

US-APWRRRAIsPEm Resource

From: Ward, William
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Cc: Hamzehee, Hossein; Ciocco, Jeff; Nguyen, Khoi; Jung, Ian; Taneja, Dinesh
Subject: US-APWR Design Certification Application RAI 992-6999 (7.9)
Attachments: US-APWR DC RAI 992 ICE2 6999.pdf

MHI,

The attachment contains the subject request for additional information (RAI). This RAI was sent to you in draft form. Your licensing review schedule assumes technically correct and complete responses within 30 days of receipt of RAIs. However, MHI requests and we grant 60 days to respond to the RAI. We will adjust the schedule accordingly.

Please submit your RAI response to the NRC Document Control Desk.

Thank you,

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REQUEST FOR ADDITIONAL INFORMATION 992-6999

Issue Date: 2/15/2013

Application Title: US-APWR Design Certification - Docket Number 52-021

Operating Company: Mitsubishi Heavy Industries

Docket No. 52-021

Review Section: 07.09 - Data Communication Systems

Application Section: 7.9

QUESTIONS

07.09-26

GDC 24 states, "The protection system shall be separated from control systems to the extent that failure of any single control system component or channel, or failure or removal from service of any single protection system component or channel which is common to the control and protection systems leaves intact a system satisfying all reliability, redundancy, and independence requirements of the protection system. Interconnection of the protection and control systems shall be limited so as to assure that safety is not significantly impaired."

IEEE Std. 603-1991 (incorporated by reference via 10 CFR 50.55a(h)) requires demonstration of interdivisional independence and high reliability as well for safety system design. DI&C-ISG-04, Staff position 1.3 states, in part, that functions that are not necessary for safety, even if they enhance reliability, should be executed outside the safety system. ISG-04, Staff Position 1.3, further states, in part, that "A safety channel should not receive any communication from outside its own safety division unless that communication supports or enhances the performance of the safety function. Functions that are not necessary for safety, even if they enhance reliability, should be executed outside the safety system."

Appendix E (1.3) of the technical report MUAP-07004-P, Rev. 7, states, in part, "The control from the operational VDU reduces the task burden of accessing controls through separate train safety-related HSIS. Reducing task burden frees mental resources to improve situation awareness and reduce human performance errors. In addition, due to the advanced graphical user interface, the operational VDU is less prone to human performance error, than the safety VDU, therefore it is the preferred interface for all control actions. Multi divisional control from the operational VDU is expected to result in an overall improvement in plant safety-related [sic], as demonstrated through HFE full scope simulator testing."

Since the justification provided for conformance ISG-04 Staff Position 1.3 in MUAP-07004-P is largely based on human factors engineering, the NRC staff coordinated review of the interface between the operational VDU and safety systems with Chapter 18 reviewers at NRC. Even though the safety evaluation of HFE (DCD Chapter 18) agrees that having centralized controls at the operational VDU does offer reduction in operator task burden, there is no evidence that the control of safety equipment from operational VDU enhances the performance of safety function. One-way communications from safety to non-safety systems makes all of the safety system information available at operational VDU that could be used by the operator to access the need for any manual action. With availability of the multi-divisional safety display, manual operator actions can be performed from the safety VDU with reduced burden.

REQUEST FOR ADDITIONAL INFORMATION 992-6999

The staff requests the applicant to provide the following:

1. Sufficient evidence associated with the HFE full scope simulator testing or a quantitative analysis to demonstrate that the use of operational VDU to operate safety equipment enhances the performance of the safety function.
2. An ITAAC that adequately verifies testing for normal and abnormal data transmission conditions for all non-safety to safety interfaces.