ArevaEPRDCPEm Resource

From: WILLIFORD Dennis (AREVA) [Dennis.Williford@areva.com]
Sent: Wednesday, February 15, 2012 9:56 PM
To: Tesfaye, Getachew
Cc: BENNETT Kathy (AREVA); DELANO Karen (AREVA); ROMINE Judy (AREVA); RYAN Tom (AREVA); KOWALSKI David (AREVA)
Subject: Response to U.S. EPR Design Certification Application RAI No. 492 (5815), FSAR Ch. 9, Supplement 3
Attachments: RAI 492 Supplement 3 Response US EPR DC.pdf

Importance: High

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the six questions in RAI No. 492 on July 6, 2011. Supplement 1 and Supplement 2 responses were sent on November 11, 2011 and December 16, 2011, respectively, to provide a revised schedule.

The attached file, "RAI 492 Supplement 3 Response US EPR DC.pdf" provides a technically correct and complete final response to Question 09.03.04-24. 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 Question 09.03.04-24.

The following table indicates the respective pages in the response document, "RAI 492 Supplement 3 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 492 — 09.03.04-24	2	2

The schedule for technically correct and complete responses to the remaining five questions has changed as provided below.

Question #	Response Date
RAI 492 — 09.03.04-21	**April 18, 2012**
RAI 492 — 09.03.04-22	**March 29, 2012**
RAI 492 — 09.03.04-23	**August 17, 2012**
RAI 492 — 09.03.04-25	**April 18, 2012**
RAI 492 — 09.03.04-26	**March 29, 2012**

Sincerely,

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

From: WILLIFORD Dennis (RS/NB)
Sent: Friday, December 16, 2011 9:29 AM
To: Getachew.Tesfaye@nrc.gov
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); KOWALSKI David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 492 (5815), FSAR Ch. 9, Supplement 2

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the six questions in RAI No. 492 on July 6, 2011. Supplement 1 response to RAI No. 492 was sent on November 11, 2011 to provide a revised schedule.

The schedule for technically correct and complete responses to the six questions has changed as provided below.

Question #	Response Date
RAI 492 — 09.03.04-21	**February 15, 2012**
RAI 492 — 09.03.04-22	**February 15, 2012**
RAI 492 — 09.03.04-23	**February 15, 2012**
RAI 492 — 09.03.04-24	**February 15, 2012**
RAI 492 — 09.03.04-25	**February 15, 2012**
RAI 492 — 09.03.04-26	**February 15, 2012**

Sincerely,

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

From: RYAN Tom (RS/NB)
Sent: Friday, November 11, 2011 11:16 AM
To: Tesfaye, Getachew
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); KOWALSKI David (RS/NB); WILLIFORD Dennis (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 492 (5815), FSAR Ch. 9, Supplement 1

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the six questions in RAI No. 492 on July 6, 2011.

The schedule for technically correct and complete responses to the six questions has been changed and is provided below.

Question #	Response Date
RAI 492 — 09.03.04-21	December 16, 2011
RAI 492 — 09.03.04-22	December 16, 2011
RAI 492 — 09.03.04-23	December 16, 2011
RAI 492 — 09.03.04-24	December 16, 2011
RAI 492 — 09.03.04-25	December 16, 2011
RAI 492 — 09.03.04-26	December 16, 2011

Sincerely,

Tom Ryan 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

From: WILLIFORD Dennis (RS/NB)
Sent: Wednesday, July 06, 2011 5:26 PM
To: 'Tesfaye, Getachew'
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); KOWALSKI David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 492 (5815), FSAR Ch. 9

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 492 Response US EPR DC," provides a schedule since technically correct and complete responses to the six questions cannot be provided at this time.

The following table indicates the respective pages in the response document, "RAI 492 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 492 — 09.03.04-21	2	2
RAI 492 — 09.03.04-22	3	3
RAI 492 — 09.03.04-23	4	4
RAI 492 — 09.03.04-24	5	5
RAI 492 — 09.03.04-25	6	6
RAI 492 — 09.03.04-26	7	7

The schedule for technically correct and complete responses to these questions is provided below.

