

  
**MITSUBISHI HEAVY INDUSTRIES, LTD.**  
16-5, KONAN 2-CHOME, MINATO-KU  
TOKYO, JAPAN

September 30, 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-10264

**Subject: MHI's Responses to US-APWR DCD RAI No. 622-4949 Revision 2**

**References:** 1) "REQUEST FOR ADDITIONAL INFORMATION 622-4949 REVISION 2, SRP Section: 19 – Probabilistic R Assessment and Severe Accident Evaluation" dated August 30, 2010.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document as listed in Enclosures.

Enclosed are the responses to all of the RAIs that are contained within Reference 1.

As indicated in the enclosed materials, this submittal contains information that MHI considers proprietary, and therefore should be withheld from public disclosure pursuant to 10 C.F.R. § 2.390 (a)(4) as trade secrets and commercial or financial information which is privileged or confidential. A non-proprietary version of the document is also being submitted with the information identified as proprietary redacted and replaced by the designation "[ ]".

This letter includes a copy of the proprietary version (Enclosure 2), a copy of the non-proprietary version (Enclosure 3), and the Affidavit of Atsushi Kumaki (Enclosure 1) which identifies the reasons MHI respectfully requests that all materials designated as "Proprietary" in Enclosure 2 be withheld from public disclosure pursuant to 10 C.F.R. § 2.390 (a)(4).

Please contact Dr. C. Keith Paulson, Senior Technical Manager, 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,  
General Manager- APWR Promoting Department  
Mitsubishi Heavy Industries, LTD.

DOB  
MRO

Enclosures:

1. Affidavit of Yoshiki Ogata
2. Response to Request for Additional Information No. 622-4949, Revision 2 (Proprietary Version)
3. Response to Request for Additional Information No. 622-4949, Revision 2 (Non-Proprietary Version)

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

Contact Information

C. Keith Paulson, Senior Technical Manager  
Mitsubishi Nuclear Energy Systems, Inc.  
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Monroeville, PA 15146  
E-mail: ck\_paulson@mnes-us.com  
Telephone: (412) 373-6466

## Enclosure 1

Docket No. 52-021  
MHI Ref: UAP-HF-10264

### **MITSUBISHI HEAVY INDUSTRIES, LTD.**

#### **AFFIDAVIT**

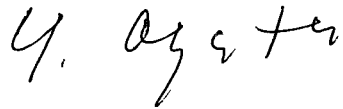
I, Yoshiki Ogata, state as follows:

1. I am General Manager, APWR Promoting Department, of Mitsubishi Heavy Industries, LTD ("MHI"), and have been delegated the function of reviewing MHI's US-APWR documentation to determine whether it contains information that should be withheld from public disclosure pursuant to 10 C.F.R. § 2.390 (a)(4) as trade secrets and commercial or financial information which is privileged or confidential.
2. In accordance with my responsibilities, I have reviewed the enclosed document entitled "Response to Request for Additional Information No. 622-4949, Revision 2", and have determined that portions of the document contain proprietary information that should be withheld from public disclosure. Those pages contain proprietary information are identified with the label "Proprietary" on the top of the page, and the proprietary information has been bracketed with an open and closed bracket as shown here "[ ]". The first page of the document indicates that all information identified as "Proprietary" should be withheld from public disclosure pursuant to 10 C.F.R. § 2.390 (a)(4).
3. The information identified as proprietary in the enclosed document has in the past been, and will continue to be, held in confidence by MHI and its disclosure outside the company is limited to regulatory bodies, customers and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and is always subject to suitable measures to protect it from unauthorized use or disclosure.
4. The basis for holding the referenced information confidential is that it describes the unique technique of the hydrogen burning analysis results related to the US-APWR severe accident analytical models developed by MHI.
5. The referenced information is being furnished to the Nuclear Regulatory Commission ("NRC") in confidence and solely for the purpose of information to the NRC staff.
6. The referenced information is not available in public sources and could not be gathered readily from other publicly available information. Other than through the provisions in paragraph 3 above, MHI knows of no way the information could be lawfully acquired by organizations or individuals outside of MHI.
7. Public disclosure of the referenced information would assist competitors of MHI in their design of new nuclear power plants without incurring the costs or risks associated with the design of the subject systems. Therefore, disclosure of the information contained in the referenced document would have the following negative impacts on the competitive position of MHI in the U.S. nuclear plant market:

- A. Loss of competitive advantage due to the costs associated with the development of the methodology related to the analysis.
- B. Loss of competitive advantage of the US-APWR created by the benefits of the modeling information.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information and belief.

