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Sent: Wednesday, June 18, 2008 3:53 PM
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Cc: Allen Howe; Amritpal Gill; Ngola Otto; Larry Burkhart
Subject: US-APWR Design Certification Application RAI No. 11
Attachments: US-APWR DC RAI 11 EEB 456.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.

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REQUEST FOR ADDITIONAL INFORMATION NO. 11 REVISION 4

6/18/2008

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 08.04 - Station Blackout

Application Section: SRP 8.4

EEB Branch

QUESTIONS

08.04-1

1. Section 8.4.1.2, states that the US-APWR class 1E onsite power system comprises of 4 trains each supplied from a class 1E gas turbine generator (GTG). The DCD states that availability of two trains is adequate to meet the electrical load requirement during LOOP, and LOOP and LOCA occurring simultaneously. Clarify whether it is any two of the 4 trains, or it is a defined set of any two out of 4 trains that are required for LOOP, and LOOP and LOCA occurring simultaneously.

08.04-2

1. Section 8.4.1.2, states that in the US-APWR design power to the shutdown buses can be restored from the AAC sources (2- non-class GTGs) within 60 minutes. Does the 60 minutes time required for the restoration of power of the shutdown buses include powering of the SBO loads? If the 60 minutes time does not include restoration of the SBO loads, then provide information on the expected time required to load the SBO loads on the shutdown bus.

08.04-3

1. Section 8.4.1.3, states that two 100% capacity alternate AC (AAC) sources provides greater reliability for coping with an SBO event. Further you state that the AAC GTGs of different rating with diverse starting system are provided to minimize the potential for common mode failures with the Class 1E GTGs. Discuss and provide a response to the following questions:

    a. Based on the description in the DCD, the 2- AAC GTGs power the non-safety buses P1 and P2 during normal and LOOP conditions. During an

SBO event one of the two AAC GTGs will be used to power the SBO loads while the second AAC GTG will power its non-safety loads from its non-safety bus P1 or P2. Clarify the statement of how greater US-APWR reliability for coping is achieved when only one AAC GTG is used to cope with an SBO event.

b. Table 8.3.1-6 "Electrical Load Distribution-AAC GTG Loading (SBO Condition)" provided in the DCD shows the Residual Heat Removal Pump is not included in the SBO loads that are powered by the AAC GTG during an SBO event, thereby keeping the plant in hot shutdown. This is contrary to the guidance provided in the SECY 94-084 which recommends the preferred method of demonstrating compliance with an SBO (10 CFR 50.63) for evolutionary designs to be a full-capacity AAC power source of a diverse design that can power a larger complement of shutdown equipment to bring the plant to cold shutdown. Justify and provide your rationale for not meeting the guidance provided on SBO in the SECY 94-084 for evolutionary designs.

c. Based on your description of GTGs, the rating of the AAC GTGs is 4000 kW compared to 4500 kW for Class 1E GTGs. The NRC staff does not consider the difference in kW rating of the Class 1E and non-Class 1E GTGs to be of great significance when classifying them as diverse GTGs because the difference in the sizes of the GTGs is small. Although the AAC GTGs have different starting system, the staff needs additional information that demonstrates that the Commission guidance as documented in SECY 94-084 on diversity of the AAC power source is addressed. Discuss and provide additional information on the differences between the AAC GTGs and Class 1E GTGs and provide justification on why these are diverse power sources and meet the intent of SECY 94-084.

08.04-4

1. Section 8.4.1.3, item 6 on page 8.4-4 states that loads that have been started and running due to LOOP on the non-Class 1E bus P1 but are not required during an SBO condition are tripped manually before restoring the power supply to the Class 1E buses from the A-AAC GTG. Describe the loads and their KVA rating on the P1 bus that are not tripped when restoring the power to the Class 1E buses from the A-AAC GTG. Discuss the capability of the A-AAC GTG to block start the loads that remain connected to the Class 1E bus (feeders to the 480 volt centers, battery charging and emergency lighting) plus the loads that are not tripped on the P1 bus. Discuss the capacity (kW) of the GTG to power its loads in view of the SBO loads of 3283 kW (Table 8.3.1-6) plus the loads on the P1 bus that are not tripped.

08.04-5

5 The RG 1.155 Position C3.4 addresses procedures and training to cope with station blackout. Section 8.4 of DCD does not describe how Position C3.4 of RG 1.155 is met. Add a requirement for a COL applicant that references the US-APWR design certification to address the RG1.155 position C.3.4 related to procedures and training to cope with an SBO. Provide an interface requirement in US-APWR DCD that a COL applicant should develop and submit a summary of SBO coping procedures and training guidelines for staff review.

08.04-6

5 The RG 1.155 Position C3.5 addresses quality assurance and specifications for SBO equipment that is not safety-related. Section 8.4 does not address Position C3.5 of RG 1.155 in discussion on SBO. Provide an interface requirement in the US-APWR DCD for a COL applicant that references the US-APWR design certification to address the RG1.155 position C.3.5 related to quality assurance and specifications for SBO equipment that is not safety-related.

08.04-7

5 Since the power from the AAC GTG to Class 1E buses is not restored until 60 minutes into an SBO, you have discussed the station blackout coping analysis for 1 hour in Section 8.4.2.1.2. This discussion does not provide sufficient information on the systems and equipment required for coping for 1 hour without ac power. Answer the following questions:

a. Items 2(1) and 2(2) on page 8.4-7, you discussed the core and reactor system conditions but did not provide information on ability to maintain adequate reactor coolant system (RCS) inventory to ensure that the core is covered and cooled. Discuss and provide information on RCS inventory taking into consideration shrinkage, leakage from pump seals, and inventory loss from letdown or other normally open lines.
b. Discuss and provide information on the capacity of the condensate storage tank to ensure that there will be sufficient water inventory to remove decay heat during the SBO duration of 1 hour.
c. Discuss and provide information on the compressed air capacity to ensure that air operated valves required for decay heat removal have sufficient reserve air and maintain appropriate containment integrity for an SBO duration of 1 hour.
d. Discuss and provide information on the adequacy of battery capacity to support loads required for decay heat removal for the SBO duration of 1 hour, and GTG field flashing for recovering onsite power sources.

e. Item 2(3) on page 8.4-8, discusses the integrity of electrical cabinets. However you did not discuss and provide information on effects of the loss of ventilation to other equipment, such as Turbine driven emergency feed water pump, valves, battery room and other equipment credited in mitigating an SBO event. Discuss and provide the information on the effects of loss of ventilation in all dominant areas of concern and on the equipment credited during an SBO event.