ArevaEPRDCPEm Resource

From: WELLS Russell (AREVA) [Russell.Wells@areva.com]
Sent: Thursday, March 31, 2011 3:30 PM
To: Tesfaye, Getachew
Cc: GUCWA Len (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. 429, FSAR Ch. 6, Supplement 2
Attachments: RAI 429 Supplement 2 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. (AREVA NP) provided a response to 1 of the 3 questions in RAI 429 on November 11, 2010, and provided Supplement 1 to revise the response schedule on December 21, 2010.

The attached file, "RAI 429 Supplement 2 Response US EPR DC.pdf" provides a technically correct and complete response to 1 of the remaining 2 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 429 Question 06.02.02-67.

The following table indicates the respective pages in the response document, "RAI 429 Supplement 2 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 429 —06.02.02-67	2	3

The schedule for technically correct and complete responses to the remaining 1 questions has been changed and is provided below:

Question #	Response Date
RAI 429 — 06.03-16	April 30, 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
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Russell.Wells@Areva.com

From: BRYAN Martin (External RS/NB)
Sent: Tuesday, December 21, 2010 10:51 AM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); GUCWA Len (External RS/NB); Carneal, Jason
Subject: Response to U.S. EPR Design Certification Application RAI No. 429, FSAR Ch. 6, Supplement 1

Getachew,

AREVA NP Inc. (AREVA NP) provided a response to 1 of the 3 questions in RAI 429 on November 11, 2010. The attached file, "RAI 429 Supplement 1 Response US EPR DC.pdf," provides a revised response to Question 06.02.02-68. 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 429 Question 06.02.02-68.

The following table indicates the respective pages in the response document, "RAI 429 Supplement 1 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 429 — 06.02.02-68	2	3

To provide an opportunity to interact with the NRC staff, a revised response schedule is provided for Question 06.02.02-67 as indicated below. The schedule for Question 06.03-16 remains unchanged.

Question #	Response Date
RAI 429 — 06.02.02-67	**March 31, 2011**
RAI 429 — 06.03-16	March 31, 2011

Sincerely,

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

From: BRYAN Martin (External RS/NB)
Sent: Thursday, November 11, 2010 6:10 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); GUCWA Len (External RS/NB); Carneal, Jason
Subject: Response to U.S. EPR Design Certification Application RAI No. 429, FSAR Ch. 6

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 429 Response US EPR DC.pdf" provides a technically correct and complete response to 1 of the 3 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 429 Question 06.02.02-68.

The following table indicates the respective pages in the response document, "RAI 429 Response US EPR DC.pdf," that contains AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 429 — 06.02.02-67	2	2
RAI 429 — 06.02.02-68	3	3
RAI 429 — 06.03-16	4	4

A complete answer is not provided for 2 of the 3 questions. The schedule for a technically correct and complete response to these questions is provided below.

Question #	Response Date
RAI 429 — 06.02.02-67	January 6, 2011
RAI 429 — 06.03-16	March 31, 2011

Sincerely,

Martin (Marty) C. Bryan
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From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Friday, October 15, 2010 2:50 PM
To: ZZ-DL-A-USEPR-DL
Cc: Ashley, Clinton; Jackson, Christopher; McKirgan, John; Budzynski, John; Lu, Shanlai; Thomas, George; Donoghue, Joseph; Carneal, Jason; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 429 (4821, 4914), FSAR Ch. 6

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on July 21, 2010, and on October 15, 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: 2792

Mail Envelope Properties (1F1CC1BBDC66B842A46CAC03D6B1CD41042B9B75)

Subject: Response to U.S. EPR Design Certification Application RAI No. 429, FSAR Ch. 6, Supplement 2
Sent Date: 3/31/2011 3:29:36 PM
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From: WELLS Russell (AREVA)

Created By: Russell.Wells@areva.com

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MESSAGE	5832	3/31/2011 3:29:44 PM
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Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Response to

Request for Additional Information No. 429, Supplement 2

10/15/2010

U.S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 06.02.02 - Containment Heat Removal Systems
SRP Section: 06.03 - Emergency Core Cooling System

Application Section: FSAR Chapter 6

QUESTIONS for Reactor System, Nuclear Performance and Code Review (SRSB)
QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects) (SPCV)

Question 06.02.02-67:

Follow Up to RAI 292, Question 14.03-12:

In RAI 140, Question 14.03-7, the NRC asked AREVA to develop ITAAC or justify why no ITAAC is required, related to the containment debris source term. In response, AREVA developed ITAAC to verify a portion of the US EPR debris source term – reflective metal insulation. This ITAAC did not consider aspects of the debris generation analysis (source term) that are more likely to impact ECCS analysis and downstream effects (e.g. fiber insulation, particulate insulation, coatings, chemicals etc). As a result, staff developed RAI 292, Question 14.03-12. In response AREVA indicated the addition of these other debris sources to the ITAAC are not necessary because of margin between tested performance and design basis. Guidance for ITAAC is discussed in SRP 14.3. The existence and extent of margin (small or large) for a safety significant system does not appear to be a sufficient basis for determining if ITAAC is needed.

