

## ArevaEPRDCPEm Resource

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**From:** WELLS Russell (AREVA) [Russell.Wells@areva.com]  
**Sent:** Friday, April 01, 2011 3:17 PM  
**To:** Tesfaye, Getachew  
**Cc:** LENTZ Tony (EXTERNAL AREVA); BENNETT Kathy (AREVA); DELANO Karen (AREVA); ROMINE Judy (AREVA); RYAN Tom (AREVA)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 395, FSAR Ch. 14, Supplement 8  
**Attachments:** RAI 395 Supplement 8 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete response to the one question in RAI No. 395 on June 2, 2010. On July 15, 2010 (Supplement 1), August 12, 2010 (Supplement 2), September 9, 2010 (Supplement 3), October 25, 2010 (Supplement 4), November 29, 2010 (Supplement 5), January 6, 2011 (Supplement 6) and February 23, 2011 (Supplement 7) AREVA provided a revised schedule for question 14.02-161.

The attached file, "RAI 395 Supplement 8 Response US EPR DC" provides technically correct and complete responses to the remaining question, 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 395 Question 14.02-161.

The following table indicates the respective pages in the response document, "RAI 395 Supplement 8 Response US EPR DC" that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 395 — 14.02-161	2	2

This concludes the formal AREVA NP response to RAI 395, and there are no questions from this RAI for which AREVA NP has not provided responses.

*Sincerely,*

*Russ Wells*

*U.S. EPR Design Certification Licensing Manager*

*AREVA NP, Inc.*

*3315 Old Forest Road, P.O. Box 10935*

*Mail Stop OF-57*

*Lynchburg, VA 24506-0935*

*Phone: 434-832-3884 (work)*

*434-942-6375 (cell)*

*Fax: 434-382-3884*

[Russell.Wells@Areva.com](mailto:Russell.Wells@Areva.com)

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**From:** WELLS Russell (RS/NB)  
**Sent:** Wednesday, February 23, 2011 4:21 PM  
**To:** 'Tesfaye, Getachew'  
**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BRYAN Martin (External RS/NB); BENNETT Kathy (RS/NB); LENTZ

Tony (External RS/NB)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 395, FSAR Ch. 14, Supplement 7

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete response to the one question in RAI No. 395 on June 2, 2010. On July 15, 2010 (Supplement 1), August 12, 2010 (Supplement 2), September 9, 2010 (Supplement 3), October 25, 2010 (Supplement 4), November 29, 2010 (Supplement 5), and January 6, 2011 (Supplement 6) AREVA provided a revised schedule for question 14.02-161.

To allow time for interaction between AREVA and the NRC staff, a revised schedule for submittal of the final response for the 1 question is provided in this e-mail.

The schedule for technically correct and complete responses to the question has been revised and is provided below:

Question #	Response Date
RAI 395 — 14.02-161	April 7, 2011

*Russ Wells*

*U.S. EPR Design Certification Licensing Manager*

*AREVA NP, Inc.*

*3315 Old Forest Road, P.O. Box 10935*

*Mail Stop OF-57*

*Lynchburg, VA 24506-0935*

*Phone: 434-832-3884 (work)*

*434-942-6375 (cell)*

*Fax: 434-382-3884*

*[Russell.Wells@Areva.com](mailto:Russell.Wells@Areva.com)*

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

**Sent:** Thursday, January 06, 2011 10:57 AM

**To:** Tesfaye, Getachew

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

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 395, FSAR Ch. 14, Supplement 6

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete response to the one question in RAI No. 395 on June 2, 2010. On July 15, 2010 (Supplement 1), August 12, 2010 (Supplement 2), September 9, 2010 (Supplement 3), October 25, 2010 (Supplement 4), and November 29, 2010 (Supplement 5), AREVA provided a revised schedule for question 14.02-161.

To allow time for interaction between AREVA and the NRC staff, a revised schedule for submittal of the final response for the 1 question is provided in this e-mail.

