ArevaEPRDCPEm Resource

From: BRYAN Martin (EXTERNAL AREVA) [Martin.Bryan.ext@areva.com]
Sent: Wednesday, February 02, 2011 2:09 PM
To: Tesfaye, Getachew
Cc: DELANO Karen (AREVA); ROMINE Judy (AREVA); BENNETT Kathy (AREVA); RYAN Tom (AREVA); COLEMAN Sue (AREVA); WILLIFORD Dennis (AREVA); HALLINGER Pat (EXTERNAL AREVA); HAYS Lynn (AREVA); Canova, Michael
Subject: DRAFT Response to U.S. EPR Design Certification Application RAI No. 414, FSAR Ch. 7 OPEN ITEM, Question 7.3-31
Attachments: RAI 414 Question 07.03-31 Response US EPR DC- DRAFT.pdf

Getachew,

To support the final response date and to incorporate NRC comments, a draft response to RAI 414 question 7.3-31 is being provided.
Let me know if the staff has questions or if the response can be sent as final.

Thanks,

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

From: BRYAN Martin (External RS/NB)
Sent: Thursday, January 13, 2011 4:35 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); PANNELL George (CORP/QP)
Subject: Response to U.S. EPR Design Certification Application RAI No. 414, FSAR Ch. 7 OPEN ITEM, Supplement 3

Getachew,

AREVA NP provided a schedule on July 14, 2010 for a technically correct and complete response to RAI 414. Supplement 1 response was sent on October 28, 2010 to provide a revised schedule for all questions. Supplement 2 was sent on November 29, 2010 to provide a revised schedule for 6 of the remaining 7 questions. To allow additional time to interact with the NRC staff, a revised schedule for these six questions is provided. The schedule for Question 07.02-32 remains the same.

A complete answer is not provided for the 7 questions. The schedule for technically correct and complete responses to these questions is provided below.

Question #	Response Date
RAI 414 — 07.02-32	March 01, 2011
RAI 414 — 07.03-33	February 11, 2011
RAI 414 — 07.02-30	February 11, 2011
RAI 414 — 07.03-31	February 11, 2011
RAI 414 — 07.04-14	February 11, 2011
RAI 414 — 07.07-20	February 11, 2011
RAI 414 — 07.07-22	February 11, 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: Monday, November 29, 2010 2:35 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); PANNELL George (CORP/QP)
Subject: Response to U.S. EPR Design Certification Application RAI No. 414, FSAR Ch. 7 OPEN ITEM, Supplement 2

Getachew,

AREVA NP provided a schedule on July 14, 2010 for a technically correct and complete response to RAI 414. Supplement 1 response was sent on October 28, 2010 to provide a revised schedule for all questions. To allow additional time to interact with the NRC staff, a revised schedule for six of the seven questions is provided. The schedule for Question 07.02-32 remains the same.

A complete answer is not provided for the 7 questions. The schedule for technically correct and complete responses to these questions is provided below.

Question #	Response Date
RAI 414 — 07.02-32	March 01, 2011
RAI 414 — 07.03-33	January 13, 2011
RAI 414 — 07.02-30	January 13, 2011
RAI 414 — 07.03-31	January 13, 2011
RAI 414 — 07.04-14	January 13, 2011
RAI 414 — 07.07-20	January 13, 2011
RAI 414 — 07.07-22	January 13, 2011

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
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Martin.Bryan.ext@areva.com

From: BRYAN Martin (External RS/NB)
Sent: Thursday, October 28, 2010 4:53 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); PANNELL George (CORP/QP)
Subject: Response to U.S. EPR Design Certification Application RAI No. 414, FSAR Ch. 7 OPEN ITEM, Supplement 1

Getachew,

AREVA NP provided a schedule on July 14, 2010 for a technically correct and complete response to RAI 414. To allow additional time to interact with the NRC staff, a revised schedule is provided.

A complete answer is not provided for the 7 questions. The schedule for technically correct and complete responses to these questions is provided below.

Question #	Response Date
RAI 414 — 07.02-32	March 01, 2011
RAI 414 — 07.03-33	November 29, 2010
RAI 414 — 07.02-30	November 29, 2010
RAI 414 — 07.03-31	November 29, 2010
RAI 414 — 07.04-14	November 29, 2010
RAI 414 — 07.07-20	November 29, 2010
RAI 414 — 07.07-22	November 29, 2010

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 (EXT)
Sent: Wednesday, July 14, 2010 6:32 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); RYAN Tom (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 414, FSAR Ch. 7 OPEN ITEM

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 414 Response US EPR DC.pdf" provides a schedule since technically correct and complete responses to the 7 questions are not provided.