Executed on this 30<sup>th</sup> day of September 2010.

A handwritten signature in black ink, appearing to read "Y. Ogata". The signature is written in a cursive, somewhat stylized font.

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

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Enclosure 3

UAP-HF-10264  
Docket No. 52-021

Response to Request for Additional Information No. 622-4949,  
Revision 2

September 2010  
(Non-Proprietary)

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**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

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09/29/2010

**US-APWR Design Certification**

**Mitsubishi Heavy Industries**

**Docket No.52-021**

**RAI NO.:** NO. 622-4949 REVISION 2  
**SRP SECTION:** 19 – Probabilistic Risk Assessment and Severe Accident Evaluation  
**APPLICATION SECTION:** 19  
**DATE OF RAI ISSUE:** 08/30/2010

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**QUESTION NO. : 19-444**

The US-APWR Probabilistic Risk Assessment Report Attachment 23N, Control Room Fires and I&C Rooms, page 23N-2 states “the boundary of each floor is not comprised of a fire resistant barrier.” Please explain how it is ensured that a fire in an I&C Room does not spread to the Main Control Room or vice versa. Please update the PRA and the DCD, as necessary, to clearly state each fire boundary between the I&C rooms and the Main Control Room and please document why a fire from an I&C Room cannot spread to the Main Control Room and vice versa.

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**ANSWER:**

The MCR and four I&C rooms are separated individually by fire resistant walls as shown in Figure 1. A train and B train class 1E I&C rooms are located on the east side of the MCR. C train and D train class 1E I&C rooms are located on the west side of the MCR. The boundaries of each fire area are composed of a fire resistance barrier. Every fire area is provided with the raised floor space as a fire zone, and the boundaries of the raised floor spaces and each fire area are not composed of fire resistant barriers.

In the multiple fire scenario analysis, it is assumed that a fire in each safety I&C room will propagate to the MCR with a failure of resistant barriers between each I&C room and MCR. Also, the fire scenario of each safety I&C room that propagates to the MCR will cause a loss of only one safety train.

The fire scenarios from the MCR assumed that a fire in the MCR propagates to only one safety I&C room in the multiple fire scenario analyses. This is because the potential of a coincident failure of multiple fire barriers will be very low.

Impact on DCD

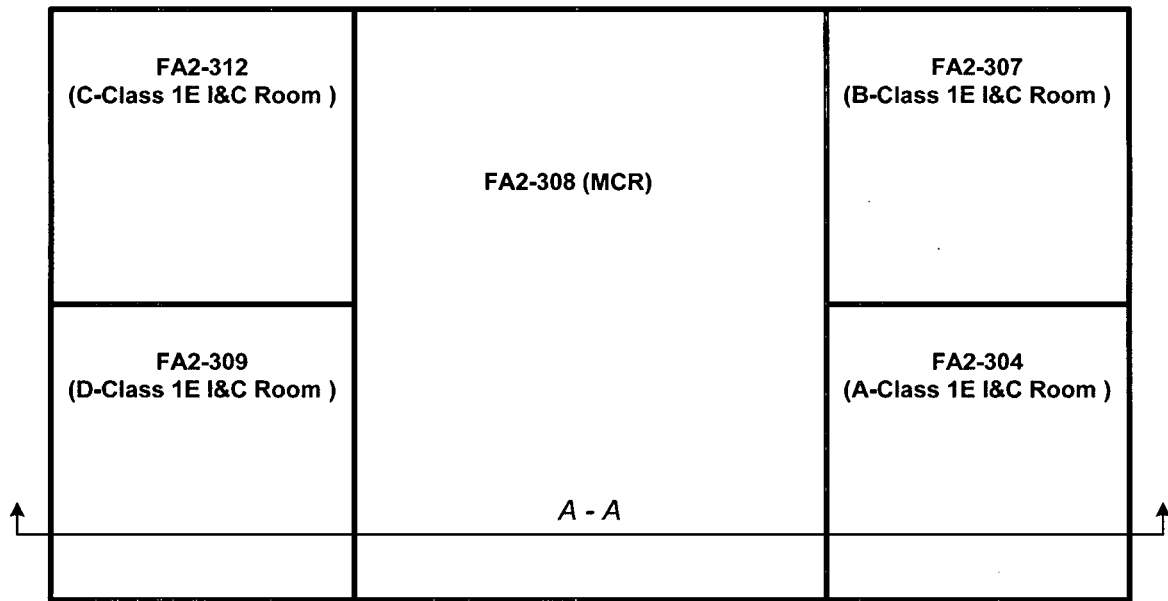
There is no impact on DCD.

