

REQUEST FOR ADDITIONAL INFORMATION 775-5836 REVISION 3

6/28/2011

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 07.08 - Diverse Instrumentation and Control Systems
Application Section: 7.8

QUESTIONS for Instrumentation, Controls and Electrical Engineering 2 (ESBWR/ABWR Projects)
(ICE2)

07.08-23

MHI's D3 Coping Analysis Technical Report, MUAP-07014, Revision 3, section 4.1 under "External Hazards," states the following:

"In the D3 coping analysis, no external hazards such as earthquakes, fires, or other natural phenomena are assumed to occur concurrent with an event."

The staff has reviewed MHI's DCD Chapter 19 which shows that the plant risk contribution from external events/hazards may significant compared with that from internal events/hazards. During the May 11-12th public meeting, MHI made a presentation on the subject. Based on the discussion at the meeting, the staff requests MHI to explain how the US-APWR is protected against potential software common cause failures concurrent with risk-significant external event/hazard scenarios. The staff requests MHI to address all risk significant external events/hazards including floods, fires, and earthquakes, or justify why an external event is not applicable.

07.08-24

The US-APWR DAS requires actuation signals from both Diverse Automatic Actuation Cabinet (DAAC) subsystems using a 2-out-of-2 voting logic to initiate actuation of safety-related and non-safety systems required to cope with abnormal plant conditions concurrent with a CCF that disables all functions of the PSMS and PCMS. The DAS uses this 2-out-of-2 logic to prevent spurious actuation of automatic and manual functions due to a single component failure.

Title 10 CFR 50.62(c)(1) states *"Each pressurized water reactor must have equipment from sensor output to final actuation device, that is diverse from the reactor trip system, to automatically initiate the auxiliary (or emergency) feedwater system and initiate a turbine trip under conditions indicative of an ATWS. This equipment must be designed to perform its function in a reliable manner..."*

In Chapter 16 of the US-APWR DCD Revision 3, "Technical Specifications," LCO 3.3.6 states that *"DAS for each function in Table 3.3.6-1 shall be OPERABLE."* The BASES section of Chapter 16, B 3.3.6, also states that *"DAS is required to be OPERABLE in the MODES specified in Table 3.3.6-1. All functions of the DAS are required to be OPERABLE in MODES 1, 2 and 3 with the pressurizer pressure > P-11."* This means that when one or more required DAS functions is/are inoperable the applicant would

REQUEST FOR ADDITIONAL INFORMATION 775-5836 REVISION 3

have a completion time of 30 days to restore the required function to OPERABLE status. The loss of any of the functions presented in Table 3.3.6-1 of Chapter 16 makes the DAS system inoperable, including the loss of one of the two DAAC subsystems.

The staff is questioning MHI's approach of using a 2-out-of-2 logic for the DAS cabinets (DAAC) for actuation of the DAS automatic functions. 10 CFR 50.62(c)(1) states that the systems relied upon for ATWS mitigation should be designed to perform their functions in a reliable manner. MHI's US-APWR approach maximizes the protection against spurious trips of the DAS system but the staff does not see the safety benefits in the use of a 2-out-of-2 logic use for the DAS versus that of a traditional 2-out-of-3 logic. The staff requests MHI to justify the use of 2-out-of-2 logic from the reliability and availability perspective as high reliability and availability are expected for a system that provides a vital defense-in-depth for potential common cause failures.