

ArevaEPRDCPEm Resource

From: Tesfaye, Getachew
Sent: Wednesday, June 16, 2010 8:03 AM
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Cc: Wheeler, Larry; Eul, Ryan; Lee, Samuel; Segala, John; Hearn, Peter; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 397 (4644,4680), FSAR Ch. 9
Attachments: RAI_397_SBPA_4644_4680.doc

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on May 4, 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 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
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Request for Additional Information No. 397(4644, 4680), Revision 0

6/16/2010

U. S. EPR Standard Design Certification
AREVA NP Inc.

Docket No. 52-020

SRP Section: 09.02.02 - Reactor Auxiliary Cooling Water Systems

SRP Section: 09.02.05 - Ultimate Heat Sink

Application Section: 9.2

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

09.02.02-107

Follow-up to RAI 334, Question 9.2.2-59 and RAI 174, Question 9.2.2-10

The staff's review of the applicant's response dated March 12, 2010 and associated FSAR markup provided for RAI 9.2.2-59 identified follow-up questions for parts (a) and (d), as described below:

- a. Part (a) identified inconsistencies in the markup provided for FSAR Tier 1 Table 2.7.1-1. The response provided by the applicant in Supplement 1 of RAI 334 (RAI 9.2.2-59) included markups of both Tier 1 Table 2.7.1-1 and 2.7.1-2. While the originally noted inconsistency was adequately resolved in the markup, the staff found that Table 2.7.1-2 note (3) had also been changed. Note (3) was added by the applicant in response to RAI 9.2.2-12 (part 7d) of Supplement 3 to RAI 174. The note previously included an important explanation that multiple solenoid operated pilot valves were provided for each hydraulically operated valve and each pilot valve was powered from a different Class 1E uninterruptible power supply division to provide redundancy.

The markup of Tier 1 Table 2.7.1-2 Note (3) is not acceptable to the staff since multiple solenoid operated pilot valves are still identified but the key point that "each solenoid operated pilot valve is powered by different uninterruptible Class 1E power sources..." has been deleted with no explanation. The applicant is requested to resolve this concern and consider the addition of this information to the Tier 2 Section 9.2.2.2 discussion of switchover valves, which currently discusses only a single pilot valve for each hydraulic operated valve.

In addition, for Tier 1 Table 2.7.1-2, column "Description", several locations should state 'valves' instead of 'valve'. This should be corrected in the FSAR (editorial).

- b. In a portion of part (d) the staff asked the applicant to justify the identification of the emergency surge tank makeup water source from the fire water distribution system (FWDS) as Seismic Category II, which is typically associated with equipment that must maintain sufficient integrity to prevent causing damage to other nearby safety-related, Seismic "Category I" SSCs from a seismic event rather than equipment that must remain functional. In response the applicant stated that the emergency makeup is from the

seismically qualified portion of the fire water distribution system inside the nuclear island. Although the applicant described the makeup source as “seismically qualified,” the staff noted that the FSAR text and FSAR figure markups identified the makeup source as non-safety related and seismic category II. The staff found this inconsistent with the definition provided for seismic category II provided in revision 1 of U.S. EPR FSAR Tier 2 paragraph 3.2.1.2, which states;

“U.S. EPR SSCs classified as Seismic Category II are designed to withstand SSE seismic loads without incurring a structural failure that permits deleterious interaction with any Seismic Category I SSCs or that could result in injury to main control room occupants.”

Additionally, RG 1.29, “Seismic Design Classification,” item C. 1. G, states that cooling water and component cooling should be seismic category I, and therefore, any cooling water makeup should also be seismic category I.

Based on the FSAR definition above, the staff concluded that the use of a NSR/ Seismic Category II surge tank makeup water source is inconsistent with guidance provided in SRP 9.2.2 paragraph III.3C for a safety related seismic makeup source. Accordingly, the applicant needs to specify that the makeup water source is safety related, seismic category I. The applicant should also identify the flow rate and water volume that is available from the finally selected makeup source to confirm that the requirements of the CCWS system can be met.

09.02.02-108

Follow-up to RAI 334, Question 9.2.2-60 and RAI 174, Question 9.2.2-11

In RAI 9.2.2-60 the applicant was asked several follow-up questions in regard to addressing hydraulic transients such as water hammer and two phase flow the CCWS design. The questions included: (1) specifically address the potential for two-phase flow as identified in NRC Generic Letter 96-06, (2) explain the means by which the CCWS withstands “adverse transients,” and (3) provide details on I&C design features to avoid water hammer.

