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TOKYO, JAPAN

September 20, 2012

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-12257

Subject: **MHI's Revised** Response **to US-APWR DCD RAI No. 559-4387 Revision 2 (SRP 06.04)**

References: 1) "Request for Additional Information No. 559-4387 Revision 2, SRP Section: 06.04 - Control Room Habitability System, Application Section: 6.4" dated March 23, 2010 (ML100830687).
2) MHI Letter No. UAP-HF-10142, "MHI's Responses to US-APWR DCD RAI No. 559-4387 Revision 2", dated May 20, 2010 (ML101450208).

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Revised Response to Request for Additional Information No. 559-4387 Revision 2."

Enclosed is the revised response to Question 06.04-11 contained within Reference 1. This response supersedes the previous response to Question 06.04-11 in Reference 2 in its entirety. The responses to the other questions in Reference 2 are not changed by this document.

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,

Y. Ogata

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

D081
NRO

Enclosures:

1. Revised Response to Request for Additional Information No. 559-4387 Revision 2 (SRI included version)

2. Revised Response to Request for Additional Information No. 559-4387 Revision 2 (SRI excluded version)

CC: J. A. Ciocco
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Enclosure 2

UAP-HF-12257
Docket No. 52-021

Revised Response to Request for Additional Information
No. 559-4387 Revision 2

September 2012
(SRI excluded version)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

09/20/2012

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: **NO.559-4387 REVISION 2**

SRP SECTION: **06.04 – Control Room Habitability System**

APPLICATION SECTION: **DCD Tier 2 Section 6.4**

DATE OF RAI ISSUE: **03/23/2010**

QUESTION NO. : 06.04-11

OPEN ITEM – Follow-up RAI (NRC ID 4387, Q#16730)

The staff notes that RAI No. 501-4004 Revision 2, Question No. 06.04-10 was the third in a sequence of RAI submittals with respect to the issue of the potential for Control Room flooding. The first two RAIs in the series were RAI No. 49-895, Question Number 06.04-8 and RAI 338-2325 Question 06.04-8.

The staff finds applicant's response to RAI No. 501-4004 Revision 2, Question No. 06.04-10 incomplete. The applicant in its response did not provide the following information: (1) a general description of the design of the doors and (2) whether identical or similar doors have been used in similar applications elsewhere

Due to the importance of the control room and recognizing the recommendations in the SRP associated with flood protection. Additional information is needed. As follow-up to the previous RAI, are these doors identical or similar doors are already used elsewhere and can the staff review the operating experience and how will they be tested to show operability (this should be part of the DCD)?

The staff also notes that the applicant has amended the DCD subsection 3.4.1.5.2.2 in accordance with RAI No. 338.2325 Question No. 06.04-8 to allow flood waters to encroach within 0.13ft (≈1.5 inches) of the safety related MCR emergency filter trains. This is very little margin for water surges, waves, splashes, and/or prevent electric shock hazards to operators or water draining into the CRE through ineffective floor seals, etc.. Please explain why this small margin with respect to the integrity of a safety related filter train is acceptable when considering uncertainties.

The staff also notes that the MCR air handling units and filter train units are being located above the CRE. How will the HVAC ductwork be routed to and from these units through the flood waters? What measures will be employed to prevent a path of flood waters in the CRE below?

The Staff could find no evidence in the DCD that an FMEA has been performed on the structures and components (i.e. doors, fire barriers, penetration seals) that make up the CRE.

The staff requests that the applicant perform a FMEA that considers each of these issues on the components that make up the CRE and its innermost doors.

Alternatively, other methods to prevent the possibility of 3 feet of fire fighting water accumulating outside the CRE doors can be proposed by the applicant. The applicant could design the plant to divert fire fighting runoff water by drains, canals, floor slopes, barriers, etc., to make it virtually impossible for flood water to even approach the control room and other safety related doors.

ANSWER:

e) MHI agrees that the initial response did not provide specific information regarding: (1) general description of the design of the water tight doors; and (2) the use of identical or similar doors in similar applications elsewhere.

To the extent of our survey, we did not find any US plant that relies on water tight control room doors for flood protection. MHI agrees with the NRC's concern that regular use of the water tight control room doors to serve operator traffic may cause the doors to wear and potentially impact the water tight function.

MHI proposes the use of barriers to prevent design basis flooding water accumulating outside the CRE from flowing into the control room without taking credit for the water tight doors.

MHI will revise the DCD Subsection 3.4.1.5.2.2 on "NRCA" to state that the MCR is protected by the barriers from internal flooding.