The following table indicates the respective pages in the response document, "RAI 414 Response US EPR DC.pdf" that contain AREVA NP's responses to the subject questions.

Question #	Start Page	End Page
RAI 414 — 07.02-32	2	2
RAI 414 — 07.03-33	3	3
RAI 414 — 07.02-30	4	6
RAI 414 — 07.03-31	7	8
RAI 414 — 07.04-14	9	9
RAI 414 — 07.07-20	10	10
RAI 414 — 07.07-22	11	11

A complete answer is not provided for the 6 questions. The schedule for technically correct and complete responses to these questions is provided below.

Question #	Response Date
RAI 414 — 07.02-32	October 28, 2010
RAI 414 — 07.03-33	October 28, 2010
RAI 414 — 07.02-30	October 28, 2010
RAI 414 — 07.03-31	October 28, 2010
RAI 414 — 07.04-14	October 28, 2010
RAI 414 — 07.07-20	October 28, 2010
RAI 414 — 07.07-22	October 28, 2010

Sincerely,

Martin (Marty) C. Bryan
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From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Tuesday, June 15, 2010 4:58 PM
To: ZZ-DL-A-USEPR-DL
Cc: Truong, Tung; Morton, Wendell; Spaulding, Deirdre; Mott, Kenneth; Jackson, Terry; Canova, Michael; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 414(4394,4398,4752,4548), FSAR Ch. 7 OPEN ITEM

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on June 8, 2010, and on June 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 question in this RAI is an OPEN ITEM in the safety evaluation report for Chapter 7 for Phases 2 and 3 reviews. As such, the schedule we have established for your application assumes technically correct and complete responses prior to the start of Phase 4 review. For any RAI that cannot be answered prior to the start of Phase 4 review, it is expected that a date for receipt of this information will be provided 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: 2505

Mail Envelope Properties (199EBB4D1CD9644D9472AA84D5D8EFA719330E)

Subject: DRAFT Response to U.S. EPR Design Certification Application RAI No. 414, FSAR Ch. 7 OPEN ITEM, Question 7.3-31
Sent Date: 2/2/2011 2:09:24 PM
Received Date: 2/2/2011 2:09:30 PM
From: BRYAN Martin (EXTERNAL AREVA)

Created By: Martin.Bryan.ext@areva.com

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

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Files	**Size**	**Date & Time**	
MESSAGE	7927	2/2/2011 2:09:30 PM	
RAI 414 Question 07.03-31 Response US EPR DC- DRAFT.pdf			448767

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

Response to

Request for Additional Information No. 414(4394, 4398, 4752, 4548), Revision 1, Question 07.03-31

6/15/2010

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 07.02 - Reactor Trip System
SRP Section: 07.03 - Engineered Safety Features Systems
SRP Section: 07.04 - Safe Shutdown Systems
SRP Section: 07.07 - Control Systems

Application Section: FSAR Chapter 7

QUESTIONS for Instrumentation, Controls and Electrical Engineering 1 (AP1000/EPR Projects) (ICE1)

Question 07.03-31:

OPEN ITEM

Follow-up to RAI 285, Question 07.03-26.

IEEE Std. 603-1998, Clause 4.k, requires documentation of equipment protective provisions that prevent the safety systems from accomplishing their safety functions. The staff used SRP Appendix 7.1-C as guidance in the review of conformance to Clause 4.k. Clause 4.k is not addressed in the U.S. EPR DCD Tier 2, FSAR Section 7.3. Per U.S. EPR DCD Tier 2, FSAR Section 7.1.2.6.10, U.S. EPR DCD Tier 2, FSAR Chapters 5, 6, 8, 9, 10 and 11 contain descriptions on this requirement. However, the applicant does not state whether there are, or are not, any equipment protective features that can prevent a safety actuation of ESF. As such, the staff found there was insufficient detail to finalize an evaluation for this clause. RAI 957, Question 07.03-14 (ML091630750) was issued to clarify the issue. In its response, the applicant states the functional requirements for the PS do not include any provisions for protective features that could prevent safety functions. The applicant goes on to state that should the design of the PS change in the future to add such a feature, that this would be documented consistent with IEEE Std. 603-1998, Clause 4.k. The applicant did not commit to clearly stating this fact in the FSAR.

