REQUEST FOR ADDITIONAL INFORMATION 774-5859 REVISION 0

6/27/2011

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 09.02.02 - Reactor Auxiliary Cooling Water Systems
Application Section: 9.2.2 and Chapter 16 (TS 3.7.7)

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

09.02.02-84

This RAI is a follow-up to RAI 571-4365, Question 09.02.02-56, related to the component cooling water system (CCWS) cross-tie alignment.

US-APWR DCD Tier 2 Section 5.4.1.3.4 states that if a loss of CCWS occurs, seal injection flow would continue to be provided to the reactor coolant pumps (RCPs) from the chemical volume & control system (CVCS). In addition, the DCD states that the RCPs are designed so that the seal injection flow is sufficient to prevent damage to the seals if cooling to the thermal barrier heat exchanger from CCWS is lost. The DCD states that the RCP motor bearing coolers are designed such that the RCP can last up to 10 minutes without CCWS cooling to its motor bearings. The DCD further states that if CCWS cooling to RCPs cannot be restored within 10 minutes, the RCPs will be tripped.

US-APWR DCD Tier 2 Section 9.2.2.2.1.5 states that the CCWS cooling for the RCP thermal barrier heat exchanger is ensured by opening NCS-MOV-232A and B and NCS-MOV-233A and B and closing NCS-MOV-234A (or 234B). The US-APWR DCD Technical Specification (TS) Bases do not describe these design features of the CCWS with respect to its cooling functions for RCP components.
In a postulated scenario that involves one division of CCWS out for maintenance (Note: no TS Action statement is entered since the limiting condition of operation (LCO) for CCWS is only specified for 3 trains, not 4) and a single failure occurring on the CCWS division that shares the common surge tank with the division that is out for maintenance (e.g., "A" and "C" are in operation with "D" out for maintenance and the single failure occurs on "C"), the plant would then be in a condition that would require operator actions within 10 minutes to restore CCWS to the RCPs. The TS 3.7.7 LCO required action that would be entered has a 72-hour completion time which requires restoring three divisions of CCWS to operable status. Given this scenario, the applicant should address the following items in DCD Tier 2 Section 9.2.2 and/or TS 3.7.7:

- The DCD should clearly state the basis for opening of the RCP cross-tie between divisional pairs A/B to C/D (or vice versa), pertaining to RCPs thermal barrier heat exchangers and RCP motors. This basis should also take into consideration the contribution of RCP seal injection from the charging pumps which are described in DCD Section 9.3.4.
- The DCD should clearly describe when the cross-tie valves should be opened or be prohibited from opening depending on the operating status or the accident condition of the plant.

- The applicant should consider and address in the RAI response the use of whether an automatic opening of the RCP cross-tie is necessary due to the limited time for which the main control room operators have to manually restore cooling to the RCP motors and RCP seals. (For dealing with loss of cooling to the RCP thermal barrier heat exchangers, operator actions should also consider the availability of seal injection from CVCS charging function).
- The applicant should address in the RAI response whether TS 3.7.7 LCO should include RCP thermal barrier protection in its scope, and whether TS 3.7.7 Required Actions should address RCP cooling flow. Specifically, the valves relied on to provide cross-tie capability between A/B and C/D division pairs should be addressed.
- The applicant should address whether CCWS flow to the RCP thermal barriers heat exchangers (including when RCP cross-tie is needed to established flow to these heat exchangers) should be discussed in Tier 2 DCD Section 9.2.2.1.1, "Safety Design Basis," DCD Section 9.2.2.3, "Safety Evaluation" and Tier 1 of the DCD.
- Based on the applicant's responses for the above, consider necessary changes to Tier 1 DCD ITAAC and Tier 2 DCD Chapter 14 testing.

Reference: MHI's Responses to US-APWR DCD RAI No. 571-4365; MHI Ref: UAP-HF-10160; dated June 8, 2010; ML101650268.