ArevaEPRDCPEm Resource

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Sent: Thursday, May 21, 2009 12:14 PM
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Subject: Draft - U.S. EPR Design Certification Application RAI No. 238 (2881), FSAR Ch. 10
Attachments: Draft RAI_238_SBPA_2881.doc

Attached please find draft RAI No. 238 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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Request for Additional Information No. 238 (2881), Revision 0

5/21/2009

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.