The staff is looking for the applicant to clearly state in the FSAR that the current design of the U.S. EPR does not have any equipment features that would prevent a safety system from accomplishing its safety function. If, in the future, the design of the U.S. EPR introduces a protective feature that would prevent a safety system from accomplishing its safety function, then the applicant should take the necessary steps to document this fact in the FSAR and the staff would review that design change. That does not alleviate the responsibility of the applicant from clearly stating in the latest FSAR revision the design aspects of the current U.S. EPR PS design with respect to IEEE Std. 603-1998, Clause 4.k. The staff created RAI 285, Question 07.03-26, as a supplemental question. In its response, the applicant attempted to clarify its initial response by stating:

> "It should be noted that if a piece of safety equipment is prevented from performing its function (for example, by an equipment protective function), then a single failure has occurred. This scenario is functionally equivalent to that piece of equipment failing to perform its safety function due to any number of failure mechanisms. Failure modes and effects analysis (FMEA) have been performed for the safety-related process systems to demonstrate that no single failure can prevent performance of a safety function. These FMEAs are presented in the chapters of the U.S. EPR FSAR where the process systems are described. From this perspective, it can be said that no single equipment protective function (equivalent to single failure of the equipment) can prevent performance of a safety function."

The applicant's second response has provided valuable information that allowed the staff to better understand the applicant's position. The staff agrees with applicant's position that a failure to actuate due to an equipment protective feature would be bounded by the single failure analyses. With that said, this information should be added to the FSAR if the bounding single failure analyses is ultimately the reasons why the applicant believes the U.S. EPR PS system design has no equipment protective features that can prevent a safety system actuation. This supplemental question has been created to ensure that the applicant commits to stating in the

U.S. EPR DCD that there are no equipment protective features that prevent safety system actuation and provide more detail as to why this is true.

Response to Question 07.03-31:

U.S. EPR FSAR Tier 2, Section 7.1.2.6.10 will be revised to include the single failure criterion information requested in this question.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 7.1.2.6.10 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

7.1.2.6.10 Design Basis: Equipment Protection Provisions (Clause 4.k)

The I&C systems provide the capability to implement equipment protection of the safety process systems. Equipment protection can be implemented as an operational I&C function or a safety I&C function. The categorization is derived from process system requirements. Safety I&C functions have priority over operational I&C functions as described in Section 7.1.1.6. Refer to Chapter 5, Chapter 6, Chapter 8, Chapter 9, Chapter 10, and Chapter 11 for descriptions of the process systems.

07.03-31

The U.S. EPR contains equipment protective functions that may prevent a piece of safety equipment from performing its function. If a piece of safety equipment is prevented from performing its function by an equipment protective function, then a single failure has occurred. This scenario is functionally equivalent to that piece of equipment failing to perform its safety function due to any number of failure mechanisms. Failure modes and effects analysis (FMEA) have been performed for the safety-related process systems to demonstrate that no single failure can prevent performance of a safety function. Therefore, no single equipment protective function can prevent performance of a safety function.

7.1.2.6.11 Design Basis: Special Design Basis (Clause 4.l)

A software CCF of the PS concurrent with a design basis event is considered in the design. The D3 principles described in Section 7.1.1.6 provide sufficient means to mitigate this software CCF. Section 7.8 describes the D3 assessment.

7.1.2.6.12 Single Failure Criterion (Clause 5.1)

The safety systems meet the requirements of Clause 5.1 of IEEE Std 603-1998 (Reference 1).

The safety systems are arranged in four independent divisions, located in four physically separated Safeguards Buildings. The PS acquires redundant sensors and generally implements 2/4 voting logic to accommodate single failures. This approach also prevents a single failure from resulting in a spurious actuation of process safety-related systems.

Independence is provided so that the redundancy of the safety systems is not defeated due to a single failure. The independence measures provided are described in Section 7.1.1.6.4.

A FMEA for the protective functions executed by the PS is described in Section 7.2.2 and Section 7.3.2. Demonstration of the single failure criterion for the execute features is provided with the description of the process systems in Chapter 5, Chapter 6, Chapter 8, Chapter 9, Chapter 10, and Chapter 11.