The staff’s review of the applicant’s response provided for RAI 9.2.2-60 identified the follow-up questions, as described below:

- a. The applicant needs to provide an explanation of preventing or mitigating two phase flow in the return pipes from any CCWS heat exchanger exposed to post accident conditions inside containment. The response should address heat exchangers that may be automatically isolated (e.g. Containment HVAC) as well as those that can remain in service (e.g. RCP and, CVCS HP cooler loads etc). For this response the applicant needs to provide assurance that CCWS worst case fluid outlet temperatures will remain below saturation for the expected fluid pressure conditions.

- b. The applicant needs to explain the mitigation of a hydraulic transient that could result from automatic closing of the 10 second switchover valve by the time sequence of opening the LHSI isolation valve. The discussion should include the source and relative timing of valve initiating signals as well as valve stroke timing for the 18” butterfly valve (AA005) to provide assurance that the LHSI path will open in time to support switchover valve closure. The applicant should also add a discussion of this water hammer mitigating design feature in FSAR Tier 2 Section 9.2.2.
- c. Describe if a similar water hammer transient concern exists upon automatic isolation of non-safety loads outside of containment by fast closing hydraulic valves (i.e. 80AA0015,16,19 and 50AA001, 004 and 006). Several control signals are discussed in FSAR Tier 2 Section 9.2.2 that will automatically initiate closure of these fast closing hydraulic valves (e.g. a mismatch in flow between the inlet and outlet). Describe if design features are also provided to mitigate the potential for a water hammer transient for this scenario.
- d. The applicant should identify the indications and controls referenced in the initial response to RAI 174, Supplemental 2 (page 2), that will help to avoid water hammer and add them to the appropriate sections of the FSAR (for example FSAR Tier 1 and FSAR Tier 2 Section 9.2.2 and Chapter 14).

09.02.05-36

Follow-up to RAI 277, Question 09.02.05-21:

Based on the staff's review of the RAI 277, Question 09.02.05-21 response dated September 16, 2009, the applicant did not address the 10 CFR 52.47(a)(24) and (a)(25) regulations for the ultimate heat sink (UHS) emergency make-up water system which state:

"(24) A representative conceptual design for those portions of the plant for which the application does not seek certification, to aid the NRC in its review of the Final Safety Analysis Report (FSAR) and to permit assessment of the adequacy of the interface requirements in paragraph (a)(25) of this section;

(25) The interface requirements to be met by those portions of the plant for which the application does not seek certification. These requirements must be sufficiently detailed to allow completion of the FSAR;"

- a. Since the design of the raw water supply system (RWSS) submitted in the response is designated as “non-safety” and supplies only the normal make-up water supply to the UHS, the EPR design certification (DC) application still lacks a description of the safety-related emergency make-up water system to the UHS. Therefore, to comply with 10 CFR 52.47(a)(24), the applicant should revise the FSAR to include a certified or conceptual design for the UHS emergency make-up water system.
- b. Also, to comply with 10 CFR 52.47(a)(25), the FSAR, including Chapter 4, “Interface Requirements,” of Tier 1, needs to be revised to include sufficiently detailed interface requirements for this system that must be satisfied by combined license applicants when they provide their plant specific RWSS design. Currently, the staff could find only a 300

gpm interface requirement for the safety-related, UHS emergency make-up water system, which has no certified or conceptual design provided. The current interface requirement is not comprehensive in that it does not take into account the temperature and chemistry of potential make-up water sources and their impact on the UHS performing its intended safety function over a period of 30 days. The applicant should address the staff's concern on the comprehensiveness of the interface requirement for the UHS emergency make-up water system.

- c. The applicant's response included an FSAR markup including a conceptual design of a non-safety related RWSS in FSAR Section 9.2.9. The sentence "[Connections to the UHS cooling tower basins are made at safety-related motor operated valves (MOV), identified in Section 9.2.5]" is notated as "conceptual" design while these MOVs are shown to be part of the standard design in all of the corresponding figures. The applicant should clarify and maintain consistency regarding what portions are conceptual design, and what portions are part of the certified design in figures, tables, and text for FSAR Sections 9.2.1, 9.2.5, and 9.2.9. For figures and tables that include both conceptual design portions and certified design portions, a clear notation should be used to illustrate the distinctions. The applicant should address the apparent discrepancy in the example cited above as well as review the FSAR for other inconsistencies.
- d. The opening sentence of FSAR Chapter 9.2.9 provided in the response states that the RWSS provides ultimate heat sink make-up. Figure 9.2.9-1 shows the RWSS supplies only "normal" make-up to the UHS. The applicant should add the word "normal" to the text portion so that there is clarity that the RWSS does not provide both normal and emergency make-up water to the UHS per the conceptual design provided.