The schedule for technically correct and complete responses to the question has been revised and is provided below:

Question #	Response Date
RAI 395 — 14.02-161	February 25, 2011

Sincerely,

Martin (Marty) C. Bryan  
U.S. EPR Design Certification Licensing Manager  
AREVA NP Inc.  
Tel: (434) 832-3016  
702 561-3528 cell  
[Martin.Bryan.ext@areva.com](mailto:Martin.Bryan.ext@areva.com)

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**From:** BRYAN Martin (External RS/NB)  
**Sent:** Monday, November 29, 2010 6:47 PM  
**To:** 'Tesfaye, Getachew'  
**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); WELLS Russell (RS/NB)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 395, FSAR Ch. 14, Supplement 5

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete response to the one question in RAI No. 395 on June 2, 2010. On July 15, 2010 (Supplement 1), August 12, 2010 (Supplement 2), September 9, 2010 (Supplement 3), and October 25, 2010 (Supplement 4), AREVA provided a revised schedule for question 14.02-161.

To allow time for interaction between AREVA and the NRC staff, a revised schedule for submittal of the final response for the 1 question is provided in this e-mail.

The schedule for technically correct and complete responses to the questions has been revised and is provided below:

Question #	Response Date
RAI 395 — 14.02-161	January 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:** Monday, October 25, 2010 1:27 PM  
**To:** 'Getachew.Tesfaye@nrc.gov'  
**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); LENTZ Tony (External RS/NB)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 395, FSAR Ch. 14, Supplement 4

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete response to the one question in RAI No. 395 on June 2, 2010. On July 15, 2010, August 12, 2010, and September 9, 2010, AREVA provided a revised schedule for question 14.02-161.

To allow time for interaction between AREVA and the NRC staff, a revised schedule for submittal of the final response for the 1 question is provided in this e-mail.

The schedule for technically correct and complete responses to the questions has been revised and is provided below:

Question #	Response Date
RAI 395 — 14.02-161	December 7, 2010

Sincerely,

Martin (Marty) C. Bryan  
U.S. EPR Design Certification Licensing Manager  
AREVA NP Inc.  
Tel: (434) 832-3016  
702 561-3528 cell  
[Martin.Bryan.ext@areva.com](mailto:Martin.Bryan.ext@areva.com)

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**From:** BRYAN Martin (External RS/NB)  
**Sent:** Thursday, September 09, 2010 11:07 AM  
**To:** Tesfaye, Getachew  
**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); LENTZ Tony (External RS/NB)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 395, FSAR Ch. 14, Supplement 3

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete response to the one question in RAI No. 395 on June 2, 2010. On July 15, 2010 and August 12, 2010 AREVA provided a revised schedule for question 14.02-161.

To allow time for interaction between AREVA and the NRC staff, a revised schedule for submittal of the final response for the 1 question is provided in this e-mail.

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

Question #	Response Date
RAI 395 — 14.02-161	October 28, 2010

Sincerely,

Martin (Marty) C. Bryan  
U.S. EPR Design Certification Licensing Manager  
AREVA NP Inc.  
Tel: (434) 832-3016  
702 561-3528 cell  
[Martin.Bryan.ext@areva.com](mailto:Martin.Bryan.ext@areva.com)

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**From:** BRYAN Martin (EXT)  
**Sent:** Thursday, August 12, 2010 3:01 PM  
**To:** 'Tesfaye, Getachew'  
**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); LENTZ Tony F (EXT)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 395, FSAR Ch. 14, Supplement 2

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete response to the one question in RAI No. 395 on June 2, 2010. On July 15, 2010 AREVA provided a revised schedule for question 14.02-161.

To allow time for interaction between AREVA and the NRC staff, a revised schedule for submittal of the final response for the 1 question is provided in this e-mail.

