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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-12162

Subject: MHI's Response to US-APWR DCD RAI No.927-6460 Revision 3 (SRP 06.04)

References: 1) "Request for Additional Information No. 927-6460 Revision 3, SRP Section: 06.04 – Control Room Habitability System Application Section: Section 9.3.3, 6.4 and 9.4.1" dated May 8, 2012 (ML12135A700).

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Response to Request for Additional Information No. 927-6460 Revision 3 (SRP 06.04)".

Enclosed is the response to 1 RAI question contained within Reference 1.

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.

Enclosure:

1. Response to Request for Additional Information No. 927-6460 Revision 3 (SRP 06.04)

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NRO

CC: J. A. Ciocco
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Enclosure 1

UAP-HF-12162
Docket No.52-021

Response to Request for Additional Information No. 927-6460
Revision 3 (SRP 06.04)

September 2012

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

9/19/2012

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**927-6460 REVISION 3**
SRP SECTION:	**06.04 -Control Room Habitability System**
APPLICATION SECTION:	**DCD SECTION 9.3.3, 6.4, and 9.4.1**
DATE OF RAI ISSUE:	**5/8/2012**

Question No. : 06.04-16

The following Request for Additional Information is based on the requirements of 10CFR50 Appendix A Criteria 2, 4 and 19.

The staff notes that the equipment drain lines for collecting condensate from the four Main Control Room Air Handling Unit (AHU) cooling coils are neither identified on DCD Tier 2 Figure 9.4.1-1 nor on Figure 9.3.3-1.

The portions of the equipment drain lines that connect to the Air Handling Units would have to be Safety Related and Seismic Category I since they form part of the Control Room Envelope (CRE) boundary. Since these equipment drain lines tie into the four AHUs just upstream of the respective AHU fan, the drain lines most likely will be below atmospheric pressure and provide unfiltered paths for radioactive containments into CRE in a post accident plant environment.

The staff references the Open Item associated with RAI 883-6063 Question 09.04.01-32.

The capability of these equipment drains lines to drain 45 gpm in the event of a Essential Chilled Water system leak internal to an AHU, would require these equipment drain lines to be of sufficient size (e.g. 2" to 4") to mitigate the effects of this worst case internal leak in an AHU.

Given the above, the staff requests additional information about how the design of the four AHU equipment drain lines will satisfy the requirements of GDC 2, GDC 4 and GDC19. The staff requests that the applicant appropriately amend the DCD (e.g. Tier 2 Sections 6.4, 9.3.3 and 9.4.1) to capture the applicant's response.

ANSWER:

The equipment drain lines from the main control room air handling units include a loop seal configured to prevent unfiltered air from equipment drain lines being drawn into the air handling unit. The loop seal is installed to provide this function under normal operating and accident conditions. Therefore, there is no unfiltered path for radioactive contaminants from the equipment drain lines passing through the air handling units into the control room envelope under post-accident conditions. The equipment drain line is safety related and seismic category I.

As described in the response to RAI 883-6063, Question 09.04.01-32, the design of the MCR air handling unit cooling coils, which are safety-related, equipment class 3, seismic category I components, in accordance with ASME AG-1 - 2003 and quality requirements, and the pre-service hydrostatic pressure testing, provide assurance that the pressure boundary will not fail in service. In addition, the cooling coils are manufactured component assemblies consisting of end fittings, or headers, and finned tubes. The air handling unit cooling coils are not considered piping since connections are provided on the header for tie-in to chilled water supply and return piping and the connections are external to the air handling unit. Therefore, the requirements for postulating piping breaks as described in DCD Section 3.6 are not applicable to the cooling coils. The failure of the cooling coils are not required to be postulated as an internal flooding source since DCD Section 3.4.1.3 identifies that only equipment or pipe not classified as seismic category I are considered to contribute to flooding due to a seismic event. Therefore, sizing the air handling unit equipment drain line to accommodate the cooling water flow rate from a failure of the cooling coil is not warranted.

DCD Subsection 6.4.2 will be revised to describe the design of the drain line loop seal and the safety classification of the equipment drain line. DCD Subsection 9.4.1.2 will also be revised to describe the safety classification of the equipment drain line.

Impact on DCD

DCD Revision 3 Subsection 6.4.2, fifth paragraph, will be revised as follows (see Attachment 1):

> "The emergency pressurization mode establishes a CRE pressure higher than that of adjacent areas. For automatic initiation in emergency pressurization mode, a portion of the return air flow is directed into the emergency filtration units. Outside air is drawn in through either of the two tornado-generated missile protection grids and the tornado depressurization protection dampers, and is directed to both 100% capacity MCR emergency filtration units and all 50% capacity MCR air handling units. **The equipment drain lines for the air handling units are safety related, seismic category I and include a loop seal to prevent an unfiltered path for radioactive contaminants into the CRE and maintain the CRE boundary.** The MCR smoke purge fan and the MCR toilet/kitchen exhaust fans are shut down and isolated. With pressurization mode established, the MCR operators may stop one MCR emergency filtration unit and two MCR air handling units and place them in standby. Figure 6.4-3 shows the air flow path in the emergency pressurization mode."

DCD Revision 3 Subsection 9.4.1.2, third paragraph, will be revised as follows:

> "Each of the 50% capacity air handling units is classified as equipment class 3, seismic category I and consists of, in the direction of airflow, a low efficiency pre-filter, a high efficiency filter, an electric heating coil, a chilled water cooling coil, and a supply fan. Each air-handling unit is provided with isolation dampers, MCR air handling unit inlet and outlet damper, at the inlet and outlet. **The air handling units are provided with safety related, seismic category I equipment drain lines.** "

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.

respect to the surrounding areas to minimize un-filtered inleakage during emergency operation in pressurization mode.

