ArevaEPRDCPEm Resource

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Sent: Wednesday, August 31, 2011 4:03 PM
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Subject: Draft - U.S. EPR Design Certification Application RAI No. 511 (6019,6020,6012), FSAR Ch. 6
Attachments: Draft RAI_511_SPCV_6019_CIB1_6020_SPCV_6012.doc

Attached please find draft RAI No. 511 regarding your application for standard design certification of the U.S. EPR. If you have any question or need clarifications regarding this RAI, please let me know as soon as possible, I will have our technical Staff available to discuss them with you.

Please also review the RAI to ensure that we have not inadvertently included proprietary information. If there are any proprietary information, please let me know within the next ten days. If I do not hear from you within the next ten days, I will assume there are none and will make the draft RAI publicly available.

Thanks,
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Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 3379

Mail Envelope Properties (0A64B42AAA8FD4418CE1EB5240A6FED1487D18B704)

Subject: Draft - U.S. EPR Design Certification Application RAI No. 511 (6019,6020,6012), FSAR Ch. 6
Sent Date: 8/31/2011 4:02:44 PM
Received Date: 8/31/2011 4:02:47 PM
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Files	**Size**	**Date & Time**
MESSAGE	888	8/31/2011 4:02:47 PM
Draft RAI_511_SPCV_6019_CIB1_6020_SPCV_6012.doc	57850	

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

Draft

Request for Additional Information No. 511(6019, 6020, 6012), Revision 0

8/31/2011

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 06.02.02 - Containment Heat Removal Systems
SRP Section: 06.04 - Control Room Habitability System

Application Section: 6.3

QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects) (SPCV)
QUESTIONS for Component Integrity, Performance, and Testing Branch 1 (AP1000/EPR Projects) (CIB1)

06.02.02-124

Follow-up to RAI 434, Question 06.02.02-75 (Supplement 4 and Revision 3 to US EPR FSAR Tier 2, Section 6.3.2.2.2)

FSAR Section 6.3.2.2.2 states “Performance of the strainers is enhanced by cleanliness programs that limit debris in the containment. A COL applicant that references the U.S. EPR design certification will describe the containment cleanliness program which limits debris within containment.…This program consists of the following elements:… Latent debris will be limited to 150 pounds.” The staff request that AREVA specify in the FSAR and other applicable references or technical reports, the debris types and amounts that make up the total latent debris amount, e.g. ‘X’ pounds of fiber and ‘Y’ pounds of particulate for a total of 150 pounds of latent debris.

06.02.02-125

In response to RAI 212, Question 06.02.02-27 that requested information on the motor-operated valves (MOVs) in the passive flooding lines, the U.S. EPR design certification applicant described a revised design for the Severe Accident Heat Removal System (SAHRS) for the U.S. EPR. For example, the applicant provided the following information on the SAHRS MOVs in the revised U.S. EPR design:

1. The SAHRS flooding line isolation motor-operated valve (MOV) identification numbers are 30JMQ42 AA004 and 30JMQ42 AA 006.
2. The MOVs are safety-related and Seismic Category I.
3. The MOVs are normally closed and support the safety-related function of the in-containment refueling water storage tank (IRWST) by protecting the water volume in the IRWST from inadvertent draining.
4. The MOVs are part of the U.S. EPR environmental qualification program for seismically and dynamically qualified mechanical equipment (U.S. EPR FSAR, Tier 2, Table 3.10-1) and part of the in-service testing program. Since the actuators are

normally deactivated and not required to perform a safety function, they will not be listed in U.S. EPR FSAR Tier 2, Table 3.11-1.

5. The MOVs are normally closed and deactivated and do not have to be operated to perform their safety function. No operator action is required to perform their safety function in case of an inadvertent opening of the passive flooding devices. Manual operator action is only required in case of a severe accident, in which case the breaker will have to be reset and the valves activated to open.