The schedule for technically correct and complete responses to the questions has been revised and is provided below:

<b>Question #</b>	<b>Response Date</b>
RAI 395 — 14.02-161	September 9, 2010

Sincerely,

Martin (Marty) C. Bryan  
U.S. EPR Design Certification Licensing Manager  
AREVA NP Inc.  
Tel: (434) 832-3016  
702 561-3528 cell  
[Martin.Bryan.ext@areva.com](mailto:Martin.Bryan.ext@areva.com)

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**From:** BRYAN Martin (EXT)  
**Sent:** Thursday, July 15, 2010 1:11 PM  
**To:** 'Tesfaye, Getachew'  
**Cc:** DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); LENTZ Tony F (EXT)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 395, FSAR Ch. 14, Supplement 1

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete response to the one question in RAI No. 395 on June 2, 2010.

AREVA NP Inc. provided technically correct and complete DRAFT responses to the one question in RAI No. 395 on June 24, 2010. To allow time for interaction between AREVA and the NRC staff, a revised schedule for submittal of the final response for the 1 question is provided in this e-mail.

The schedule for technically correct and complete responses to the question has been revised and is provided below:

<b>Question #</b>	<b>Response Date</b>
RAI 395 — 14.02-161	August 12, 2010

Sincerely,

Martin (Marty) C. Bryan  
U.S. EPR Design Certification Licensing Manager  
AREVA NP Inc.  
Tel: (434) 832-3016  
702 561-3528 cell  
[Martin.Bryan.ext@areva.com](mailto:Martin.Bryan.ext@areva.com)

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**From:** BRYAN Martin (EXT)  
**Sent:** Wednesday, June 02, 2010 10:30 AM  
**To:** 'Tesfaye, Getachew'  
**Cc:** DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); LENTZ Tony F (EXT)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 395, FSAR Ch. 14

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 395 Response US EPR DC.pdf," provides the schedule for technically correct and complete responses to these questions.

The following table indicates the respective pages in the response document, "RAI 395 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 395 — 14.02-161	2	2

A complete answer is not provided for the one question. The schedule for technically correct and complete responses to this question is provided below.

Question #	Response Date
RAI 395 — 14.02-161	July 15, 2010

Sincerely,

Martin (Marty) C. Bryan  
U.S. EPR Design Certification Licensing Manager  
AREVA NP Inc.  
Tel: (434) 832-3016  
702 561-3528 cell  
[Martin.Bryan.ext@areva.com](mailto:Martin.Bryan.ext@areva.com)

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**From:** Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]  
**Sent:** Monday, May 03, 2010 12:27 PM  
**To:** ZZ-DL-A-USEPR-DL  
**Cc:** Keim, Andrea; Roach, Edward; Patel, Jay; Miernicki, Michael; Colaccino, Joseph; ArevaEPRDCPEm Resource  
**Subject:** U.S. EPR Design Certification Application RAI No. 395 (4623), FSAR Ch. 14

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on April 28, 2010, and on May 3, 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:** 2802

**Mail Envelope Properties** (1F1CC1BBDC66B842A46CAC03D6B1CD41042BA208)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 395, FSAR Ch. 14, Supplement 8  
**Sent Date:** 4/1/2011 3:16:45 PM  
**Received Date:** 4/1/2011 3:17:07 PM  
**From:** WELLS Russell (AREVA)  
**Created By:** Russell.Wells@areva.com

**Recipients:**

"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  
"ROMINE Judy (AREVA)" <Judy.Romine@areva.com>  
Tracking Status: None  
"RYAN Tom (AREVA)" <Tom.Ryan@areva.com>  
Tracking Status: None  
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Tracking Status: None

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

<b>Files</b>	<b>Size</b>	<b>Date &amp; Time</b>
MESSAGE	12961	4/1/2011 3:17:07 PM
RAI 395 Supplement 8 Response US EPR DC.pdf		101646

