## ArevaEPRDCPEm Resource

**From:** Getachew Tesfaye
**Sent:** Friday, June 05, 2009 5:51 PM
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**Subject:** U.S. EPR Design Certification Application RAI No. 238 (2881), FSAR Ch. 10
**Attachments:** RAI_238_SBPA_2881.doc

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on May 21, 2009, and on May 28, 2009, 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,
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**Hearing Identifier:** AREVA_EPR_DC_RAIs
**Email Number:** 548

**Mail Envelope Properties** (C56E360E9D804F4B95BC673F886381E71FB9740E09)

**Subject:** U.S. EPR Design Certification Application RAI No. 238 (2881), FSAR Ch. 10
**Sent Date:** 6/5/2009 5:51:06 PM
**Received Date:** 6/5/2009 5:51:08 PM
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**Post Office:** HQCLSTR02.nrc.gov

| **Files** | **Size** | **Date & Time** |
|---|---|---|
| MESSAGE | 787 | 6/5/2009 5:51:08 PM |
| RAI_238_SBPA_2881.doc | 34298 | |

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

Request for Additional Information No. 238 (2881), Revision 0

6/05/2009

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 10.04.09 - Auxiliary Feedwater System (PWR)
Application Section: 10.4.9

QUESTIONS for Balance of Plant Branch 1 (AP1000/EPR Projects) (SBPA)

10.04.09-12

**Follow Up to RAI 10.4.9–4**

SRP 10.4.9, "Auxiliary Feedwter System (PWR)," states, in part, that the system design should conform to the guidance of BTP 10-1, "Design Guidelines for Auxiliary Feedwater System Pump Drive and Power Supply Diversity for Pressurized Water Reactor Plants", as it relates to auxiliary feedwater pump drive and power supply diversity. SRP 10.4.9 also indicates that diversity in pump motive power sources (e.g. electric motor-driven, steam driven, direct-drive diesel, etc), and essential instrumentation should be provided, and that the diverse system including pump(s), controls and valves should be independent of offsite and onsite AC power sources in accordance with BTP 10-1. In Section 10.4.9.3 of the FSAR the applicant indicates that the design of the emergency feedwater system (EFWS) is consistent with BTP 10-1, except that the power sources are redundant but not diverse. FSAR section 10.4.9.3 also states that incorporating non-electric EFWS pumps into the EPR plant design for diversity is not expected to significantly improve EFWS reliability and plant core damage frequency.

The staff previously issued RAI 10.4.9-4 requesting that Areva to provide additional information to demonstrate compliance of the EPR with BTP 10-1. In the response to question 10.04.09-4 (RAI 83), Areva provide information on diversity of the EFW power supply, but did not provide justification for the exception taken in the FSAR to the recommendation to have diversity in the EFW pump motive power source, nor did they provide information to support their conclusion that incorporating non-electric EFWS pumps into the EPR plant design for diversity will not significantly improve EFWS reliability and plant core damage frequency.

In addition to the SRP 10.4.9 and BTP 10-1 recommending that the that the diverse system including pump(s), controls and valves should be independent of offsite and onsite AC power sources, SRP 10.4.9 Section III, Item 3, states that the EFWS design should have features to meet the generic recommendations of NUREG-0611, "Generic Evaluation of Feedwater Transients and Small Break Loss-of-Coolant Accidents in Westinghouse-Designed Operating Plants," January 1980, and NUREG-0635, “Generic Evaluation of Feedwater Transients and Small Break Loss-of-Coolant Accident in Combustion Engineering – Designed Operating Plants,” January 1980,” Generic Long Term Recommendation No. 3 (GL-3) recommends that at least one EFW system pump and its associated flow path and essential instrumentation should automatically initiate

AFW system flow and be capable of being operated independently of any AC power source for at least two hours. Also, Generic Short Term Recommendation No. 5 (GS-5) recommends that plants be capable of providing required EFW flow for at least two hours from one EFW pump train independent of any ac power. The EPR FSAR claims compliance with NUREG-0611 and NUREG-0635 without exception.

1. EFWS, designed using a defense-in-depth design philosophy generally provide diverse and independent means of delivering feedwater to the steam generators, with one of the means being independent of AC power availability. This arrangement allows for timely initiation and operation of the EFWS following a loss of all AC power. Recommendations related to this are contained in BTP 10-1, NUREG-0611 and NUREG-0635 (Recommendations GL-3, and GS-5) .

   a) Provide the provisions for the diversity in pump motive power sources and essential instrumentation and control power sources in the EPR design.

   b) The guidelines of BTP 10-1 recommend that the diverse system including pumps(s), controls and valves should be independent of offsite and onsite AC power sources, address this recommendation in the EPR design or demonstrate that the EPR design provides equivalent reliability to the BTP 10-1 guidelines..

   c) Demonstrate that the EFWS design meets GS-5 and GL-3 listed in NUREG-0611 and NUREG-0635.

   d) Explain the case of a lost of all AC power for the establishment of the EFWS flow to the steam generators in a timely manor. If automatic actuation of the EFWS is not assumed, describe required operator action needed to manually start the EFWS, and discuss the time required for the actions and the time required for the steam generator to dryout.

2. In response to Question 10.04.09-1 (RAI 83), the EFWS design was changed to maintain the supply header isolation valves normally closed. The response to Question 19-274 (RAI 197) showed an increase in overall core damage frequency (CDF) as a result of this design change, which indicates that the EFWS system reliability decreases. Provide a revision to Table 10.4.9-4 that reflects the new EFWS system reliability.

3. In Section 10.4.9.3 of the FSAR the applicant indicates that the design of the EFWS is consistent with BTP 10-1, except that the power sources are redundant but not diverse. FSAR section 10.4.9.3 also states that incorporating non-electric EFWS pumps into the EPR plant design for diversity is not expected to significantly improve EFWS reliability and plant core damage frequency. Discuss, with support from sensitivity studies as needed, the benefit in EFWS reliability that could be obtained if diverse EFWS pumps were included in the U.S. EPR design.

   Describe the process for evaluating the risk reduction of proposed design changes and balancing them with operational considerations (e.g., increased maintenance). The staff observes that this design change appears not to have been evaluated as a PRA sensitivity study, as described in FSAR Table 19.1-15 and the response to Question 19-45 (RAI 2), although FSAR page 19.1-58 indicates that another design change resulting in a 7-percent CDF improvement may be considered in the future.