As discussed in SRP 14.3, a purpose for ITAAC is to verify that the as-built facility conforms to the approved plant design and applicable regulations. ITAAC should verify that the key design characteristics and performance requirements of SSC's are met. The level of detail specified in the ITAAC should be commensurate with the safety significance of the functions and bases for that SSC.

The staff is particularly interested in ensuring that the assumptions and insights from key safety and integrated plant safety analyses in Tier 2, where plant performance is dependent on contributions from multiple systems of the design, are adequately considered in Tier 1. Addressing these assumptions and insights in Tier 1 ensures that the integrity of the fundamental analyses for the design are preserved in an as-built facility referencing the certified design. Examples of these analyses include containment analyses, core cooling analyses, and Generic Safety Issue items.

The ECCS system is considered a safety significant system. The debris generation analysis is considered a key safety analysis. This analysis determines the debris source term used for ECCS head loss testing. The debris source term is a function of materials installed in the containment and is a main consideration of Generic Safety Issue (GSI) 191. Industry experience shows that the impact on head loss due to changes in debris source term quantities and/or combinations of source material is difficult to analytically predict, in the absence of testing. Therefore, given the discussion provided above, the verification that the as-built plant is consistent with the approved plant design, with respect to debris source term, should be adequately considered in Tier 1.

AREVA is requested to justify the debris source term materials selected (and reasons for not selecting other materials) as part of this as-built verification (ITAAC).

Response to Question 06.02.02-67:

ITAAC for Microtherm insulation and coatings within the Reactor Containment Building will be added to U.S. EPR FSAR Tier 1, Section 2.1.1.1 and Table 2.1.1-8. The basis for this addition will be added to U.S. EPR FSAR Tier 2, Section 6.1.2.2.1. Latent debris and miscellaneous loose debris are addressed programmatically, that is, via the containment cleanliness program.

Latent debris, intended or unintended, is controlled through the containment cleanliness program by limiting the amount of potential debris sources prior to reactor containment closeout before plant operation. General surveys consisting of visual examination of containment can be performed every refueling incidence. Surveys with detailed calculations of latent debris shall be performed every other outage. Additional surveys shall be conducted after major or extended maintenance activities. The containment cleanliness program is performed on every refueling frequency basis in conjunction with containment close-out procedures.

Visual inspection of containment for loose debris is performed to reduce intended and unintended debris sources. Visual inspection includes all levels of the containment; including the trash racks, weirs, and retaining baskets located below each heavy floor opening. The inspection shall include the safety injection system (SIS) strainers located above each respective sump. The containment cleanliness program shall be implemented to limit intended and unintended latent debris inside containment.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 6.1.2.2.1 and U.S. EPR FSAR Tier 1, Section 2.1.1.1 and Table 2.1.1-8 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

2.10 Essential equipment required for plant shutdown located in the RB and RBA is located above the internal flood level.

2.11 The reactor pressure vessel, reactor coolant pumps, pressurizer, steam generators, and interconnecting RCS piping are insulated with reflective metallic insulation.

2.12 The RB structures have key dimensions that are confirmed after construction.

2.13 The RCB has a minimum containment free volume that is confirmed after construction.

2.14 The RCB and RB internal structures have a minimum containment heat sink surface area value.

2.15 The integrated leak rate from the RCB does not exceed the maximum allowable leakage rate.

2.16 The location of the doors and blowout panels is as listed in Table 2.1.1-6(a).

2.17 Seismic Category I doors and blowout panels can withstand seismic design basis loads without a loss of the function.

2.18 Doors and blowout panels provide pressure relief.

2.19 Doors with blowout panels are provided with missile restraint.

2.20 Vent path areas provide room (compartment) pressure relief.

2.21 The RCB has a maximum volume of Microtherm insulation within the zone of influence.

2.22 The coatings in the RCB are qualified.

2.23 RCB coatings in the zone of influence areas have a maximum thickness.

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3.0 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.1.1-8 lists the RB ITAAC.

Table 2.1.1-8—Reactor Building ITAAC (6 Sheets)

