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TOKYO, JAPAN

May 20, 2010

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-10142

Subject: MHI's Responses to US-APWR DCD RAI No.559-4387 Revision 2

References: 1) "Request for Additional Information No. 559-4387 Revision 2, SRP Section: 06.04 – Control Room Habitability System Application Section: DCD section 6.4" dated March 23, 2010.

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. 559-4387 Revision 2".

Enclosed are the responses to 3 RAIs 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 Dr. C. Keith Paulson, Senior Technical Manager, Mitsubishi Nuclear Energy Systems, Inc. if the NRC has questions concerning any aspect of the submittals. His contact information is below.

Sincerely,

Y. Ogata

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

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NRO

Enclosure:

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

2. Responses 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- 10142
Docket Number 52-021

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

May 20, 2010

(Security excluded version)

- Fire Fighting Operations

  The total water volume from the fire fighting operation events is same as that of elevation -26 ft, 4 in.

Based on the flood events described above, the worst case results are from a combination of earthquake and fire fighting operations. The total volume of flood water caused by this combination is 4,710 ft^3 in both the east and west area.

The footage of corridor area and the water level are as follows:

- East side: 1,500 ft^2 area, 3.14 ft above elevation 3 ft, 7 in.

- West side:1,500 ft^2 area, 3.14 ft above elevation 3 ft, 7 in.

Class 1E electrical panels are installed in the room which prevents flow-in water by water-tight door. Therefore, panels are not flooded.

Elevation 25 ft, 3 in.

The equipment to be protected in the NRCA portion of elevation 25 ft, 3 in. is the main control panel and Class 1E I&C panels. The main control room and Class 1E I&C rooms are isolated from corridor by concrete walls and water-tight door.

Flood events are considered as follows;

- Earthquake

  The total water volume from the earthquake event is same as that of elevation -26 ft, 4 in.

- High-Energy Line Break/Moderate-Energy Line Break (HELB/MELB)

  HELB event is not a concern, because there are no piping breaks, which are assumed to occur in the subject area.

- Fire Fighting Operations

  The total water volume from the fire fighting operation events is same as that of elevation -26 ft, 4 in.

Based on the flood events described above, the worst case results are from a combination of earthquake and fire fighting operations. The total volume of flood water caused by this combination is 4,710 ft^3 in both the east and west area.

The footage of corridor area and the water level are as follows;

- East side: 1,500 ft^2 area, 3.14 ft above elevation 25 ft, 3 in.

- West side: 1,650 ft^2 area, 2.85 ft above elevation 25 ft, 3 in.

The ~~main control panel and~~ Class 1E I&C panels are installed in the room which prevents flow-in water by the use of barriers and water-tight doors. Therefore, panels are

not flooded. The main control room subject to regular access is protected from flooding by the use of barriers.

The main control room penetrations are designed to prevent water from flowing in by applying appropriate sealing features. The HVAC ducts coming from the main control room air handling units and the filter train units are routed horizontally above the postulated flooding level. The vertical HVAC ducts penetrate the main control room 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 R/B). Cables enter the MCR from beneath the raised MCR floor, and the penetrations at the control room envelop boundary may contain a liquid or clay filling and are water sealed. Therefore, flooding of the main control room through those penetrations is precluded through the use of appropriate sealing features.

Elevation 50 ft, 2 in.

The equipment to be protected in the elevation 50 ft, 2 in. of the NRCA is the main control room air handling units, Class 1E electrical room air handling units, and main control room emergency filtration units.

Flood events are considered as follows;

- Earthquake

  The total water volume from the earthquake event is same as that of elevation -26 ft, 4 in.

- High-Energy Line Break/Moderate-Energy Line Break (HELB/MELB)

  HELB event is not a concern, because there are no piping breaks, which are assumed to occur in the subject area.

- Fire Fighting Operations

  The total water volume from the fire fighting operation events is same as that of elevation -26 ft, 4 in.

Based on the flood events described above, the worst case results are from a combination of earthquake and fire fighting operations. The total volume of flood water caused by this combination is 4,710 ft^3 in both the east and west area.

The footage of subject area and the water level are as follows;

- East side: 5,400 ft^2 area, 0.87 ft above elevation 50 ft, 2 in.

- West side: 5,500 ft^2 area, 0.86 ft above elevation 50 ft, 2 in.

The main control room air handling units, Class 1E electrical room air handling units, as well as the main control room 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.

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

Elevation 76 ft, 5 in.

Elevation 76 ft, 5 in. of the NRCA is divided into the MS/FW piping area and other areas by concrete walls and water-tight doors. Moreover, the MS/FW piping area is divided into the two areas, east and west, by the concrete wall.

The equipment to be protected in the MS/FW piping area is the MS isolation valve, main feedwater isolation valve (MFIV), and MS depressurization valve.

The equipment to be protected in the subject area, except the MS/FW piping area, is the instrumentation of the EFW pit, and the remote shutdown console within the remote shutdown room.

Flood events in the MS/FW piping area are considered as follows:

- Earthquake

  The total water volume from the earthquake event is same as that of elevation -26 ft, 4 in.

- HELB/MELB

  In the flooding events caused by the postulated failure of piping, the high energy piping consists of main steam, feedwater, and SG blowdown piping, within the MS/FW piping area. A rupture of the feedwater piping in this area represents the worst case flooding scenario for this area. This is based on a 1.0 ft^2 break, as defined in Section 3.6, in the feedwater piping upstream of the feedwater check valve. The rupture at this point results in feedwater from the SG and from within the associated feedwater piping flow back into and flooding the compartment. In addition, the main feedwater pump is assumed be pumping at the maximum flowrate. As a result of this scenario, the water level in the SG would decline resulting in a low level alarm/signal from the SG water level indication instrumentation. The low water signal initiates the feedwater isolation circuit. Based on actuation of the feedwater isolation circuit, the main feedwater pump is tripped, which stops the main feedwater pump. The volume of water which floods the main steam/feedwater pipe/relief valve compartment, based on the time required to reach the low water level set point, is 12,180 ft^3. The flood water occurring in the main steam/feed water piping room is drained to the T/B sump through the floor drain. Conservatively assuming that the drain line is clogged, the flood water will not be discharged by way of the floor drain.

- Fire Fighting Operations

  The total water volume from the fire fighting operation events is same as that of elevation -26 ft, 4 in.

Based on the above, the worst case flooding in the MS/FW piping area is a piping rupture at 12,180 ft^3. The floor area of the MS/FW piping area is 2,640 ft^2; therefore the water level caused by piping rupture area is 4.6 ft above elevation 65 ft, 0 in, the bottom

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