REQUEST FOR ADDITIONAL INFORMATION 394-3048 REVISION 0

6/18/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 08.03.01 - AC Power Systems (Onsite)
Application Section: 8.3.1

QUESTIONS for Electrical Engineering Branch (EEB)

08.03.01-34

In response to RAI 5-272, Question 08.03.01-1 on starting air requirements for the Class-1E gas turbine generators (GTGs), Mitsubishi Heavy Industries (MHI) stated that any two out of four GTGs (any two-50% divisions) can power equipment necessary for safe shut down. In a teleconference meeting with MHI on March 12, 2009, the staff asked MHI to verify that there is similar redundancy in the mechanical and fluid systems as is in the electrical system for shutting the plant down with any two out of four division of safety equipment. MHI agreed during the March 12 teleconference meeting that it will add additional wording to section 8.3.1 in Rev. 2 to explain how safe shutdown will be accomplished with any two trains for all systems (mechanical & fluid) based on the four train system.

The staff requests that MHI docket its response confirming the above actions to resolve this RAI question.

08.03.01-35

In responses to RAI 5-272 Question(s) 08.03.01-2 and 08.03.01-3 MHI furnished reliability data of commercial-grade GTGs and the component reliability data given in NUREG /CR6928 for justifying a reliability of 0.995 for the proposed Class-1E GTGs. Based on its review the staff concluded that MHI's use of the commercial-grade GTGs reliability data and the NUREG /CR6928 data was not relevant for justifying a reliability of 0.995 for the Class-1E GTGs. The staff's assessment was that the commercial-grade GTGs reliability data was for limited samples and lacked information on components included in the data, thereby making the conclusions derived from the reliability data inconclusive. The data presented in NUREG /CR6928 was not applicable to the commercial components to be used in the GTGs. The staff discussed its assessment of the MHI's responses during the March 12 teleconference meeting without reaching a consensus on Class-1E GTGs reliablity. During a follow up public meeting held on April 13, 2009, MHI proposed a new reliability target of 0.95 for the Class-1E GTGs that would be achieved by actual initial type testing. MHI agreed during the public meeting of April 13, 2009, to perform 100 initial type tests without any failures to achieve 0.95 reliability target with 95% confidence. Therefore MHI's selection of the new reliability target of 0.95 for the Class-1E GTGs which is to be confirmed by the proposed initial type testing renders the above RAIs and MHI's responses to them moot.

In order to close the above RAIs, the staff requests that MHI docket its response confirming that the Class 1E GTGs furnished for the US_APWR design will meet a reliability target of 0.95 with a confidence of 0.95 which will be achieved by actual initial type tests in accordance with the guidelines of IEEE-387 and RG 1.9.

08.03.01-36

In RAI 5-272, Question 08.03.01-4 the staff asked MHI to justify and provide a basis why the qualification tests for the proposed Class 1E GTGs should be less than 300 tests with 3 failures to achieve a point target reliability of 0.99 that were originally required for Emergency Diesel Generator (EDG) qualification. Based on MHI's decision during the public meeting held on April 13, 2009, to select a new reliability target of 0.95 for the Class-1E GTGs and proposed testing to achieve the stated reliability target renders this RAI moot.

In order to close this RAI, the staff requests that MHI docket its response confirming that the Class 1E GTGs furnished for the US_APWR design will meet a reliability target of 0.95 with a confidence of 0.95 in accordance with the guidelines of IEEE-387 and RG 1.9.

08.03.01-37

In RAI 5-272, Question 08-03-01-5 the staff asked MHI to address the significance of the lower and high range of temperatures from the nameplate values of 41 to 104 degrees F on the performance of the GTGs. The staff did not find any discussion on the effects of low and high temperatures on the GTG performance in the DCD FSAR. During the March 12 teleconference meeting, MHI stated that the ambient temperature condition for the GTGs of US-APWR is set within -40 degrees F to 115 degrees F and US-APWR standard design has heating equipment as countermeasure against for low side ambient temperature. During the March 12 teleconference, MHI agreed to incorporate the discussion of the heating equipment as a counter measure against for low side ambient temperatures in the description of the DCD in the appropriate section. The staff requests that MHI provide detail description on the preheating design and equipment to address lower temperatures including information on whether the preheat system uses GTG exhaust gas, or if it is a stand-alone system. If the preheat system uses GTG's exhaust gas then the description of the preheat system should include a discussion on the heating system until the GTG reaches steady-state temperatures.

The staff requests that MHI docket its response confirming the above actions to resolve this RAI question.

08.03.01-38

In RAI 5-272, Question 08.03.01-6, the staff requested additional information on diversity between the Class-1E GTGs and the AAC GTGs in view of the guidance given in SECY papers and SRP review guidance. By the subject RAI the staff asked MHI to address SECY-90-16, "Evolutionary Light Water Reactor (LWR) Certification Issues and Their Relationships to Current Regulatory requirements." In SECY-90-16, the NRC

Commissioners approved the staff's position that all evolutionary ALWR's have an AAC power source of diverse design capable of powering at least one set of normal shutdown loads. Also, RG1.206 provides guidance on meeting 10 CFR 50.63 (Station Blackout Rule) for evolutionary designs. Similar to SECY-90-16, it requires the installation of an AAC power source of diverse design with sufficient capacity, capability, and reliability that will be available on a timely basis for powering at least one complete set of normal safe shutdown loads to bring the plant to safe shutdown. In SECY-91-078, item 5.2.3, "Power Rating of the Combustion Turbine Generators," the staff concluded that, as a minimum, the GTG should be capable of powering one safety division and one division of permanent non-safety loads during worst-case shutdown (to cold shutdown) and that it should have capability to power these loads with some margin for load growth when operating within its continuous rating. In the USAPWR design, The GTG proposed for meeting 10 CFR 50.63 is rated at 4000 kW and are of the same design and manufacture as the class 1E onsite GTG power sources. The applicant has claimed that AAC GTGs and Class1E GTGs are diverse because AAC GTGs use battery for starting whereas the Class1E GTGs use air starting. In view of the guidance given in the SECY-90-16, SECY-91-078, and Chapter 8.4 of the SRP, the staff concluded that Class-1E GTGs and AAC GTGs proposed for the US-APWR design are not diverse.

The staff discussed with MHI its initial response to this RAI during the April 13, 2009, teleconference. During the March 12, 2009, public meeting, MHI agreed to provide to the staff its final resolution of this issue after internal meetings and discussions within MHI. The applicant is requested to discuss and elaborate on limiting common mode failure potential in the safety and non-safety GTGs since they are of the same manufacture and design. Also, the applicant is asked to discuss whether the 4000 kW GTG is sized to power one safety division and one division of permanent non-safety loads during worst-case shutdown (to cold shutdown) and that it has the capability to power these loads with some margin for load growth when operating within its continuous rating.

The staff requests that MHI docket its response on the issue of diversity between Class1E GTGs and the AAC GTGs to resolve this RAI question.