DCD Figure 3K-5 titled "Location of Watertight Doors and Flood Barrier Walls R/B Plan View Elevation 25'-3" " will be revised to add flood barriers in each of vestibule.

f) DCD Subsection 3.4.1.5.2.2 titled "NRCA" and "Elevation 50ft, 2 in" discusses how the safety-related MCR emergency filter trains are protected against internal flooding level (i.e., 0.87 feet from the floor) as follows:

> "The air handling unit and filtration unit foundations (top of concrete) height is 1.0 feet above floor elevation 50 ft, 2 in. As such, the air handling units and filtration units are not flooded."

As the NRC noted, this approach provides very little margin for uncertainty regarding flooding. MHI reviewed the basement design of the components and found that the MCR air handling units, Class 1E electrical room air handling units, as well as the MCR emergency filter units have a steel frame base installed on the top of the concrete foundations. The additional height of this base results in a total of 1.5 feet between the floor level and the filtration units. Therefore, when considering the steel frame base units, the current design has sufficient margin (i.e., 0.63 feet above the postulated flood level) to protect against the postulated flooding.

MHI will revise the DCD Subsection 3.4.1.5.2.2 to state that the safety-related filter units are installed with sufficient margin to protect against postulated flooding.

g) The MCR penetrations are designed to prevent water from flowing in by applying appropriate sealing features. The HVAC ducts coming from the MCR air handling units and the filter train units are routed horizontally above the postulated flooding level. The vertical HVAC ducts penetrate the MCR ceiling and are welded to embedded sleeves for penetration. The HVAC duct sections of concern and the embedded sleeves are designed to withstand the hydrostatic load of flooding. The penetrations of sanitary pipes also use the embedded sleeves (southern exterior wall of the reactor building). Cables enter the MCR from beneath the raised MCR floor, and the penetrations at the CRE boundary may contain a liquid or clay filling and are water sealed. Therefore, flooding of the MCR through those penetrations is precluded through the use of appropriate sealing features.

   MHI will revise the DCD Subsection 3.4.1.5.2.2 to state how the MCR penetrations are protected from flooding outside the CRE.

h) As stated in part a) of this response, MHI will utilize barriers to protect the MCR from postulated flooding outside of the CRE, instead of taking credit for the water tight doors. Other penetrations involve passive components which are not subject to wear by frequent "use" by plant personnel. Therefore, MHI proposes to the staff that a specific FMEA will not be required.

Impact on DCD

See Attachment 1 for a mark-up of the following changes in DCD Rev. 3, Tier 2, Chapter 3. The following two items will be incorporated in a future revision of the DCD.

- Replace Figure 3K-5 with revised figure that indicates the location of flood barriers.
- Revise Table 3K-3 Note 6 to read as follows: "These components are protected by water-tight doors or barriers against the in-flow of flooding occurring outside of compartment."

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.

Table 3K-3 R/B NRCA Components Protected From Internal Flooding (Sheet 29 of 29)

Item No.	Equipment Tag	Description	Location					Flood Elevation above Floor [ft]	Notes
			Building	Side	Floor Elevation	Fire Zone No.	Location Elevation above Floor		
447	NCS-PT-037	C - Component Cooling Water Pump discharge Pressure	R/B NRCA	W	-26'-4"	FA2-106-01	above flood elevation	0.60	
448	NCS-PT-038	D - Component Cooling Water Pump discharge Pressure	R/B NRCA	W	-26'-4"	FA2-107-01	above flood elevation	0.60	

DCD_09.02.02-86

Notes:

1. These components are protected by water-tight door and floor drain isolation valve against in-flow of flooding occurring outside of compartment. In addition, these components are not required to be protected against flooding occurring inside the compartment due to redundancy of other trains/components.
2. There is no impact to this component, even if outside of pit is flooded.
3. Main feed water valves are submerged in the event of main feed water pipe rupture. However, the function of these valves are not required for the mitigation of a main feed water rupture event. Main feed water valves are required for containment isolation function in the event of LOCA. In the event of LOCA, a huge volume of water is released. However, this flooding only occurs inside containment. Therefore, these valves are not submerged in the event of LOCA.
4. Support leg of A-CCW surge tank is flooded, but there is no impact to function of this component.
5. Lower portion of B-CCW surge tank is flooded, but there is no impact to function of this component.
6. These components are protected by water-tight door or barriers against in-flow of flooding occurring outside of compartment.

DCD_06.04.11-S01

7. These valves are closed when in the normal condition. If this valve opens due to the event of flooding, the water is continuously supplied to CCW surge tank. Then, the surge tank may fail. However, the other valve "NCS-RCV-056B" will open on a high pressure alarm. Since the valve "NCS-RCV-056B" is not submerged in the event of flooding, the CCW surge tank maintains its function.

DCD_06.04.
11-S01

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Figure 3K-5 Location of Watertight Doors and Flood Barrier Walls R/B Plan View Elevation 25'-3"