The NRC staff considers the revised U.S. EPR design to resolve the initial question regarding the functional design, qualification, and testing of the SAHRS MOVs to be capable of closing to prevent draining the emergency core cooling water supply in the event of an inadvertent opening of the passive flooding valves. The new design requires the SAHRS MOVs to be normally closed such that these MOVs do not have an active safety-related function. However, these MOVs must open to perform their severe accident function. The NRC staff requests that the U.S. EPR design certification applicant specify these commitments in the U.S. EPR FSAR that provide confidence that the SAHRS MOVs will be capable of performing their severe accident design function to open to allow cooling water flow to mitigate a beyond design basis event. The staff requests that the applicant identify any necessary modifications to the U.S. EPR FSAR to support its RAI response.

06.02.02-126

In RAI 212, Question 06.02.02-28, the NRC staff requested information regarding the passive flooding valves in the Severe Accident Heat Removal System (SAHRS) for the U.S. EPR design including: (1) identification numbers; (2) safety classification; (3) design and operating mechanism; (4) normal and safety functions; (5) functional design, qualification and inservice testing; and (6) position indication system, and provisions to alert the reactor operators to an incorrect valve position. In response to RAI 212, Question 06.02.02-28, the applicant noted that the design of the passive flooding lines had been revised and provided the following information on the SAHRS passive flooding valves in the revised U.S. EPR design:

1. The SAHRS passive flooding valve identification numbers are 30JMQ42 AA003 and 30JMQ42 AA005.
2. The passive flooding valves are non-safety augmented quality and Seismic Category II.
3. The passive flooding valve design is described in U.S. EPR FSAR Tier 2, Section 19.2.3.3.3.1, “Core Melt Stabilization System.” The spring-loaded valve is held closed by a cable and pulley system. The cable is attached to the thermal actuator in the sacrificial concrete of the spreading compartment. The tension in the cable offsets the force of the spring and keeps the valve from opening. In case of a core melt with subsequent corium spreading, the thermal actuator is destroyed, releasing tension in the cable. The spring then opens the valve and allows water to flow from the IRWST to the spreading compartment.
4. The passive flooding valves are normally closed and do not perform a safety-related function. The valves are only used in case of a severe accident.
5. The passive flooding valves will be part of the U.S. EPR environmental qualification program for seismically and dynamically qualified mechanical equipment (U.S. EPR FSAR Tier 2, Table 3.10-1). However, since these valves are used only to mitigate beyond design basis accidents, they do not have to meet the stringent requirements for

quality assurance requirements of 10 CFR Part 50, Appendix B, or the redundancy/diversity requirements of 10 CFR Part 50, Appendix A.

6. Position indication will be provided for each passive flooding valve providing Open/Close indication in the control room. In addition, flow measurements will be provided downstream of the passive flooding valves to further assist the operator in determining an opening of the passive flooding valves.

The NRC staff requests that the U.S. EPR design certification applicant specify these commitments in the U.S. EPR FSAR that provide confidence that the SAHRS passive flooding valves will be capable of performing their severe accident design function to open to allow cooling water flow to mitigate a beyond design basis event. The staff requests that the applicant identify any necessary modifications to the U.S. EPR FSAR to support its RAI response.

06.04-9

Clarify how primary containment bypass leakage that is not captured by the AVS or the leakoff system, is captured by the secondary containment.

Based on the staff's review of your responses and proposed Tier 1 and Tier 2 markups to questions in RAI 277 (Supplement 18 response) and RAI 462 (Supplement 4 response), the staff requests the following information with regard to FSAR Section 6.2.3 "Secondary Containment":

The staff understands that the containment leakoff system functions with the AVS to provide assurance that some but not all primary containment leakage is directed back to the AVS filtration trains. Details of the system will be documented in the FSAR per your response to RAI 462 Question 06.02.03-8. The staff understands that there remain other bypass leakage pathways including hatches and isolation valves that terminate in the fuel building and the Safeguard buildings. In several locations in the FSAR you credit the existence of a .25 inch water gauge negative pressure in these buildings as the means to assure that any leakage of potentially contaminated air to the outside environment is prevented.

In accordance with SRP 6.2.3, since you assume zero bypass leakage ($0.00L_a$) of secondary containment in section 6.2.6.5, of the FSAR and in the FSAR chapter 15 radiological analyses, the staff considers the Fuel Building and the Safeguard Building Controlled Areas along with the Shield Building as containment structures that are part of the secondary containment. The staff understands that, it is the intent of the design that in a DBA, 100% of containment leakage is filtered at 99% efficiency 305 seconds after ESF system actuation. It is the function of the secondary containment to capture any primary containment leakage, and provide 100% filtration of L_a in order to meet assumptions used in the radiological analyses.

