

# REQUEST FOR ADDITIONAL INFORMATION 228-2021 REVISION 0

2/26/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 07.08 - Diverse Instrumentation and Control Systems

Application Section: Section 07.08 - Diverse Instrumentation and Control Systems

QUESTIONS for Instrumentation, Controls and Electrical Engineering 1 (AP1000/EPR Projects) (ICE1)

07.08-1

A figure of the DAS should be provided in Section 7.8 of the DCD.

A complete description of DAS is provided in the TR *Defense-in-Depth and Diversity* (MUAP-07006-P, R2) with a figure of the DAS system architecture shown in Fig. 6.0-1. This figure provides needed insight into the design of the DAS and its interface with the PSMS.

07.08-2

Address the test, maintenance, surveillance, and calibration procedures for the DAS.

The DAS can be tested manually by injecting simulated input signals to confirm its function actuation setpoints, designed logic functions, and required system outputs. Spurious actuation from any one subsystem, during testing, is precluded by the system design of 2-out-of-2 logic that must be satisfied to generate an actuation signal. DAS output signals are tested to the inputs of the SLS power interface module. This testing overlaps with periodic testing of the SLS, which provides complete testing of all power interface module functions. SRP 7.8 states that for system testing and surveillance, the applicant/licensee should identify the test, maintenance, surveillance, and calibration procedures. These provisions should be consistent with the guidance of Generic Letter 85-06. The ATWS mitigation system should be testable at power (up to, but not necessarily including, the final actuation device).

07.08-3

Address the performance requirements for which credit is taken in the mitigation of design basis events (e.g., dynamic response, accuracy).

According to SRP 7.8, performance requirements should be identified. MHI performed a D3 analysis on the I&C system that assumes a CCF of the digital protection and control systems. Because the DAS is composed only of analog and discrete digital devices, it provides diversification from the digital safety I&C system; the analog DAS is unaffected

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by a software CCF and remains available to perform its intended function. The Defense-in-Depth and Diversity Coping Analysis (MUAP-07014) considers CCFs that result in a fail-as-is (i.e., fails to function) condition in the PSMS and PCMS concurrent with AOOs and PAs. The review should confirm that the applicant/licensee verifies conformance to these requirements by validation testing and surveillance. However, Section 7.8 of the DCD did not address any of these performance requirements for the diverse I&C system (i.e., DAS).

07.08-4

Address the environment for the diverse I&C equipment.

Although MUAP-07006-P indicates that the diverse I&C system equipment as installed will be qualified for the environment that could exist during the events for which the equipment is assumed to respond and that the environment for the APWR I&C components is expected to be a mild environment, this is not addressed in the DCD.

07.08-5

Address the setpoint methodology, calculation and reviews to be employed on the DAS setpoints.

BTP 7-12 is applicable to DAS which should be included as setpoint program. ISA-S67.04-1994, Part I, Section states that as safety significance of various types of setpoints important to safety may differ, and thus a less rigorous setpoint determination method for certain functional units and limiting conditions of operation may be applied. The use of a graded approach allows a less rigorous setpoint determination method based on the safety significance of the instrument function. However, the grading technique chosen by the applicant/licensee should be consistent with the standard and should consider and bound all known applicable uncertainties regardless of setpoint application. Additionally, the application of the standard using a graded approach is also appropriate for non-safety system instrumentation maintaining design limits in the technical specifications.