Jeff Ciocco

From: Jeff Ciocco
Sent: Wednesday, April 30, 2008 10:17 AM
To: us-apwr-rai@mhi.co.jp
Cc: Larry Burkhart; Stephen Monarque; David Curtis; Liliana Ramadan
Subject: US-APWR Design Certification Application RAI No.4
Attachments: US-APWR DC RAI 4 EEB 205.pdf

MHI,

Attached please find the subject request for additional information (RAI). This RAI was sent to you in draft form. The schedule we are establishing for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule. Please submit your RAI response to the NRC Document Control Desk.

Thanks,

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Request for Additional Information No. 4 Revision 0

4/30/2008

US-APWR Design Certification
Mitsubishi Heavy Industries
Docket No. 52-021
SRP Section: 08.02 - Offsite Power System
Application Section: 08.02- Offsite Power System
EEB Branch

QUESTIONS

08.02-1

In a letter dated February 8, 2008, you provided a response to question 3 on grid stability analysis that justifies the assumed 3-second time delay for loss of offsite power. The 3 second time delay for loss of offsite power is not described in Section 8.2, "Offsite Power" of your application. Revise your FSAR to include this discussion. In addition, provide the following information: 1)Provide a discussion how the energy stored in the rotational inertia of the main turbine-generator is maintained to power the medium voltage buses (including the RCPs) for 3 seconds or more. 2)Provide the minimum voltage and frequency that must be maintained by the COL applicant for the reactor coolant pumps to satisfy Chapter 15 analysis for a minimum of 3 seconds. 3) It is also stated in the letter that if a turbine trip occurs, the generator load break switch (GLBS) opens after a time delay of 15 seconds. Provide the signal that initiates opening of the GLBS in this scenario.

08.02-2

In order to maintain reactor coolant pump operation for 3 seconds following a turbine trip, what should be the allowable voltage drop in the grid voltage on the high side of the main step-up transformer (MT), and reserve auxiliary transformer from the pre-trip steady-state voltage that the COL applicant must maintain in order to accomplish the 3 seconds requirement?

08.02-3

Section 8.2.3 of the FSAR discusses design basis requirements for Combined License Information (COL). The staff believes that the applicant should also include the following interface requirement for the COL applicant: 1) Perform a grid stability analysis to show that, with no electrical system

failures, the grid will remain stable and the reactor coolant pump bus voltage will remain above the voltage required to maintain the flow assumed in the Chapter 15 analyses for a minimum of 3 seconds following a turbine trip. 2) Revise the FSAR to include the above as an interface requirement.

08.02-4

Section 8.2.1.2 of the FSAR states that all plant medium voltage (MV) buses, both safety-related and non safety-related, are connected to the UATs and RATs through bus incoming circuit breakers. If power to any MV bus is lost from the normal source, it is automatically transferred to the alternate source. In this regard, provide the following information: a) Describe the bus transfer scheme in detail (slow or fast) that will be used to transfer power from the normal source to the alternate source? b) Describe the design features provided to prevent connection of the alternate power on to a faulted bus when the buses are transferred from the reserve auxiliary transformers to the unit auxiliary transformer.

08.02-5

Figure 8.1-1 of the FSAR indicates that the safety-related buses and non-safety related buses are fed from the same reserve auxiliary transformer. The staff is concerned that in this configuration, the offsite power system design may not satisfy the criteria of SECY-91-078, "EPRI's Requirements Document and Additional Evolutionary LWR Certification Issues," which requires that an evolutionary plant design should include at least one offsite circuit to each redundant safety division supplied directly from one of the offsite power sources with no intervening non-safety buses in such a manner that the offsite source can power the safety buses upon a failure of any non-safety bus. Describe how your design satisfies the criteria of SECY-91-078.

08.02-6

Regulatory Guide 1.206, states that "if generator breakers/load break switches are used as a means of providing access to the offsite power system to the onsite ac distribution system by isolating the unit generator from the main step-up and unit auxiliary transformers and allowing backfeeding of power through these circuits to the onsite ac distribution system." In this regard, provide information how you have followed the guidance found in SRP section 8.2 in Appendix A, "Guidelines for Generator Circuit Breakers/Load Break Switches." More specifically, describe how the design of the load break switch complies with the recommendations of Appendix A.

08.02-7

Section 8.2.1.2 of the FSAR indicates that the UATs and RATs have been provided with protective devices for overcurrent and differential current. The MT is provided with a differential current protection scheme. IEEE-Std-666, "IEEE Design guide for Electric Power Service Systems for Generating Systems," recommends sudden pressure and ground fault protection for transformers. Provide your justification for not including neutral overcurrent, and sudden pressure protection for MT, RATs and UATs.

08.02-8

Your discussion in Section 8.2.2.1 regarding compliance with GDC 2 is incomplete. Provide your acceptance criteria for the design of switchyard and offsite power systems to withstand the effects of natural phenomena such as high and low atmospheric temperatures, high wind, rain, lightning discharges, ice and snow conditions.

08.02-9

Section 8.2.1.2 of the FSAR states that there are four three winding RATs, namely RAT1, RAT2, RAT3 and RAT4, however, Figure 8.1-1 indicates that RATs are two winding transformers. Clarify whether the RATs have one secondary winding or two secondary windings.