Since the SBVS is the ESF system that establishes the negative pressure in the Safeguard Building and the Fuel building, and the SBVS is credited to establish a negative pressure in the Fuel Building and the Controlled Area of the Safeguard Buildings for the purpose of capturing this primary containment bypass leakage, the staff requests the following clarifications in the US EPR FSAR:

a. Clarify The Tier 2 and Tier 1 safety- related functions of the Fuel Building, Safeguard Building, and the SBVS to state that they provide the safety-related function of capturing the primary containment bypass leakage that is not captured by the leak-off system. Clarify the discussion on secondary containment in 6.2.6.5 to clarify that the secondary containment encompasses all SSCs that are credited with secondary containment functions (i.e those SSC's relied upon to ensure that zero bypass leakage is zero ($0.00L_a$)).

b. In order to verify the FSAR Chapter 15 accident analyses assumptions, add Tier 1 ITAAC to verify that the Fuel Building and the Safeguard Building Controlled Areas are capable of being drawn down to a negative pressure of .25 inches of water gauge in 305 seconds.

c. Clarify the scope of Technical specification 3.6.6 to cover the functions of the entire secondary containment as opposed to just the shield building (only a portion of the secondary containment). Specifically,

   I. Include similar operability requirements and required actions for the Safeguard Building Controlled Areas and the Fuel Building as that in LCO 3.6.8.

   II. Add similar surveillance requirements for the Fuel Building and the Safeguard Building Controlled Area as those for the Shield Building specifically, expand the scope of SR 3.6.6.5, inspection requirements to include the Safeguard Building Controlled Area and the Fuel Building)

   III. Clarify the Shield Building Technical Specification Bases 3.6.6 discussion to indicate that the Shield Building functions in conjunction with the Safeguard Building Controlled Areas and the Fuel Building to ensure that the release of radioactive materials from the primary containment atmosphere is restricted to those leakage paths and associated leakage rates assumed in the accident analyses.

   IV. Clarify the SBVS Technical Specification Bases 3.7.12 to clarify that the SBVS design basis addresses the capture of the primary containment bypass leakage, that is described in Tier 2 paragraph 6.2.6.5, (i.e. that bypass leakage that is not captured by the AVS or the leak-off system.)

d. Re- address RAI 233 Question 06.05.03-1 which requested the scope of the secondary containment review to include the Safeguard Buildings and the Fuel building, and questioned the effect of wind on the outside walls of these buildings, on the capability of the SBVS to maintain the credited negative pressure within. In your response to this RAI, please assume the SBVS flow rate stated in SR 3.7.12.7 in your analysis.

e. Revise the analysis that supports the functional capability of the EPR secondary containment design in response to a LOCA, to include the Safeguard Building Controlled Area and the Fuel Building along with the Shield Building Annulus. Address SRP Section 6.2.3 Acceptance Criteria 1A through 1H with this scope.

06.04-10

<u>Clarify the CRE ITAAC described in Tier 1 and CRACS Toxic Gas Design Features described in Tier 2.</u>

Based on the staff's review of your responses and proposed Tier 1 and Tier 2 Markups to questions in RAI 277 (Supplement 18 response) and RAI 462 (Supplement 4 response), the staff requests the following information with regard to FSAR Section 6.4 Control Room Habitability:

a. The staff remains unclear on the method of testing that will be used to perform ITAAC item 6.4 in Tier 1 Table 2.6.1.3. The staff understands that periodic verification of the CRE unfiltered air in-leakage is as per the Control Room Habitability Program, as described in FSAR Tier 2 Chapter 16, section 5.5.17, "Control Room Envelope Habitability Program" and will be performed in accordance with the testing methods described in Section C.1 and C.2 of RG 1.197, "Demonstrating Control Room Envelope Integrity and Nuclear Power

