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TOKYO, JAPAN

October 7, 2011

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-11348

# Subject: MHI's Response to US-APWR DCD RAI No.827-5812 Revision 0 (SRP 09.04.01)

**References:** 1) "Request for Additional Information No. 827-5812 Revision 0, SRP Section: 09.04.01 – Control Room Area Ventilation System Application Section: Section 9.4.1" dated September 7, 2011.

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.827-5812 Revision 0".

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

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,

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

Enclosure:

1. Response to Request for Additional Information No. 827-5812, Revision 0

CC: J. A. Ciocco C. K. Paulson

<u>Contact Information</u> C. Keith Paulson, Senior Technical Manager Mitsubishi Nuclear Energy Systems, Inc. 300 Oxford Drive, Suite 301 Monroeville, PA 15146 E-mail: ck\_paulson@mnes-us.com Telephone: (412) 373-6466

Docket No. 52-021 MHI Ref: UAP-HF-11348

Enclosure 1

# UAP-HF-11348 Docket Number 52-021

# Response to Request for Additional Information No. 827-5812, Revision 0

October, 2011

#### **RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

10/7/2011

US-APWR Design Certification Mitsubishi Heavy Industries Docket No. 52-021

RAI NO.:827-5812 REVISION 0SRP SECTION:09.04.01 -Control Room Area Ventilation SystemAPPLICATION SECTION:DCD SECTION 9.4.1DATE OF RAI ISSUE:9/7/2011

#### Question No. : 09.04.01-28

"Question on CR Intake Flow Rate"

There are three information sources related to CR intake flow rate from USAPWR DCD:

1. Rev 3 of DCD Tier 2 Section 6.4.2.3 (page 6.4.7).

"Make-Up flow < 1200 cfm".

2. Rev 3 of DCD Tier 2 Section 9.4.1.2.2.1 (page 9.4-5).

"Make-Up flow < 600 cfm".

3. Rev 3 of DCD Tier 2 Table 2.7.5.1-3 Sheet 3 Acceptance Criteria Item 4.b.ii (page 2.7-175).

"Intake flow < 1200 cfm"; "recirculation flow >2400 cfm".

Request for additional information: What is the correct CR intake flow rate? 1200 cfm or 600 cfm. The applicant's information seems contradicting itself.

#### ANSWER:

As described in DCD Section 6.4, two 100% capacity MCR emergency filtration units, which are part of the habitability systems for the MCR, are provided to allow operators to remain safely inside the control room envelope (CRE) and take the actions necessary to manage and control the plant under normal and abnormal plant conditions, including a LOCA. The MCR emergency filtration units are part of the MCR HVAC system.

As indicated in Table 9.4.1-1, each emergency filtration unit has an airflow capacity of 3,600 cfm. The system is designed to provide 600 cfm outside airflow and 3,000 cfm recirculation airflow for each train of emergency filtration. Each air handling unit provides 10,000 cfm conditioned air to the CRE.

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. The pressurization mode is initiated automatically by the MCR isolation signal and provides outside airflow and recirculation for CRE pressurization and removal of airborne radioactive material, respectively.

The emergency pressurization mode establishes a CRE pressurization of a minimum of 0.125 inches w.g. higher than that of adjacent areas. On an automatic initiation of the emergency pressurization mode, the

operating air handling units continue to run and the standby air handling units start, and both emergency filtration units start. With pressurization mode established, one MCR emergency filtration unit and two MCR air handling units may be stopped and placed in standby. One MCR emergency filtration unit is capable of establishing and maintaining the design positive pressure in the CRE with respect to the surrounding areas to minimize un-filtered in-leakage in pressurization mode. The air flow path of the MCR HVAC system in pressurization mode is shown in DCD Figure 6.4-3.

In pressurization mode, a portion of the return air flow from the CRE is directed into the emergency filtration units. Outside air is drawn in and is directed through the MCR emergency filtration units to the MCR air handling units.