Question #	Response Date

RAI 492 — 09.03.04-21	November 11, 2011
RAI 492 — 09.03.04-22	November 11, 2011
RAI 492 — 09.03.04-23	November 11, 2011
RAI 492 — 09.03.04-24	November 11, 2011
RAI 492 — 09.03.04-25	November 11, 2011
RAI 492 — 09.03.04-26	November 11, 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

From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Friday, June 03, 2011 7:22 PM
To: ZZ-DL-A-USEPR-DL
Cc: Sastre, Eduardo; Terao, David; Hearn, Peter; Clark, Phyllis; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 492 (5815), FSAR Ch. 9

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on May 21, 2011, and on June 1, 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: 3748

Mail Envelope Properties (2FBE1051AEB2E748A0F98DF9EEE5A5D4AE9351)

Subject: Response to U.S. EPR Design Certification Application RAI No. 492 (5815), FSAR Ch. 9, Supplement 3
Sent Date: 2/15/2012 9:55:49 PM
Received Date: 2/15/2012 9:55:33 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
"KOWALSKI David (AREVA)" <David.Kowalski@areva.com>
Tracking Status: None
"Tesfaye, Getachew" <Getachew.Tesfaye@nrc.gov>
Tracking Status: None

Post Office: auscharmx02.adom.ad.corp

Files	**Size**	**Date & Time**
MESSAGE	7046	2/15/2012 9:55:33 PM
RAI 492 Supplement 3 Response US EPR DC.pdf	519014	

Options
Priority: High
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Response to

Request for Additional Information No. 492(5815), Supplement 3
6/03/2011

U.S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 09.03.04 - Chemical and Volume Control System (PWR) (Including Boron Recovery System)
Application Section: 9.3.4

QUESTIONS for Component Integrity, Performance, and Testing Branch 2 (ESBWR/ABWR Projects) (CIB2)

Question 09.03.04-24:

The applicant's response to RAI 125, Question 09.03.04-15 Parts 1 and 2 indicated that demineralizer resins will be purchased in the lithiated form. The information provided in Response #1 to this RAI is contrary to the statement in section 9.3.4.2.1 of the licensee submittal:

> "Both ion exchangers are initially charged with the same quantity of resin in the form of H^+ and OH^-. One ion exchanger is saturated with lithium and boron. After an equilibrium concentration is reached, this ion exchanger serves as the main purification ion exchanger. The other ion exchanger removes cesium and excess lithium produced in the RCS."

The applicant stated in response to the RAI that the FSAR will not need to be changed.

Rev 2 of the EPR FSAR Tier 2, 9.3.4 has not been changed to reflect the fact that the applicant intends to purchase lithiated mixed bed ion exchanger rather than perform the lithiation process *in situ*. The current description in the FSAR would have the plant changing out a mixed bed demineralizer during power operation, and performing an *in situ* equilibration by addition of lithium into the RCS. This process description is not done at *any* PWR.

Therefore, the Staff requests that the applicant change the FSAR Section 9.3.4.2.1 to match the response to RAI Question 09.03.04-14 parts 1 and 2.

Response to Question 09.03.04-24:

U.S. EPR FSAR Tier 2, Section 9.3.4.2.1, will be revised to be consistent with the current methodology used in the U.S. operating fleet of pressurized water reactors.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 9.3.4.2.1, will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

The major components of the CVCS are located in the RB and FB. The building design protects these components from external hazards and the components are either physically separated or provided with protection from internal hazards. To prevent precipitation of boric acid, CVCS components and piping containing boric acid are located within heated rooms.

Coolant Purification System

The CPS provides continuous full CVCS letdown flow purification. The CPS comprises three inlet filters, two mixed-bed ion exchangers and two outlet filters. If the letdown temperature is less than 140°F, a three-way valve in the CVCS letdown line directs reactor coolant to the system inlet. If the letdown temperature is greater than 140°F, the three-way valve automatically closes and bypasses the purification system. A flow diagram of the CPS is shown in Figure 9.3.4-2—Coolant Purification System.

