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Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Attention: Mr. Jeffrey A. Ciocco

Docket No. 52-021
MHI Ref: UAP-HF-12018

Subject: MHI's Responses to US-APWR DCD RAI No.875-6211 Revision 3 (SRP 08.04)

References: 1) "Request for Additional Information No. 875-6211 Revision 3, SRP Section: 08.04 – Station Blackout Application Section: DCD section 8.4" dated December 5, 2011.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Responses to Request for Additional Information No. 875-6211 Revision 3".

Enclosed are the responses to 1 RAI that are contained within Reference 1.

This response is being submitted in two versions. One version (Enclosure 1) includes certain information, designated pursuant to the Commission guidance as sensitive unclassified non-safeguards information, referred to as security-related information ("SRI"), that is to be withheld from public disclosure under 10 C.F.R. § 2.390. The information that is SRI is identified by brackets. The second version (Enclosure 2) omits the SRI and is suitable for public disclosure. In the public version, the SRI is replaced by the designation "[Security-Related Information - Withheld under 10 CFR 2.390]."

Please contact Mr. Joseph Tapia, General Manager of Licensing Department, Mitsubishi Nuclear Energy Systems, Inc. if the NRC has questions concerning any aspect of this submittal. His contact information is provided below.

Sincerely,



Yoshiki Ogata,
Director- APWR Promoting Department
Mitsubishi Heavy Industries, LTD.

DOB1
NR0

Enclosure:

1. Responses to Request for Additional Information No. 875-6211 Revision 3
(SRI included version)
2. Responses to Request for Additional Information No. 875-6211 Revision 3
(SRI excluded version)

CC: J. A. Ciocco
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Contact Information

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Enclosure 2

UAP-HF-12018
Docket Number 52-021

Responses to Request for Additional Information No. 875-6211
Revision 3

January, 2012

(Security excluded version)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

1/27/2012

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: 875-6211 REVISION 3
SRP SECTION: 08.04 - Station Blackout
APPLICATION SECTION: DCD SECTIONS 8.4
DATE OF RAI ISSUE: 12/5/2011

Question No. : 08.04-15

10 CFR 50.63, "Loss of all alternating current power," requires that the design must be able to withstand for a specified duration and recover from a station blackout. Indicated in responses to RAIs 3170 (Question 10.04.09-24) and 1848 (Question 10.04.09-8) the evaluation that addresses the scenario identified in NUREG-0635 and 0611 in which a loss in EFW pump room cooling occurs would not fail the EFW turbine-driven pumps during the first hour because room heatup calculations show the room temperatures would not exceed the equipment qualification limits during the first hour. Since the EFW pump rooms contain equipment used to respond to Station Blackout, and there is substantial heat generation in the rooms, and no operational heat removal systems during the first hour of the SBO, reasonable assurance of EFW room equipment operability should be provided.

- a. Provide the heatup calculations for the EFW pump rooms for a station blackout induced loss of ventilation event in which the turbine-driven EFW pumps begin to operate at the onset of the station blackout and the EFW pump room cooling is not available during the first hour after the onset of SBO. Information provided should include the transient ambient air temperature of the room over the SBO coping period (8 hours), initial environmental conditions assumed, time dependent heat loads, details of room geometry, humidity assumptions, thermal stratification, thermophysical properties of materials, major assumptions and boundary conditions used in the analysis, and the identification of any operator actions necessary, and assumptions regarding equipment which may be out of service due to routine maintenance or LCO conditions.
- b. Provide documentation in the FSAR to support the determination that in the event of a Station Blackout, that reasonable assurance of EFW room equipment operability is provided for both mechanical and electrical equipment. (include documentation of the turbine control system environmental qualification that justify why TDEFW pumps will continue to operate stably at least one hour after loss of all room cooling).
- c. Provide in the FSAR the EQ room temperature envelope for the EFW (T/D) pump room, showing both the calculated transient room temperature, and the EQ envelope temperature.

Provide sensitivity studies of the heatup calculations for the EFW pump rooms including an analysis extending to the first two hours after onset of SBO, with no ventilation, and identify the time that ambient room temperature reach the EQ maximum temperature for the EFW pump rooms.

ANSWER:

Assumptions and results of room heatup calculations are provided.

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The result of the heatup calculation for the T/D EFW pump room after the onset of SBO is shown in Figure 1.

b. DCD Subsection 8.4.2.1.2 will be revised to provide the design assurance of EFW equipment operability.

c. The environmental qualification (EQ) conditions of the EFW turbine pump room during abnormal condition are shown below, as described in the technical MUAP-08015R1 "US-APWR Equipment Qualification Program" which has been referred as Reference 3.11-3.

Maximum temperature	: 175°F
Humidity	: Non-Condensing

Figure 1 shows the result of the heatup calculation for the EFW turbine pump room. The room temperature does not reach the EQ condition in 24 hours after the onset of SBO.

Impact on DCD

DCD Subsection 8.4.2.1.2 will be revised as follows (See Attachment-1);

"(4) Integrity of T/D EFW pump

Until AAC GTG restores power to the Class 1E power system within one hour after SBO occurs, turbine driven (T/D) emergency feedwater (EFW) pump room HVAC system cannot be operated. However, T/D EFW system mechanical and electrical equipment, including EFW turbine control system components, are qualified to operate up to 175°F temperature. The temperature of T/D EFW pump room will not reach 175°F within one hour even without HVAC."

Impact on R-COLA

There is no impact on the R-COLA.

Impact on S-COLA

There is no impact on the S-COLA.

Impact on PRA

There is no impact on the PRA.

Impact on Technical / Topical Reports

There is no impact on the Technical / Topical Reports.

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Figure 1 Heatup Calculation for T/D EFW Pump Room

8. ELECTRIC POWER

US-APWR Design Control Document

RCP seal can keep its integrity for at least one hour without water cooling, as described in Chapter 5.4.1.4.9. There is no LOCA considered in this condition.

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(3) Integrity of electrical cabinets

Until AAC GTG restores power to the Class 1E power system within one hour after SBO occurs, Class 1E electrical room HVAC system cannot be operated. However, all Class 1E electrical cabinets and I&C cabinets are rated to keep their integrity up to 50°C temperature. The temperature of Class 1E electrical room and I&C room will not reach 50°C within one hour even without HVAC.

(4) Integrity of T/D EFW pump

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Until AAC GTG restores power to the Class 1E power system within one hour after SBO occurs, turbine driven (T/D) emergency feedwater (EFW) pump room HVAC system cannot be operated. However, T/D EFW system mechanical and electrical equipment, including EFW turbine control system components, are rated to keep their integrity up to 175°F temperature. The temperature of T/D EFW pump room will not reach 175°F within one hour even without HVAC.

3. After AAC GTG has restored power to the Class 1E power system, the following operations will be performed and the plant will be in a safe shutdown condition for the long term:

Function	Action
Reactivity control	Supplying boric acid tank (BAT) water by using charging pump
RCS make up	Supplying water of refueling water auxiliary tank by using charging pump
RCS pressure control	Pressurizing by using pressurizer backup heater and depressurizing by using safety depressurization valve (SDV)
Decay heat removal	Supplying EFW pit water by using T/D EFW pump and Steam relieved by using Main Steam Relief Valve
Cooling of RCP seal	RCP seal injection by using charging pump (Water source is refueling water auxiliary Tank)
Supporting system	I&C, cooling system, HVAC