**Options**

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



**Response to**

**Request for Additional Information No. 395(4623), Supplement 8**

**5/03/2010**

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

**AREVA NP Inc.**

**Docket No. 52-020**

**SRP Section: 14.02 - Initial Plant Test Program - Design Certification and New  
License Applicants**

**Application Section: 14.2**

**QUESTIONS for Health Physics Branch (CHPB)**

**Question 14.02-161:**

In response to RAI 313, Question 14.02-127, the applicant provided a revised Test #206, which incorporated the verification of the aeroball system's time dependence and decay constants into the calibration of the self powered neutron detectors (SPNDs). Section 2.2 of Test #206 states that "the reactor is at equilibrium xenon conditions prior to performing tests to meet 1.2 and 1.3." However, there is no discussion on the prerequisites for the aeroball system constant checks, nor are there acceptance criteria in section 5.0 of the test for the determination of the time dependence and decay constants.

Acceptance criteria for the aeroball time constants should be included to ensure that performance of the aeroball system is as expected. Therefore, in order for Test #206 to ensure functional adequacy of the aeroball system, provide acceptance criteria and prerequisites for objective 1.1 (determination of constants), or justify why these are not needed.

**Response to Question 14.02-161:**

U.S. EPR FSAR Tier 2, Chapter 14.2, Test #206 will be revised to clarify the following:

1. Objective: Revised to clarify that it is necessary to verify the adequacy of the time dependent decay constant functions of the vanadium steel flux measurement balls.
2. Prerequisite: To verify that theoretical time dependent decay constant functions for the vanadium steel measurement balls within the aeroball measurement system (AMS) have been entered into the software.
3. Test Method: To verify that the time dependent decay constant functions are adequate or establish revised time dependent decay constant functions.
4. Acceptance Criteria: To ensure that the time dependent decay constant functions for the vanadium steel balls do not create a data bias for the AMS flux maps.

**FSAR Impact:**

U.S. EPR FSAR Tier 2, Section 14.2, Test #206 will be revised as described in the response and indicated on the enclosed markup.

# U.S. EPR Final Safety Analysis Report Markups

- 4.4 Core average burnup.
- 4.5 Isotopic activities.
- 5.0 ACCEPTANCE CRITERIA
  - 5.1 Measured activity levels are within their limits.
  - 5.2 Laboratory analyses and process radiation monitors agree with the within measurement uncertainties as designed (refer to Section 9.3.2 or investigation of the discrepancies has been initiated).
  - 5.3 Samples of RCS and secondary fluids can be obtained from design locations as designed (refer to Sections 9.3.2 and 11.5).
  - 5.4 Chemistry lab instrumentation used to analyze primary sampling parameters described in Table 9.3.2-2 will meet the design requirements for the measurements. This includes, but is not limited to, the following (that could adversely impact the ability to measure the parameters described in Table 9.3.2-2):
    - 5.4.1 Range.
    - 5.4.2 Response time.
    - 5.4.3 Sensitivity.
    - 5.4.4 Maximum anticipated drift between calibrations.
  - 5.5 Radiation monitoring instrumentation used to perform primary system monitoring that is described in Table 11.5-1 will meet the design requirements for the radiation monitor. This includes, but is not limited to, the following (that could adversely impact the ability to measure the parameters described in Table 11.5-1):
    - 5.5.1 Range.
    - 5.5.2 Response time.
    - 5.5.3 Sensitivity.
    - 5.5.4 Maximum anticipated drift between calibrations.

**14.2.12.18.7 Self Powered Neutron Detector Calibration (Test #206)**

1.0 OBJECTIVE

- 1.1 To perform a test on the Aeroball Measurement System (AMS) to verify the adequacy of time dependent decay constant functions of the vanadium steel flux measurement balls.
- 1.2 To perform a full core flux map using the movable incore detector (i.e., AMS). To perform a full core flux map using the following:
  - 1.2.1 Moveable incore system - AMS.
  - 1.2.2 Fixed incore system - Self powered neutron detectors (SPND).
- 1.3 Normalize the ~~fixed incore detector system (SPNDs)~~ to the AMS (using full core flux map produced by the POWERTRAX-E system) at the following power plateaus:

14.02-161

- 1.3.1 25 percent reactor power.
- 1.3.2 50 percent reactor power.
- 1.3.3 75 percent reactor power.
- 1.3.4 ≥98 percent reactor power.

