

## ArevaEPRDCPEm Resource

---

**From:** WILLIFORD Dennis (AREVA) [Dennis.Williford@areva.com]  
**Sent:** Wednesday, September 07, 2011 2:52 PM  
**To:** Tesfaye, Getachew  
**Cc:** BENNETT Kathy (AREVA); DELANO Karen (AREVA); ROMINE Judy (AREVA); RYAN Tom (AREVA); GUCWA Len (EXTERNAL AREVA)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 480 (5625, 5440,5613, 5573), FSAR Ch. 6, Supplement 4  
**Attachments:** RAI 480 Supplement 4 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to the five questions in RAI 480 on April 18, 2011. Supplement 1 response to RAI 480 was sent on June 22, 2011 with a revised response schedule for the five questions. The schedule for responding to Questions 06.01.02-10, 06.01.02-11, 06.02.02-89 and 06.03-17 was revised as described in the GSI-191 Closure Plan (AREVA NP Inc. letter NRC:11:092 dated August 25, 2011) and as provided in Supplement 2 response to RAI 480, dated August 31, 2011. Supplement 3 response to RAI 480 was sent on September 1, 2011 to provide technically correct and complete responses to 2 of the remaining 5 questions.

The attached file, "RAI 480 Supplement 4 Response US EPR DC.pdf" provides technically correct and complete responses to 2 of the remaining 3 questions. The following table indicates the respective pages in the response document, "RAI 480 Supplement 4 Response US EPR DC.pdf" that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 480 — 06.02.02-88	2	3
RAI 480 — 06.02.02-89	4	4

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

Question #	Response Date
RAI 480 — 06.03-17	November 18, 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, September 01, 2011 7:51 AM

**To:** [Getachew.Tesfaye@nrc.gov](mailto:Getachew.Tesfaye@nrc.gov)

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

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 480 (5625, 5440,5613, 5573), FSAR Ch. 6, Supplement 3

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to the five questions in RAI 480 on April 18, 2011. Supplement 1 response to RAI 480 was sent on June 22, 2011 with a revised response schedule for the five questions. The schedule for responding to Questions 06.01.02-10, 06.01.02-11, 06.02.02-89 and 06.03-17 was revised as described in the GSI-191 Closure Plan (AREVA NP Inc. letter NRC:11:092 dated August 25, 2011) and as provided in Supplement 2 response to RAI 480, dated August 31, 2011.

The attached file, "RAI 480 Supplement 3 Response US EPR DC.pdf" provides a technically correct and complete response to 2 of the remaining 5 questions. Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the responses to RAI 480 Question 06.01.02-10 and Question 06.01.02-11.

The following table indicates the respective pages in the response document, "RAI 480 Supplement 3 Response US EPR DC.pdf" that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 480 — 06.01.02-10	2	2
RAI 480 — 06.01.02-11	3	3

The schedule for technically correct and complete responses to the remaining 3 questions is unchanged as provided below:

Question #	Response Date
RAI 480 — 06.02.02-88	September 7, 2011
RAI 480 — 06.02.02-89	November 18, 2011
RAI 480 — 06.03-17	November 18, 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:** Wednesday, August 31, 2011 4:41 PM

**To:** [Getachew.Tesfaye@nrc.gov](mailto:Getachew.Tesfaye@nrc.gov)

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

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 480 (5625, 5440,5613, 5573), FSAR Ch. 6, Supplement 2

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to the five questions in RAI 480 on April 18, 2011. Supplement 1 response to RAI 480 was sent on June 22, 2011 with a revised response schedule for the five questions.

The schedule for responding to Questions 06.01.02-10, 06.01.02-11, 06.02.02-89 and 06.03-17 has been revised as described in the GSI-191 Closure Plan (AREVA NP Inc. letter NRC:11:092 dated August 25, 2011) and as provided below. The schedule for Question 06.02.02-88 is unchanged.

Question #	Response Date
RAI 480 — 06.01.02-10	<b>November 18, 2011</b>
RAI 480 — 06.01.02-11	<b>November 18, 2011</b>
RAI 480 — 06.02.02-88	September 7, 2011
RAI 480 — 06.02.02-89	<b>November 18, 2011</b>
RAI 480 — 06.03-17	<b>November 18, 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:** Wednesday, June 22, 2011 9:53 AM

**To:** Tesfaye, Getachew

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

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 480 (5625, 5440,5613, 5573), FSAR Ch. 6, Supplement 1

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to the five questions in RAI 480 on April 18, 2011.