DCD Section 6.4.2.3 describes the limits for CRE in-leakage and out-leakage and potential leakage sources. The make-up airflow rate in pressurization mode is stated as equal to or less than 1,200 cfm and refers to the maximum make-up airflow rate with both emergency filtration units in operation. As identified above, both emergency filtration units automatically start on a MCR isolation signal and each emergency filtration unit flowpath provides 600 cfm outside airflow.

DCD Section 9.4.1.2.2.1 describes the MCR HVAC system in pressurization mode. The last bulleted item states that MCR HVAC system design airflow rate is 20,000 cfm and the make-up design airflow rate is less than 600 cfm. This statement refers to system operation with the minimum required two MCR HVAC air handling units and one emergency filtration unit in operation. The last bulleted item in DCD Section 9.4.1.2.2.1 will be revised to clarify the MCR HVAC units operating.

Tier 1 DCD Table 2.7.5.1-3, Sheet 2, Item 4.b provides ITAAC for the MCR HVAC system filter efficiencies and required system airflow as required in the safety analyses. Item 4.b.ii Acceptance Criteria are that the as-built MCR HVAC system provides filtered air intake flow of  $\leq$ 1,200 cfm, filtered air recirculation flow of  $\geq$ 2,400 cfm, and maintains positive pressure in the as-built CRE in the emergency pressurization mode. The intake flow rate acceptance criterion considers the outside airflow rate with two emergency filtration units in operation, each flowpath providing  $\leq$ 600 cfm outside air flow. As described above, both emergency filtration units automatically start on a MCR isolation signal and each provides 600 cfm outside airflow. The filtered air recirculation flowrate of 2,400 cfm is a conservatively low value assumed in the analyses and is based on one emergency filtration unit in operation.

#### Impact on DCD

US-APWR DCD Revision 3 Tier 2 Subsection 9.4.1.2.2.1, last bulleted item, will be revised as follows (See Attachment-1) :

"• In the emergency pressurization mode of operation, the MCR HVAC system design airflow rate is 20,000 cfm with two MCR air handling units operating and the make-up design airflow rate is less than 600 cfm with one MCR emergency filtration unit operating."

#### 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.

- **US-APWR Design Control Document**
- The non-safety in-duct humidifier is controlled by a humidity instrument located in the MCR.

## 9.4.1.2.2 Emergency Operation Mode

### 9.4.1.2.2.1 **Pressurization Mode**

Upon receipt of the MCR isolation signal (Chapter 7), the MCR HVAC system is to automatically switch to pressurization mode by initiating the following control functions:

- The toilet/kitchen exhaust line and smoke purge line isolation dampers revert to the close position.
- The toilet/kitchen exhaust fans and smoke purge fan automatically shut down or remain in the shutdown status.
- The operating air handling units continue to run and the standby air handling units will start.
- All return air dampers of all air handling units remain in the open position allowing recirculation.
- Both emergency filtration units automatically start, their isolation dampers open, and their Class 1E electric heating coils are energized so that the air entering the charcoal adsorber has a relative humidity below 70%, which assures adsorption efficiency.
- The energized emergency filtration units continue to run to remove the airborne radioactivity from the CRE ambient air prior to circulation back to the CRE through the operating air handling units.
- Following automatic initiation of the emergency operation, two of the air handling units and one of the emergency filtration units may be manually de-energized and placed on standby status.
- In the emergency pressurization mode of operation, the CRE is maintained at a
  positive pressure 0.125 inches w.g. as a minimum relative to external areas
  adjacent to the CRE boundary.
- In the emergency pressurization mode of operation, the MCR HVAC system design airflow rate is 20,000 cfm with two MCR air handling units operating and the make-up design airflow rate is less than 600 cfm with one MCR emergency filtration unit operating.

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## 9.4.1.2.2.2 Isolation Mode

If the smoke detectors located in the outside air intake detect the presence of the smoke, they activate an alarm in the MCR. The MCR HVAC system will be automatically switched to the isolation mode and the following is to take place: