ArevaEPRDCPEm Resource

From: WILLIFORD Dennis (AREVA) [Dennis.Williford@areva.com]
Sent: Thursday, July 14, 2011 5:20 PM
To: Tesfaye, Getachew
Cc: BENNETT Kathy (AREVA); DELANO Karen (AREVA); HALLINGER Pat (EXTERNAL AREVA); ROMINE Judy (AREVA); RYAN Tom (AREVA); GUCWA Len (EXTERNAL AREVA); RANSOM Jim (AREVA); SALM Bob (AREVA)
Subject: DRAFT Response to U.S. EPR Design Certification Application RAI No. 488 (5788), FSAR Ch. 6, Questions 6.2.2-91, 92, 95, 98,99
Attachments: RAI 488 Questions 06.02.02-91, 92, 95, 98, 99 Response US EPR DC - DRAFT.pdf

Getachew,

Attached are draft responses for RAI 488, Questions 06.02.02-91, 06.02.02-92, 06.02.02-95, 06.02.02-98 and 06.02.02-99 in advance of the final response date shown below.

We would like to discuss the draft responses with the NRC staff during next week's GSI-191 telecon.

Thanks,

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: Monday, June 20, 2011 10:17 AM
To: Tesfaye, Getachew
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); WILLIFORD Dennis (RS/NB); GUCWA Len (External RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 488 (5788), FSAR Ch. 6

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 488 Response US EPR DC.pdf", provides a schedule since a technically correct and complete response to the 9 questions cannot be provided at this time.

The following table indicates the respective pages in the response document, "RAI 488 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 488 — 06.02.02-91	2	2
RAI 488 — 06.02.02-92	3	3
RAI 488 — 06.02.02-93	4	4
RAI 488 — 06.02.02-94	5	5

RAI 488 — 06.02.02-95	6	6
RAI 488 — 06.02.02-96	7	7
RAI 488 — 06.02.02-97	8	8
RAI 488 — 06.02.02-98	9	9
RAI 488 — 06.02.02-99	10	10

A complete answer is not provided for the 9 questions in RAI 488. The schedule for a technically correct and complete response to this question is provided below.

Question #	Response Date
RAI 488 — 06.02.02-91	August 24, 2011
RAI 488 — 06.02.02-92	August 24, 2011
RAI 488 — 06.02.02-93	August 24, 2011
RAI 488 — 06.02.02-94	August 24, 2011
RAI 488 — 06.02.02-95	August 24, 2011
RAI 488 — 06.02.02-96	August 24, 2011
RAI 488 — 06.02.02-97	August 24, 2011
RAI 488 — 06.02.02-98	August 24, 2011
RAI 488 — 06.02.02-99	August 24, 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: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Friday, May 20, 2011 2:47 AM
To: ZZ-DL-A-USEPR-DL
Cc: Ashley, Clinton; Jackson, Christopher; McKirgan, John; Carneal, Jason; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 488 (5788), FSAR Ch. 6

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on May 11, 2011, and on May 19, 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: 3246

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Subject: DRAFT Response to U.S. EPR Design Certification Application RAI No. 488 (5788), FSAR Ch. 6, Questions 6.2.2-91, 92, 95, 98,99
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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
"HALLINGER Pat (EXTERNAL AREVA)" <Pat.Hallinger.ext@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
"RANSOM Jim (AREVA)" <James.Ransom@areva.com>
Tracking Status: None
"SALM Bob (AREVA)" <Robert.Salm@areva.com>
Tracking Status: None
"Tesfaye, Getachew" <Getachew.Tesfaye@nrc.gov>
Tracking Status: None

Post Office: auscharmx02.adom.ad.corp

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MESSAGE	3793	7/14/2011 5:20:32 PM
RAI 488 Questions 06.02.02-91, 92, 95, 98, 99 Response US EPR DC - DRAFT.pdf	289612	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
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Response to

Request for Additional Information No. 488

5/20/2011

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 06.02.02 - Containment Heat Removal Systems
Application Section: 6.3

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

Question 06.02.02-91:

Follow-up to RAI 434 Supplement 4, Question 06.02.02-71 and Revision 3 to ANP-10293 (March 2011).

Technical Report ANP-10293 R3 section 2.3.2 states: "There is a gap of approximately 1.6 ft between the top of each basket and the heavy floor to provide a flow path for return water in the event the basket becomes filled with debris." The report goes on to state "water overflow over the top of the retaining basket would occur after the debris have been captured." While the gap does exist for all 4 retaining baskets (RB), the flow path at the top of basket may essentially be rendered ineffective for two out of the four installed retaining baskets (referred to as the single compartment RB's). The two single compartment RB's are provided with an alternate flow path that is capable of delivering the return water to the annular region, via the gutter system. This flow path is situated well below (several feet) the top of the two single compartment RB's. The staff request that AREVA clarify FSAR/ANP-10293 technical report language about RB flow paths for return water.

Response to Question 06.02.02-91:

The following section will be added to Technical Report ANP-10293:

Section 2.3.5 Retaining Basket Gutter System

The lower annular space communicates with the IRWST through seven openings via gutters. These gutters seal off the two areas with a water seal in the IRWST to maintain a two-zone containment. The gutters are attached to the IRWST wall at the openings by anchoring bolts to the IRWST wall. The gutters protrude out from the wall approximately 12 inches, and then turn 90° down into the IRWST water to a level of -9.2 ft. The minimum IRWST level during normal operating conditions is -8.5 ft, keeping the annular space separated from the IRWST (see Figure 2-1). The gutters are stainless steel, including the anchoring material.

The IRWST wall openings and associated gutters allow a single compartment basket to communicate with the other three baskets through the annular space. In the event that a single compartment basket begins to clog, it overflows into the annular space at the level of the IRWST wall opening. This limits the increase in level in the clogged basket and allows the overflow to be routed to the other three baskets. This overflow is then filtered by the other three baskets. This effectively increases the filtering area for the clogged single compartment basket.

The double compartment baskets are designed to have a flow path into the IRWST at the annular space level via the small compartment. This is designed to alleviate excessive flooding in the annular space from the single compartment baskets. Due to the low fiber source term in the U.S. EPR design, this feature is unnecessary.

FSAR Impact:

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

Technical Report ANP-10293 Impact:

Technical Report ANP-10293, Section 2.3.5 will be added in the next response as described in the response.

Question 06.02.02-92:

Follow-up to RAI 434 Supplement 4, Question 06.02.02-71 and Revision 3 to ANP-10293 (March 2011).

ANP-10293 Technical Report section 2.3.2 states, "The minimum volume of the two other baskets [the single compartment baskets] is approximately 1589 ft^3 each with a minimum surface area of approximately 721 ft^2." The single compartment RB area and volume description provided in ANP-10293 section 2.3.2 are based on the full basket height. The listed area/volume includes area/volume that is bypassed by the installation of the "gutter" system. The un-bypassed area/volume is more representative of the single compartment RB area/volume available to collect/filter debris during an accident. Therefore, the staff request that AREVA include a description of the single compartment RB area/volume that is not bypassed by the gutter system.

Response to Question 06.02.02-92:

The unbypassed area for the single compartment basket is less than the total filtering surface of the entire large compartment of the double compartment basket. However, the single compartment basket will communicate with the other retaining baskets (e.g., the single compartment basket and the two small compartments of the double compartment basket) via the gutter and annular space in the event that the basket clogs. This will effectively increase the available filtering area significantly above the filtering area of the large compartment of the double compartment basket.

FSAR Impact:

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

Technical Report ANP-10293 Impact:

Technical Report ANP-10293 will not be changed as a result of this question.

Question 06.02.02-95:

Follow-up to RAI 434 Supplement 4, Question 06.02.02-71 and Revision 3 to ANP-10293 (March 2011).

RAI 434 response to Question 06.02.02-71 states that all four retaining baskets collect and filter flow from the annular space and commits to change FSAR section 6.3 which currently indicates that only two of the four baskets [the double compartment baskets] filter flow from the annular space.

ANP-10293 R3 Section 3.2.5 describes how the "…lower annular area communicates with the IRWST through seven openings via gutters."

Appendix E to ANP-10293 R3, indicates that the screened area of the large compartment (front basket) of the double compartment RB design (at full height) contains less screened area than the single basket design (at full height). Therefore, it is conservative to model the front portion of the double basket design in the test apparatus.

Given that the single compartment RB now connects to the annular region (via the gutter system), and this connection is several feet below the baskets full height, essentially reducing the baskets effective area to the region at or below the gutter, the staff request that AREVA explain how comparing the full height of the single compartment basket area to the full height of the double compartment front/large basket area is a conservative approach for designing the test apparatus?

Response to Question 06.02.02-95:

See the response to Question 06.02.02-92. The single compartment basket will effectively increase its filtering area as it communicates with the other baskets via the gutters and annular space. The large compartment of the double compartment basket remains limiting with regard to filtering area.

FSAR Impact:

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

Technical Report ANP-10293 Impact:

Technical Report ANP-10293 will not be changed as a result of this question.

Question 06.02.02-98:

Follow-up to RAI 434 Question 06.02.02-77

In the response to RAI 434 question 06.02.02-77 the applicant did not include any updates to the FSAR or ANP-10293. The information contained in the response related to basket performance is needed to support the staffs safety review of testing and should be included in the appropriate sections of the FSAR and/or technical report. Therefore, request AREVA update the FSAR or technical report with the information related to basket performance.

Response to Question 06.02.02-98:

The following section will be added to Technical Report ANP-10293:

Section E.3.1 Test Configuration Selection

The large compartment of the double compartment basket was selected for the test configuration. It was determined that this had the most limiting condition under full debris loading. This is based on the fibrous debris distribution in containment. The U.S. EPR design source term for fiber is from latent debris.

The limited amount of latent debris is distributed throughout containment. The heavy floor area and the annular floor area both receive latent debris and comprise the total area for the latent debris assumed to enter the IRWST. There are no other sources of fibrous material within the zone of influence (ZOI) that will enter the IRWST.

The large compartment testing bounds the small compartment testing as follows. The only source of fiber within the zones of influence is from latent fiber. Latent fiber is uniformly distributed within containment. Based on a uniform distribution, 66 percent of the available containment surface area feeds the service area annular space. The remainder of the surface area feeds the heavy floor and the retention volumes. Therefore, the annular space will receive 15 pounds of latent fiber (66 percent of 22.5 pounds total latent fiber).

In order to discuss compartment loading and fiber retention performance, the available screen surface area needs to be identified. The small compartment has a minimum requirement of 269 ft^2 of total surface area. The wetted surface area at the minimum level for safety injection pump Net Positive Suction Head is approximately 135 ft^2. The large compartment has a minimum total surface area of 721 ft^2 and approximately 450 ft^2 of wetted surface area at the same IRWST level. The wetted surface areas above do not include the common screen between the two compartments.

Fiber in the annular space transports to each of the four baskets via holes in the IRWST wall. The debris is routed into the basket through the use of gutters that discharge below the IRWST water level. Latent fiber in the annular space migrates uniformly to each basket. Therefore, each basket sees 3.75 pounds of latent fiber. This yields a loading of 0.028 lb/ft^2 for the small compartment. By comparison, the large compartment (as tested) is loaded with 22.5 pounds of latent fiber for a loading of 0.050 lb/ft^2.

Testing, of the large compartment, discussed later in this appendix, introduced fiber in small batch sizes. No basket level increase was observed after complete loading with the design

basis latent fiber. The level increased only after addition of the paint chips. The small compartment sees fiber arrival in small increments, similar to the large compartment. The small compartment does not see paint chips as they are introduced via the heavy floor. The overall fiber loading is less than that of the large compartment. Therefore, the level in the small compartment is not expected to rise and result in any overflow condition. Testing performed on other basket and strainer configurations showed that the fiber bypass rate was fairly insensitive to basket/screen modifications to hole size and material type. Fiber bypass ratios observed were between 65 and 70 percent. The small compartment is expected to perform similarly to the large basket with a consistent bypass fraction. This would yield a situation where the strainer would see the same loading, assuming all four baskets feed one strainer, or less than the large compartment as tested.

FSAR Impact:

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

Technical Report ANP-10293 Impact:

Technical Report ANP-10293, Section E.1 will be added in the next revision as described in the response.

Question 06.02.02-99:

According to Figure 2-1 in ANP-10293 Rev. 3, it appears that return water falling from the heavy floor may directly impinge upon a portion of the Retaining Basket screened surface area. During testing of the retaining basket screen, water falling from a simulated heavy floor did not impinge upon basket screened surfaces. The staff request that AREVA clarify if the actual basket design screened surface will have water and debris directly impinging upon screen surfaces. If water does directly impinge upon a portion of the basket screened surface, explain the effects this would have on overall basket performance and strainer head loss.

Response to Question 06.02.02-99:

There is a potential for a small amount (20 percent using linear feet and the perimeter of the trash rack) of debris to directly impinge upon the sloped surface of the double compartment basket. From the standpoint of bypass, it is unknown as to whether direct impingement may increase or decrease the amount of bypass. However, any bypass from the large compartment would enter the small compartment basket which contains the same filtering media. Furthermore, there is no agitation in the small compartment, making settling and effective filtering much more likely in this area than the large compartment area that is subject to flow impingement from the heavy floor weir overflow.

During the last head loss tests, there was no observed debris bed on the tested basket, only an observed layer of fiber and particulate debris on the strainer. Therefore, any bypassed debris from a sloped face was theoretically tested by the conservative conditions under which head loss testing was performed.

Testing did not mimic basket design since the actual design is open on three sides to the IRWST and flow and debris will enter all four baskets. The tested basket used a scaled surface area of the large compartment of the double compartment basket. Testing with only one side open to the test strainer conservatively directed debris towards the strainer, which was observed after drain down with debris on the strainer during head loss and bypass testing. Testing a prototype basket would allow debris settling, which is not conservative to testing. In addition, strainer testing created non-prototypical turbulence and directed pump mini-flow return towards the floor in front of the strainer to prevent settling. Adding a sloped face to the test configuration with a secondary basket prototypical to plant design would yield more prototypical and less conservative results.

FSAR Impact:

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

Technical Report ANP-10293 Impact:

Technical Report ANP-10293 will not be changed as a result of this question.