The schedule has been changed as provided below:

Question #	Response Date
RAI 480 — 06.01.02-10	August 31, 2011
RAI 480 — 06.01.02-11	August 31, 2011
RAI 480 — 06.02.02-88	September 7, 2011
RAI 480 — 06.02.02-89	September 21, 2011
RAI 480 — 06.03-17	September 21, 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, April 18, 2011 4:42 PM  
**To:** Tesfaye, Getachew  
**Cc:** GUCWA Len (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. 480 (5625, 5440,5613, 5573), FSAR Ch. 6

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 480 Response US EPR DC.pdf" provides a schedule since technically correct and complete responses to the 5 questions are not provided.

The following table indicates the respective pages in the response document, "RAI 480 Response US EPR DC.pdf" that contain AREVA NP's responses to the subject questions.

Question #	Start Page	End Page
RAI 480 — 06.01.02-10	2	2
RAI 480 — 06.01.02-11	3	3
RAI 480 — 06.02.02-88	4	4
RAI 480 — 06.02.02-89	5	5
RAI 480 — 06.03-17	6	6

A complete answer is not provided for the 5 questions. The schedule for technically correct and complete responses to these questions is provided below.

Question #	Response Date
RAI 480 — 06.01.02-10	June 22, 2011
RAI 480 — 06.01.02-11	June 22, 2011

RAI 480 — 06.02.02-88	June 22, 2011
RAI 480 — 06.02.02-89	June 22, 2011
RAI 480 — 06.03-17	June 22, 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:** Tesfaye, Getachew [<mailto:Getachew.Tesfaye@nrc.gov>]

**Sent:** Thursday, March 17, 2011 7:29 PM

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

**Cc:** Sastre, Eduardo; Terao, David; Jensen, Walton; Ashley, Clinton; Jackson, Christopher; McKirgan, John; Budzynski, John; Lu, Shanlai; Donoghue, Joseph; Carneal, Jason; Colaccino, Joseph; ArevaEPRDCPEm Resource

**Subject:** U.S. EPR Design Certification Application RAI No. 480 (5625, 5440,5613, 5573), FSAR Ch. 6

Attached please find the subject request for additional information (RAI). A draft of the RAI was provided to you on March 11, 2011, and on March 16, 2011, 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:** 3390

**Mail Envelope Properties** (2FBE1051AEB2E748A0F98DF9EEE5A5D48A781B)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 480 (5625, 5440, 5613, 5573), FSAR Ch. 6, Supplement 4  
**Sent Date:** 9/7/2011 2:51:51 PM  
**Received Date:** 9/7/2011 2:51:55 PM  
**From:** WILLIFORD Dennis (AREVA)

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

**Recipients:**

"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  
"GUCWA Len (EXTERNAL AREVA)" <Len.Gucwa.ext@areva.com>  
Tracking Status: None  
"Tsfaye, Getachew" <Getachew.Tsfaye@nrc.gov>  
Tracking Status: None

**Post Office:** auscharm02.adom.ad.corp

Files	Size	Date & Time
MESSAGE	9615	9/7/2011 2:51:55 PM
RAI 480 Supplement 4 Response US EPR DC.pdf		71327

**Options**

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

**Response to**

**Request for Additional Information No. 480, Supplement 4**

**3/17/2011**

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

**AREVA NP Inc.**

**Docket No. 52-020**

**SRP Section: 06.01.02 - Protective Coating Systems (Paints) - Organic Materials**

**SRP Section: 06.02.02 - Containment Heat Removal Systems**

**SRP Section: 06.03 - Emergency Core Cooling System**

**Application Section: 6.1.2**

**QUESTIONS for Component Integrity, Performance, and Testing Branch 1**

**(AP1000/EPR Projects) (CIB1)**

**QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects)**

**(SPCV)**

**QUESTIONS for Reactor System, Nuclear Performance and Code Review (SRSB)**

**Question 06.02.02-88:**

There is a lack of description regarding the instrumentation and control (I&C) functions of the safety-related CONVECT ventilation system in either Chapter 6 or 7 of the FSAR for US- EPR. The response to RAI 221 Question 06.02.01-16 should be incorporated in the FSAR. In addition, provide the information as listed in RG 1.206 Section C.I.7.3.1.2 "Design Basis Information" including the functional logic diagram for safety evaluation. Provide the analyses discussed in Section C.I.7.3.2 of RG 1.206.