The design of the MCR emergency filtration units is based on ensuring that the radiation dose (total effective dose equivalent [TEDE]) to MCR operators is well below 10 CFR 50, Appendix A "General Design Criteria 19" guidelines (Ref. 6.4-1) (5 roentgen equivalent in man [rem] TEDE) while occupying the CRE for the duration of the most severe Chapter 15 accident. The MCR emergency filtration design basis also ensures that control room personnel and equipment are protected in an environment satisfactory for extended performance.

As noted in Chapter 3, the MCR HVAC system is designed to Equipment Class 3, seismic category I standards. The CRE is an area of the control room complex in the power block. Accordingly, the CRE is, by definition, the same equipment class and seismic category (e.g., Equipment Class 3, seismic category I) as the MCR.

6.4.2 System Design

The MCR HVAC system has two emergency modes: pressurization mode and isolation mode.

The pressurization mode protects the MCR operators and staff within the CRE during the accident conditions postulated in Chapter 15. The pressurization mode is initiated automatically by the MCR isolation signal (refer to Chapter 7), i.e., any one of the following:

- ECCS actuation signal
- High MCR outside air intake radiation

The isolation mode protects the MCR operators and staff within the CRE from external toxic gas or smoke.

In the normal operation mode, the MCR HVAC system draws in outside air through either of the two tornado-generated missile protection grids and the tornado depressurization protection dampers. Incoming air is directed to any two of the four 50% capacity MCR air handling units. One of the two 100% capacity MCR toilet/kitchen exhaust fans exhaust a portion of the air supplied to the MCR to the outside, while the majority of MCR ventilation air flow recirculates. Figure 6.4-2 shows the air flow path in the normal operating mode. Normal operation of the MCR HVAC system is discussed in Chapter 9, Subsection 9.4.1.

The emergency pressurization mode establishes a CRE pressure higher than that of adjacent areas. For automatic initiation in emergency pressurization mode, a portion of the return air flow is directed into the emergency filtration units. Outside air is drawn in through either of the two tornado-generated missile protection grids and the tornado depressurization protection dampers, and is directed to both 100% capacity MCR emergency filtration units and all 50% capacity MCR air handling units. The equipment drain lines for the air handling units are safety related, seismic category I and include a loop seal to prevent an unfiltered path for radioactive contaminants into the CRE and maintain the CRE boundary. The MCR smoke purge fan and the MCR toilet/kitchen

DCD_06.04-16

The MCR HVAC System stops for one hour after SBO occurs until alternate ac gas turbine generator restores power. However, all Class 1E cabinets are designed to keep their integrity during loss of a HVAC system (Chapter 8, Section 8.4).

9.4.1.2 System Description

The MCR HVAC system is shown in Figure 9.4.1-1 and system equipment and components design data are presented in Table 9.4.1-1. The COL Applicant is to determine the capacity of heating coil that are affected by site specific conditions. The MCR HVAC system consists of two redundant 100% emergency filtration units and four 50% capacity air handling units, two 100% toilet/kitchen exhaust fans, one 100% smoke purge fan, ductwork, associated damper and instrumentation and control. The air handling units are connected to a common overhead air distribution ductwork system. The ductwork delivers the conditioned air of 11,000 cfm to MCR and 9,000 cfm to other rooms (i.e. file room, shift supervisor's room, conference room, break room, kitchen and restroom).

Any two of the four 50% capacity air handling units have the capacity to satisfy the operating requirements of the CRE during normal and design basis accidents. The outside air intakes, exhaust line and smoke purge line are provided with tornado missile protection grids and tornado depressurization protection dampers. The CRE is also served by two 100% capacity toilet/kitchen exhaust fans and one smoke purge fan. The back draft damper is provided in the outlet of toilet/kitchen exhaust fan to prevent short circuiting of exhaust airflow. Non-safety related electric in-duct heaters and a humidifier that are designed as seismic Category II are located in the duct branches leading to the MCR.

Each of the 50% capacity air handling units is classified as equipment class 3, seismic category I and consists of, in the direction of airflow, a low efficiency pre-filter, a high efficiency filter, an electric heating coil, a chilled water cooling coil, and a supply fan. Each air-handling unit is provided with isolation dampers, MCR air handling unit inlet and outlet damper, at the inlet and outlet. The air handling units are provided with safety related, seismic category I equipment drain lines. DCD_06.04-16

Each of the 100% capacity emergency filtration units and emergency filtration unit fans is classified as equipment class 3, seismic category I. The emergency filtration unit consists of, in the direction of airflow, a high efficiency filter, an electric heating coil, a HEPA filter, a charcoal adsorber, a high efficiency filter and a supply fan. Each emergency filtration unit is provided with isolation dampers, MCR emergency filtration air intake, air return and fan outlet damper, at the inlet and outlet.

Upon the MCR high temperature, the chilled water control valve for the activated air handling units is automatically positioned for full chilled water flow to prevent the temperature rise.

Upon the electric heating coil outlet high temperature, the electric heating coil is automatically tripped to prevent the abnormal heating.

Redundant leak-tight dampers, MCR air intake, toilet/kitchen exhaust line and smoke purge line isolation damper, are located in series in the outside air intake line and in each