RSB, and NI foundation basemat, respectively.

A global ANSYS Finite Element Model (FEM) (addressed in Sections 3.8.1.4.1, 3.8.3.4.1, 3.8.4.4.2, and 3.8.5.4.2) is developed and loaded with various independent loads and load combinations per the applicable codes and standards and solved to produce forces and moments throughout the structure. Sections 3.8.1.3, 3.8.2.3, 3.8.3.3, 3.8.4.3, and 3.8.5.3 describe loads and loading combinations applicable to the design of NI Common Basemat Structures.

The independent loads shown in Table 3E.1-1—Independent Loads Considered in the FEM, are applied to the NI common basemat global ANSYS FEM to analyze and evaluate the overall structural response of the NI Common Basemat Structures as described in Section 3.8.1.4, 3.8.2.4, 3.8.3.4, 3.8.4.4, and 3.8.5.4. Additional loads shown in Table 3E.1-2—Independent Loads Not Considered in the FEM, and



Table 3E.1-39—Minimum Factors of Safety for the Nuclear Island Common Basemat Structure

<u>Analysis Case</u>	<u>Sliding</u>			<u>Overturning</u>			<u>Flotation</u>	
	<u>Required</u>	<u>Calculated X-DIR</u>	<u>Calculated Y-DIR</u>	<u>Required</u>	<u>Calculated X-DIR</u>	<u>Calculated Y-DIR</u>	<u>Required</u>	<u>Calculated</u>
<u>2sn4ue-m</u>	1.1	1.2	1.3	1.1	2.0	2.0		
<u>5ae-h</u>	1.1	1.1	1.1	1.1	1.7	2.0		
<u>4ue-m</u>	1.1	1.1	1.1	1.1	1.7	1.9		
<u>1n2ue-s</u>	1.1	1.9	1.9	1.1	2.6	2.9	1.1	5.0
<u>1n5ae-h</u>	1.1	1.2	1.1	1.1	1.7	2.0		
<u>hfub</u>	1.1	3.8	3.7	1.1	5.6	5.3		
<u>hflb</u>	1.1	4.1	4.0	1.1	6.7	7.7		
<u>hfbe</u>	1.1	3.6	3.8	1.1	6.0	6.7		



03.08.05-28



**Table 5.0-1—Site Parameters for the U.S. EPR Design  
(3 Sheets)**

	The 1% exceedance (seasonal basis) <sup>(3)</sup> minimum ambient temperature is -10°F.
<b>Wind</b>	
<b>Parameter</b>	<b>Value(s)</b>
Maximum Speed (Other than Tornado)	The normal maximum wind speed is 145 mph.
<b>Tornado</b>	
<b>Parameter</b>	<b>Value(s)</b>
Tornado (maximum speed, pressure drop, radius of maximum rotational speed, rate of pressure drop, missile spectra)	Maximum tornado wind speed of 230 mph. Maximum rotational speed of 184 mph. Maximum tornado pressure drop of 1.2 pounds per square inch at 0.5 psi per second. Radius of maximum rotational speed is 150 ft.
<b>Soil</b>	
<b>Parameter</b>	<b>Value(s)</b>
Soil properties: <u>Minimum angle of internal friction (in situ and backfill)</u>	<u>26.6 degrees<sup>(4)</sup></u>
Minimum shear wave velocity	Minimum shear wave velocity (low strain best estimate average value at bottom of basemat) of 1000 feet per second.
Minimum static bearing capacity	<del>Minimum</del> <u>Maximum</u> static bearing <del>capacity demand is of</del> 22,000 lbs/ft <sup>2</sup> <del>in localized areas</del> at the bottom of the Nuclear Island basemat <del>and 15,000 lb/ft<sup>2</sup> on is the average across the total area of the bottom of for the Nuclear Island basemat.</del>
<div style="border: 1px solid red; padding: 2px; display: inline-block;">03.08.05-28</div> →	<u>The ultimate static bearing capacity divided by 3.0 is greater than or equal to the maximum static bearing demand.</u>
	<del>Minimum static bearing capacity of 3,800 lbs/ft<sup>2</sup> in localized areas at the bottom of the EPGB basemat and 2,700 lbs/ft<sup>2</sup> on average across total area at the bottom of the EPGB basemat.</del>
	<del>Minimum static bearing capacity of 17,800 lbs/ft<sup>2</sup> in localized areas at the bottom of the ESWB basemat and 5,500 lbs/ft<sup>2</sup> on average across total area at the bottom of the ESWB basemat.</del>
Minimum dynamic bearing capacity	<del>Minimum</del> <u>Maximum</u> dynamic bearing <del>demand is capacity of</del> 35,000 <del>26,000</del> lbs/ft <sup>2</sup> at the <del>bottom toe</del> of the Nuclear Island basemat.
	<u>The ultimate dynamic bearing capacity divided by 2.0 is greater than or equal to the maximum dynamic bearing demand.</u>
	<del>Minimum dynamic bearing capacity of 10,800 lbs/ft<sup>2</sup> at the bottom of the EPGB basemat.</del>