2.0 PREREQUISITES

- 2.1 The reactor is at the specified power level ~~and equilibrium xenon conditions.~~
- 2.2 The reactor is at equilibrium xenon conditions prior to performing tests to meet 1.2 and 1.3.
- 2.3 The incore detector systems, related digital processing computers, and POWERTRAX-E are ~~operable~~functional.
- 2.4 Verify that theoretical time dependent decay constant functions for the vanadium steel measurement balls (AMS) have been entered into the measurement software.

14.02-161 →

3.0 TEST METHOD

- 3.1 Calculate/measure the resident time in the core to achieve AMS vanadium ball stack saturation at the current reactor power (neutron fluence). ~~Movable incore (i.e., AMS) signals are measured.~~
- 3.2 Verify that the AMS residence time exceeds the time to reach AMS vanadium ball stack saturation at the current power level. ~~Full core flux map is processed.~~
- 3.3 Perform an AMS flux map with the measuring table sequence set in “normal” (A, B, C, and D sequence) and analyze the map using POWERTRAX. ~~Normalization of fixed incore system is performed by POWERTRAX.~~
- 3.4 Perform an AMS flux map with the measuring table sequence set in “reverse from normal” (A, B, C, and D sequence) and analyze the map using POWERTRAX.
- 3.5 Compare the AMS flux maps generated by the “normal” and the “reverse from normal” sequence using POWERTRAX-E focusing on differences that could be attributed to change in sequence. If xenon equilibrium has not been achieved, the maps may not be identical. If this is the case, verify that differences are not due to sequence. ~~Background detector signals are recorded.~~
- 3.6 Verify that the time dependent decay constant functions are adequate or establish revised time dependent decay constant functions.
- 3.7 Verify that the POWERTRAX-E AMS sequence flux maps are not used to calibrate the SPNDs unless equilibrium xenon conditions have been achieved.
- 3.8 Perform an AMS flux map with the measuring table sequence set in “normal” (A, B, C, and D sequence) once equilibrium xenon conditions

14.02-161 →

have been achieved. If the previous AMS flux maps were not performed with equilibrium xenon conditions, analyze the map using POWERTRAX-E.

3.9 Calibrate the SPNDs using constants generated by POWERTRAX-E prior to increasing reactor power to the next power ascension plateau.

4.0 DATA REQUIRED

- 4.1 Reactor power as indicated by the secondary calorimetric.
- 4.2 Reactor power as indicated by the primary enthalpy calorimetric.
- 4.3 RCCA position.
- 4.4 Boron concentration and boron-10 isotopic abundance.
- 4.5 Incore detector system data.

5.0 ACCEPTANCE CRITERIA

- 5.1 The time dependent decay constant functions for the vanadium balls do not create a data bias for the AMS flux maps.
- 5.2 The full core flux map data is available for determining SPND calibration constants from measured core power distributions, using POWERTRAX-E.

**14.2.12.18.8 Steady-State Core Performance (Test #207)**

1.0 OBJECTIVE

- 1.1 To demonstrate that the core has been assembled as designed.
- 1.2 To determine if the measured and predicted power distributions are consistent. This test indirectly confirms that the predicted reactivity coefficients are within design assumptions.
- 1.3 To perform calibrations of fixed incore and excore instrumentation based on a full core flux map performed with the movable incore flux mapping (i.e., Aeroball) system.
- 1.4 To determine core power distributions using the movable incore instrumentation. This procedure shall be repeated at the following plateaus:
  - 1.4.1 25 percent reactor power in accordance with RG 1.68.
  - 1.4.2 50 percent reactor power in accordance with RG 1.68.
  - 1.4.3 75 percent reactor power in accordance with RG 1.68.
  - 1.4.4 ≥98 percent reactor power in accordance with RG 1.68.