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
2.18	Doors and blowout panels provide pressure relief.	a. Type tests and as-built testing will be performed for the swing doors to demonstrate the ability of the doors to open. b. Type tests will be performed to demonstrate the ability of the blowout panels to open. c. An inspection will be performed to verify the vent direction.	a. The pressure at which the swing doors listed in Table 2.1.1-6(a) begins to open is less than or equal to 3.48 psid. b. The pressure at which the blowout panels listed in Table 2.1.1-6(a) open is less than or equal to 1.74 psid. c. The doors listed in listed in Table 2.1.1-6(a) provide the vent direction as identified.
2.19	Doors with blowout panels are provided with missile restraint.	An inspection will be performed to verify that the doors with blowout panels are provided with a missile restraint.	The doors with blowout panels listed in Table 2.1.1-6(a) have a missile restraint.
2.20	Vent path areas provide room (compartment) pressure relief.	An inspection will be performed to verify the total vent path area.	The minimum total vent path area is greater than or equal to the value listed in Table 2.1.1-6(b) for the rooms (compartments) listed.
2.21	The RCB has a maximum volume of Microtherm insulation within the zone of influence.	An inspection of the as-built components and piping in the zone of influence will be performed.	The as-built components and piping in the zone of influence will have less than or equal to ft^3 of Microtherm insulation.
2.22	The coatings in the RCB are qualified.	An inspection for the existence of a report for the as-built coatings used in the RCB.	A report exists and confirms the as-built coatings used in the RCB are design basis accident (DBA) qualified.
2.23	RCB coatings in the zone of influence areas have a maximum thickness.	a. An inspection for the existence of a report that defines the zone of influence will be conducted. b. An inspection for the existence of a report for the as-built coatings thickness used in the RCB within the zone of influence.	a. A report exists that defines the zone of influence inside the RCB. b. A report exists and confirms the maximum thickness of the as-built coatings in the RCB within the zone of influence.

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application to carbon steel substrates in this case, with the latter preferred for higher temperature applications (i.e., above 250°F).

Surfaces in Service Level III areas subject to immersion during normal operating conditions are normally composed of corrosion resistant materials (e.g., stainless steel). In cases where carbon steel surfaces are exposed, a Service Level III epoxy-type coating that has undergone service environment testing or evaluation may be applied when used in environments subject to temperatures below 250°F.

Galvanized Surfaces

As is the case inside containment, areas outside the containment where painting is impractical may be hot-dip galvanized for corrosion protection. This method of surface protection does not require service level designation.

Concrete – Service Level II

Concrete floor surfaces outside containment requiring Service Level II protection (subject to both light and heavy traffic) and certain exposed concrete wall areas are coated with a Service Level II-qualified epoxy-type coating system (non-self-leveling). Areas not subject to traffic or constant wear (e.g., ceilings, upper wall areas, bay areas) may require only a qualified epoxy sealer.

Surfaces in Service Level II areas subject to immersion during normal operating conditions are normally composed of corrosion resistant materials (e.g., stainless steel). In cases where concrete surfaces are exposed, or additional protection or corrosion control is necessary, a Service Level II epoxy-type coating that has undergone service environment testing or evaluation may be applied when used in environments subject to temperatures below 250°F.

6.1.2.1.2.3 Balance of Plant

For the balance of the plant, commercial-grade coatings are used and applied according to the expected service conditions. Although most structural steel supports, piping, pipe supports, stairways, and tanks outside containment are coated with epoxy-type coating systems, these coatings are not considered safety related because they do not have an impact on engineered safety functions. Therefore, these coatings do not require a service level assignment.

6.1.2.2 Safety Evaluation

6.1.2.2.1 Coating Integrity and Other Safety Measures

Service Level I coatings are used inside containment in areas where coatings failure and subsequent transport to the IRWST sump screens could result in recirculation flow blockage. The Service Level I coatings are tested and qualified to remain intact

during a DBA and will not impact the operation of ESFs. Other design features also help to limit the amount of debris that will reach the IRWST following an accident, as follows:

1. Several screen defenses located upstream of the IRWST screens facilitate enhanced debris collection. Trash racks and retention baskets are installed upstream of the IRWST screens to intercept debris, limiting the amount of material reaching the screens. In addition, the weir at the base of the trash rack serves to restrain debris entrained in the coolant pool volume that approaches the IRWST following a DBA. Section 6.3 provides an evaluation of solid debris that reaches the IRWST.

2. Although the U.S. EPR severe accident heat removal system (SAHRS) takes suction from the IRWST to provide a containment spray function during beyond design basis accidents, manual actuation following a DBA is possible. However, if containment spray were to be manually actuated during a DBA, the coating systems inside containment that could be contacted by containment spray would not be subject to chemical attack, as they would when subject to caustic spray, because of the near-neutral pH range of the suction source.

3. Components in the vicinity of the IRWST are composed of corrosion resistant materials (e.g., stainless steel). All materials within the IRWST or composing the IRWST are uncoated.

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For evaluation of GSI-191, coatings are assumed to fail as identified in Section C.6 (Reference 19). The zones of influence assumed for such coating failure are identified in Section C.4.3.7 (Reference 19). The qualified coatings have the assumed density identified in Section C.2.2.2 (Reference 19).

Service Level II coatings are not DBA qualified, but may be used inside containment in areas where failed coatings could not enter a safety-related system or reach the IRWST.

Service Level III coatings are qualified as safety related, but are not DBA qualified. Therefore, they are selected for use outside of containment in areas where detachment could adversely affect the function of a safety-related SSC.

In addition to failure and delamination, protective coatings can be a source of combustible hydrogen under certain conditions. The production of hydrogen from coatings and other organic and inorganic materials is addressed in Section 6.2.5. The evaluation assesses the potential for formation of coating decomposition products under DBA conditions, and also examines radiation and chemical effects.

In addition to coatings, other organic materials used in the plant are evaluated for their potential interaction with ESFs to confirm that safety functions are not affected.