REQUEST FOR ADDITIONAL INFORMATION 388-2858 REVISION 0

6/11/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 08.03.02 - DC Power Systems (Onsite)
Application Section: Section 8.3.2

QUESTIONS for Electrical Engineering Branch (EEB)

08.03.02-15

RAI 8.3.2-15

This is a follow up RAI to the original RAI #08.03.02-1 based on discussions with the applicant (MHI) during the teleconference held on March 18, 2009. In response to Question # 08.03.02-1, MHI responded that "the 2% limits described in Regulatory Guide 1.189 was appropriate for the fire protection scenario". During the teleconference discussions with MHI on March 23, 2009, the Staff indicated MHI that it agrees that the 2% limit in Hydrogen concentration in the battery room may be acceptable for the fire protection scenario, but may not be for workers' protection. The National Fire Protection Association (NFPA) Standard 70E, "Standard for Electrical Safety in the Workplace-2004," Article 320.4(C)(2) and 320.4(D)(1) states that ventilation shall be provided so as to prevent liberated hydrogen gas from exceeding 1% concentration. The NFPA 70 E requirement is similar to the guidance given in RG 1.128 which states that "the ventilation system shall limit hydrogen accumulation to one percent of the total volume of the battery area." MHI stated that the ventilation fans have sufficient capacity to maintain the hydrogen concentration below 1%. MHI agreed to revise the Hydrogen concentration in the battery room in next FSAR revision (Revision 2) to reflect the guidance given in RG 1.128.

The staff requests that MHI dockets its response confirming the above actions on part of MHI to resolve the RAI question #08.03.02-1.

08.03.02-16

RAI 8.3.2-16

In response to Question # 08.03.02-2, MHI provided information related to the adequacy of the Class 1E DC power systems including the Class 1E Inverter specifications (UPS Unit), regulating transformer specifications, and UPS protective scheme against faults. In a teleconference meeting with MHI on March 23, 2009, the Staff indicated that the response was acceptable but that the information needed to be included in the next revision of the FSAR. MHI agreed that it will revise the FSAR to include information on Class 1E Inverter specifications (UPS Unit), regulating transformer specifications, and UPS protective schemes against faults.

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

08.03.02-17

RAI 8.3.2-17

In response to Question # 08.03.02-3, MHI clarified that both Class 1E and the Non-Class 1E chargers are designed to charge the battery to 95% capacity within 24 hours. In a teleconference meeting of March 23, 2009, MHI committed to revise the description on the charging of the Class 1E and non Class-1E batteries (page 8.3-44 in Section 8.3.2.1.2 of the DCD, Revision 1) from "fully" to "95%". This commitment on part of MHI resolves the staff concern on the charging of the batteries.

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

08.03.02-18

RAI 8.3.2-18

In response to Question # 08.03.02-4, MHI discussed the replacement scheme to be followed when a Class 1E battery charger is inoperable. MHI stated that the spare non-safety charger is used to prevent the drying out of battery when the Class 1E charger is inoperable. The staff understands the use of the spare charger but the staff question was more focused on the use of non-safety chargers and its interaction with safety-related equipment.

Article 4.11 of IEEE 308 endorsed by RG 1.32 states that connection of non-Class 1E circuits to Class 1E power systems is **not recommended**. The non-Class 1E circuits shall meet the independence and isolation requirements as established in IEEE Std 384-1992. Therefore in view of the guidance given in IEEE 308, MHI needs to provide justification on the use of the non-safety chargers and how the design meets the criteria stated in the above and why the use of non-class 1E chargers should be acceptable for out of service Class 1E charger.

As a minimum, MHI needs to provide a failure modes and effect analysis of the interactions of the non-safety system chargers on the safety-related DC train equipment to ensure that a failure of non-safety system does not cause a loss of or a failure in the safety-related system component. Also, MHI should provide a safety-related isolation device between the non-safety chargers and safety-related DC train equipment. The staff requests that MHI provide its justification on the use of the non-safety chargers in view of the guidance cited above.

08.03.02-19

RAI 8.3.2-19

In response to Question # 08.03.02-5, MHI provided a brief discussion stating that both MCCB and fuses are accepted as protective devices. In a teleconference meeting with MHI on March 23, 2009, Staff indicated to MHI that it is not clear from the response whether the US APWR will employ molded circuit breakers or fusible disconnect switches as input and output circuit protection devices. Staff asked MHI to clarify which of those devices are going to be used, and to discuss the coordination of the feeder

breakers and downstream protective devices (MCCB) of the loads, if the main fuse can be coordinated with the feeder MCCBs, and if its statements are based on actual studies. MHI agreed to provide the design of such coordination and to revise the FSAR accordingly.

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

08.03.02-20

RAI 8.3.2-20

In response to Question # 08.03.02-6, MHI provided a description of the switching scheme between the UPS unit and the transformer. In a teleconference meeting with MHI on March 23, 2009, Staff indicated that the response is acceptable and also asked to explain whether the transfer from the transformer back to the UPS was made. MHI explained that both automatic and manual transfer were possible, but that they plan to have manual transfer. MHI also committed to include the response and the teleconference explanation in its next revision of the FSAR. The staff requests that MHI docket its response confirming the above actions on part of MHI to resolve the above RAI question.

08.03.02-21

RAI 8.3.2-21

In response to Question # 08.03.02-10, MHI explained that US-APWR applies safety-related ventilation system to the Class 1E battery room. In a teleconference meeting with MHI on March 23, 2009, Staff indicated to MHI that it did not address whether the battery rooms have safety-related ventilation system. MHI clarified that safety-related ventilations systems are provided for the Class 1E battery rooms and committed to include this information in the next revision of the FSAR. The staff requests that MHI docket its response confirming the above actions on part of MHI to resolve the above RAI question.

08.03.02-22

RAI 8.3.2-22

In response to Question # 08.03.02-12, MHI indicated that the current requirement depended on procurement specifications. In a teleconference meeting with MHI on March 23, 2009, Staff indicated that MHI needed to explain the current requirements for loads such as load sequencer, dc solenoids, ground detector, auxiliary relays, indicating lights, etc., and confirm that all the loads listed above are included in battery load calculations. MHI provided a brief discussion on the conservatism used in sizing of the loads and the associated protection of the loads. MHI indicated that its assumptions for these types of loads were made based on Japanese experience and products. MHI agreed to provide a more in depth explanation on this issue which will be incorporated in the upcoming FSAR revisions.

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