During normal operation, the reactor coolant passes from the CVCS letdown line three-way valve through two inlet filters in parallel, one mixed bed ion exchanger and two outlet filters, before returning to the CVCS letdown line downstream of the three-way valve. The inlet filters are cartridges that filter undissolved corrosion products to prevent them from entering the resin beds. The outlet filters operate in parallel and act as resin traps to prevent resin carry over into the CVCS and connecting systems. The CPS allows purification of the maximum CVCS letdown flow during plant operation.

The CPS is manually operated. The main control room (MCR) provides indications of the differential pressures across the mixed bed ion exchangers and cartridge filters. If a high differential pressure is sensed, the three-way inlet valve is closed and bypasses the system.

09.03.04-24

Both ion exchangers are initially charged with the same quantity of resin, one in the form of Li^+ and OH^-, and the other in the form of H^+ and OH^-. ~~One ion exchanger is~~Both are saturated with ~~lithium~~ and boron. ~~After an equilibrium concentration is reached, this~~The lithium form ion exchanger serves as the main purification ion exchanger. The other ion exchanger removes cesium and excess lithium produced in the RCS.

The main purification ion exchanger and the lithium and cesium removal ion exchanger operate alternately. When the upper specified lithium limit is reached, the purification flow is switched to the lithium and cesium removal ion exchanger until the lithium concentration is lowered to an acceptable level. ~~Since the boron concentration of the CVCS letdown could be different than that of the reactor coolant following the switchover to the lithium and cesium removal ion exchanger, the downstream flow is routed to the coolant storage tanks.~~

and reduces the susceptibility of structural materials exposed to reactor coolant from stress corrosion cracking. Lithium hydroxide is added into the coolant to maintain the pH value in the alkaline range. The use of the isotope Lithium-7 is specified for radiological reasons. Periodic analysis of the coolant determines the amount required for the injection.

09.03.04-24

During normal power operation, the Boron-10 (n,) reaction produces Lithium-7. The coolant purification ion exchanger that is not saturated with lithium removes excess lithium. The addition of Lithium-7 ~~is~~may be required if there is a high RCS makeup requirement ~~or if the ion exchanger in the CPS is not saturated with lithium~~.

If lithium addition is required, the lithium hydroxide solution is mixed in the lithium hydroxide preparation tank by a manual agitator to provide a homogeneous solution. Then, the entire mixed quantity is transferred into the lithium hydroxide injection tank where the chemical addition pump injects the required amount of solution into the CVCS charging pump suction.

The oxygen in the RCS is controlled by the addition of hydrazine at low temperatures and maintaining an excess of hydrogen during power operation.

The mobile hydrazine injection system supplies the required amount of hydrazine to a chemical proportioning pump. The chemical proportioning pump discharges the hydrazine to the CVCS charging pump suction.

The hydrogenation station located in the charging pump suction line adds hydrogen to the RCS. The concentration of hydrogen in the reactor coolant depends on the hydrogen partial pressure in the gassing unit. The pressure in the VCT maintains the pressure in the gassing unit. The VCT pressure is adjusted so that it corresponds to the saturation pressure for the required ~~approximately two to four ppm~~ hydrogen concentration in the reactor coolant. The pressure control of the nitrogen purging gas maintains the VCT pressure at a constant value even during level variations in the VCT.

During the startup of the gassing unit, hydrogen is not admitted until the gas separator reaches its operating level. At that time, the water jet pump, which exhausts gas from the gas separator and injects it into the mixing element, is placed into operation. A branch line from the charging pump discharge line supplies the propellant liquid for the water jet pump. After the gas separator reaches its operating water level, the gas distribution system injects hydrogen into the gas separator. The gassing unit contains connections for adding hydrogen and for venting and flushing with nitrogen.

If the hydrogen forms larger gas bubbles, the charging pump suction provides a mixing element that makes sure only small bubbles enter the pump. Since out-gassing of dissolved gases can not be avoided when the pump is not operating, venting lines with