**Response to Question 06.02.02-88:**

The hydrogen mixing dampers (HMD) are safety grade and their operation and actuation logic is controlled by the protection system, safety automation system, and diverse actuation system. There are two (2) sensors per steam generator loop for a total of eight (8), safety-related delta-pressure sensors powered from their respective electrical divisions. This arrangement meets FMEA requirements so that a sensor can be out for maintenance and a single failure can occur without affecting the HMD control. If two (2) out of (8) sensor signals exceed the delta-pressure setpoint, all eight (8) HMDs receive a signal to open.

The delta-pressure setpoint is 0.5 psi. The delta pressure is measured across the steam generator pressure equalization ceiling; and, thus, measures the difference in pressure between the accessible area and equipment area. Therefore, the delta pressure signal accounts for a pressure increase in either of the regions to provide an actuation signal for the HMDs.

Additionally, there are a total of four (4) safety-grade absolute containment service compartment pressure sensors and their operation and actuation logic is also controlled by the protection system, safety automation system, and diverse actuation system. For each steam generator loop an absolute-pressure sensor is located in the accessible area of the containment. If two (2) out of four (4) of the absolute-pressure sensors exceed the absolute-pressure setpoint of 17.4 psia, the HMDs receive a signal to open. This arrangement and logic also meets the FMEA requirements such that a sensor can be out for maintenance and a single failure can occur without affecting the HMD control. As a result, there are no restrictions placed on plant operation if one of the absolute -pressure sensors is out of order.

The combination of delta-and absolute-pressure sensors fulfills the requirements of redundancy and diversity.

Position sensors indicate the HMD position in the main control room. If a hydrogen mixing damper opens unintentionally, it can be closed again by either the actuator or the mechanical backup closing mechanism. U.S. EPR FSAR Tier 2, Section 7.3 provides additional details about the I&C logic and logic diagrams of the HMDs.

In the case where the mixing damper stays open, the resulting leakage (cross-sectional area approximately 8 ft<sup>2</sup>), compared to the total leakage of all penetrations, doors, etc. across the equipment and operational rooms is insignificant. The hydrogen mixing dampers are installed in the accessible area which provides for maintenance access to the component during normal operation.

The redundancy provided by the eight (8) HMDs meets FMEA requirements so that one (1) HMD can be out for maintenance and a single failure can occur at a second HMD without



affecting the global convection between the equipment and operational rooms (see U.S. EPR FSAR Tier 2, Table 6.2.5-3, which lists the CGCS Failure Modes and Effects Analysis).

Periodic testing on site assures the proper function of each installed HMD (see U.S. EPR FSAR Tier 2, Section 6.2.5.4 and Technical Specification Surveillance Requirement 3.6.9.1). The common-mode failure is addressed by the qualification program and periodic testing.

A description of the safety-related CONVECT system I&C function was provided by the responses to RAI 389, Question 6.2.2-48 and Question 6.2.2-49 on October 6, 2010 and March 31, 2011, respectively.

The information requested in RG 1.206, Section C.I.7.3.1.2, "Design Basis Information," has been described above and addressed in U.S. EPR FSAR Tier 2, Sections 3.2.2, 6.2.5, 7.3, 14.2, and 14.3 for the following design bases:

- Single-failure criterion
- Quality of components and modules
- Independence
- Defense in depth and diversity
- System testing and inoperable surveillance
- Use of digital systems
- Setpoint determination
- ESF control systems
- Equipment qualification

**FSAR Impact:**

The U.S. EPR FSAR will not be changed as a result of this question.

**Question 06.02.02-89:**

**Follow-up to RAI 297, Questions 06.02.02-39 and 06.02.02-40.**

In RAI letter 297, Questions 06.02.02-39 and 06.02.02-40 the staff requested that AREVA, in part, assess US EPR for flashing and deaeration at the strainer under design basis conditions. The applicant's response is provided in report ANP-10293 section 3.2.2. The report indicates that flashing and deaeration are not a concern based on evaluating the maximum observed testing head loss (strainer). However, AREVA did not assess U.S. EPR for flashing and deaeration under design basis conditions. This design basis strainer head loss is listed as approximately 5.0 feet. Observed head loss during testing is less than 0.5 feet. Therefore, request AREVA to assess flashing and deaeration under the full range of design basis conditions (e.g. strainer submergence, strainer head loss, temperature of recirculating coolant etc.).

**Response to Question 06.02.02-89:**

The potential for flashing and deaeration is discussed in Section 3.2.2, "Strainer Vortexing, Submergence, Flashing, and Deaeration Assessment," of AREVA NP Technical Report ANP-10293, "U.S. EPR Design Features to Address GSI-191."

**FSAR Impact:**

The U.S. EPR FSAR will not be changed as a result of this question.