REQUEST FOR ADDITIONAL INFORMATION 878-6200 REVISION 0

12/13/2011

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

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

09.02.02-85

Follow-up to RAI 571-4365, Question 09.02.02-48 and Question 09.02.02-57.
NRC Branch Technical Position 3-3, "Protection Against Postulated Piping Failures in Fluid Systems Outside Containment," states that:

A. General Design Criterion (GDC) 2, "Design Bases for Protections Against Natural Phenomena," requires that SSCs important to safety be designed to withstand the effects of natural phenomena such as earthquakes. The BTP 3-4 does not consider full-circumferential breaks in moderate-energy piping, only through-the-wall cracks.
It is the intent of this design approach that postulated piping failures in fluid systems should not cause a loss of function of essential safety-related systems and that nuclear plants should be able to withstand postulated failures of any fluid system piping outside containment, taking into account the direct results of such failure and the further failure of any single active component, with acceptable offsite consequences.

Appendix A, C.2.a. The following leakage cracks are postulated at the locations specified by the criteria listed under B.

Moderate-Energy Fluid Systems: a. through-wall leakage cracks in piping and branch runs exceeding a nominal pipe size of 1 inch, where the crack opening is assumed as ½ the pipe diameter in length and 1/2 the pipe wall thickness in width.

Tier 2 US-APWR DCD, Table 3.6-1, "High and Moderate Energy Fluid Systems," described the CCWS as a moderate-energy system.
Tier 2 US-APWR DCD, Section 9.2.2.3.2, "Leakage from the CCWS," describes that a decrease to the setpoint in the CCWS surge tank water level initiates automatic makeup water to the surge tank and an alarm is transmitted to the main control room (MCR) indicating a system leak. After the leak source is identified by visual inspection or by a change in individual CCW flow rate, the leak is isolated. If the water level of the surge tank further decreases, the surge tank low-low water level signal is transmitted to the MCR and the operator may close the header tie line isolation valves from the MCR. Because the subsystem consists of two trains, the train with the leak can be isolated and the other train remains operational.
Tier 2 US-APWR DCD, Table 9.2.2-4, "Component Cooling Water System Heat Load," described that during startup and refueling operations it is possible to have two CCWS pumps in operation, coming off a common CCWS surge tank with an internal baffle plates. In this plant configuration, along with a single passive pipe leak path of the common safety-related header, and with the header tie isolation valves open (MOV-

007A/B/C/D and MOV-020A/B/C/D), it is possible to drain both sides of the CCWS surge tank at the same time. A postulated pipe leak path has a potential to drain the CCWS surge tank, assuming non-safety related makeup is not available, and causing two trains of CCWS to become unavailable. The applicant should address the following in Section 9.2.2 of the DCD:

- Describe in the DCD how the US-APWR is designed against postulated piping leak paths in the safety-related portions of the CCWS. Also describe the bounding conditions related to piping leak size and locations.
- Describe in the DCD the consequences of such a piping leak path in the common CCWS, looking at various modes of operations, assuming the header tie isolation valves are open.
- Describe in the DCD any operator actions necessary to prevent the potential loss of two trains of CCWS once a 'low' or 'low-low' CCWS surge tank level setpoints are reached. Also describe the operator time requirements to achieve CCWS train isolation knowing there is greater than 800 gallons between the 'low-low' level set point and '0' indication in the CCWS surge tank.
- Describe in Table 9.2.2-3, "Component Cooling Water System Failure Modes and Effects Analysis," this failure mode and the effects on the CCWS system safety function.