Reactors," Revision 0, May 2003. The staff needs assurance that the method of testing for the ITAAC will be the same as that used after the 10 CFR 52.103 (g) finding is made by the Commission. Therefore the staff requests AREVA to clarify the "Inspections Test, Analyses" section of ITAAC item 6.4 in Tier 1 Table 2.6.1.3, to indicate that tracer gas testing in accordance with ASTM E741 will be performed to measure the unfiltered air in-leakage into the CRE area with the CREF operating.

b. The staff noted that the FSAR Tier 2 mark-ups related to your response to RAI 462, Question 06.04-7 clarify the FSAR to leave the description of the sensors and features of the habitability systems required to mitigate a toxic gas event to the COL applicant that references the U.S. EPR standard design. The staff noted that several proposed FSAR mark ups seem inconsistent with the intent of the RAI response specifically:

   I. The staff noted that the Tier 1 description of the CRACS continues to describe functions for the CRACS to maintain CRE habitability in case of a toxic gas event. The staff requests you clarify Tier 1 Paragraph 2.6.1, (third subparagraph) to delete references to toxic gas.

   II. The staff noted that Tier 2 chapter 16 section B 3.7.10, describe actions to be taken for toxic gas isolation: "[The actions taken in the toxic gas isolation state are the same, except that the control room operator switches the CREF to a filtration alignment to minimize any outside air from entering the CRE though the CRE boundary.]" This description details the response of the CREF to a toxic gas event in the standard design description that appears to be inconsistent with the RG 1.78 guidance quoted in RAI 462, Question 06.04-7. The staff believes it should be revised to be consistent with the reviewer's note that was added to the same paragraph: "The need for toxic gas isolation state will be determined by the COL applicant".

c. The staff noted that the FSAR Tier 2 mark-up related to your response to RAI 462, Question 06.04-7 include a change the capacity of the CRACS cooling unit cooling capacity that affect a previous RAI responses on this subject. Specifically, Tier 2, Chapter 16 section B 3.7.11 now states the following:

> *"During normal and emergency operation each CRACS cooling unit provides 50% of the normal and emergency cooling load to allow two CRACS air handling units to cool the CRE rooms during a station blackout (SBO) event. During an SBO event, the CRACS air handling units will prevent the CRE room temperature from exceeding 78°F."*

This markup text conflicts with the February 27, 2009 Supplement 1 response to RAI 135 Question 09.04.05-1 (#2 Item 3). The mark-up also conflicts with FSAR changes made to paragraph 9.4.2.1.1 (General Description- Recirculation Air Handling Subsystem).

   I. Please provide more information as to why the CRACS cooling unit capacity is reduced. Specifically, please re-address your response to RAI 135 Question 09.04.05-1 (#2 Item 3)

   II. The LCO to restore a single inoperable CRACS train to service is proposed to be 120 days. Include a discussion on the specific case of an SBO that occurs while one of the two AAC-Backed CRACS trains is out for maintenance, and the probability of an SBO event that occurs while this LCO applies. Provide further justification for the duration of this LCO period.

   III. Clarify the FSAR as needed.

06.04-11

Clarify the startup testing requirements of the CRACS with regard to CRE positive pressure.

Based on the staff's review of your responses and proposed Tier 1 and Tier 2 mark-ups to questions in RAI 277 (Supplement 18 response) and RAI 462 (Supplement 4 response), the staff requests the following information with regard to FSAR Section 14.2, "Initial Test Program":

The staff noted that the FSAR Tier 2 markup on page 14.2-150, related to your response to RAI 462, Question 06.04-7 does not modify the Main Control Room Air Conditioning System Test (#082), item 3.7: "Verify that the system maintains the CRE at the required positive pressure relative to the outside atmosphere during system operation" The staff understands that it is the intent of the design to maintain a positive pressure relative to adjacent areas of at least 1/8 inches of water gauge inside the CRE area while the system is operating in design basis accident alignment relative to outside and adjacent areas, and the design maintains a slightly positive pressure inside the CRE area while operating in normal alignment Please clarify Test #082, Item 3.7 (or add an additional item) to specify that the system positive pressure is tested in both operating modes, and the positive pressure in the CRE is measured relative to both outside and adjacent areas when the system is tested in accident alignment.