Impact on COLA

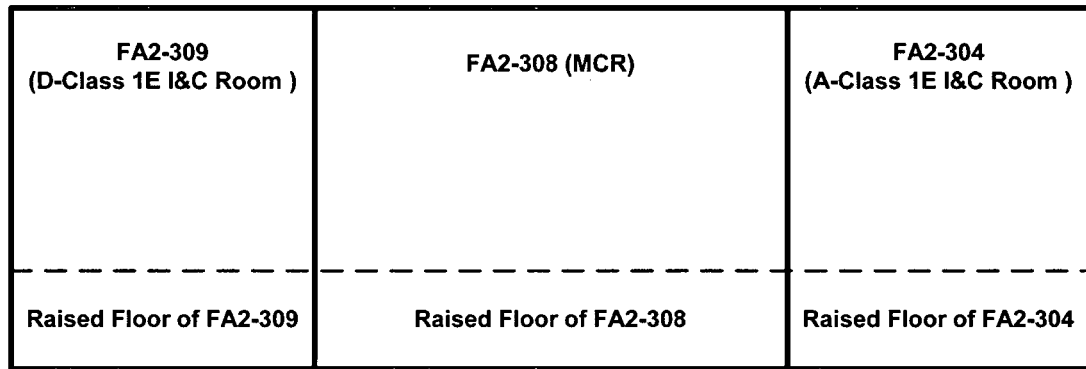
There is no impact on COLA.

Impact on PRA

Revise the Attachment 23N of the PRA report MUAP-07030(R2) to supplement the above additional information as the marked-up pages.



Ground floor plan of MCR and Class 1E I&C Rooms



Section A - A

- The boundary which is composed of fire resistant barrier
- - - - - The Boundary which is not composed of fire resistant barrier

Figure 1 Layout of MCR and class 1E I&C rooms















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**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

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09/29/2010

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**APPLICATION SECTION:** 19  
**DATE OF RAI ISSUE:** 08/30/2010

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**QUESTION NO. : 19-445**

The US-APWR Probabilistic Risk Assessment Report Attachment 23N, pages 23N-5 and 23N-6 state "because the control room fire has the potential to spread to safety related I&C rooms, including raised floor spaces, with some probability, it should be confirmed that the fire scenario will not be the dominant contributor to CDF." Please explain if it has been confirmed that the fire scenario is not the dominant contributor to CDF and, if so, specifically where this confirmation can be found. The statement in Attachment 23N should also be modified, as well as the DCD, to clarify if it has been confirmed that the fire scenario is not the dominant contributor to CDF and specifically where this confirmation can be found.

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**ANSWER:**

The MCR and four I&C rooms are separated individually by fire resistant walls as shown in Figure 1. The MCR and the under-floor space are assigned as the same fire compartment. The boundaries of each fire area are composed of a fire resistance barrier.

The fire propagations between the MCR and each safety related I&C room are assumed in the multiple fire scenario analysis. A fire in the MCR propagates to only one safety I&C room because the probability of coincident failure of multiple fire barriers is very low. Therefore, multiple fire scenarios of the MCR have been developed assuming that a fire in the MCR propagates to only one safety I&C room.

The core damage frequencies (CDFs) of the scenarios are shown in Table 23P-1 (sheet 15 of 28 on the page 23P-17) of the Attachment 23P (multiple compartment fire scenario) of the PRA report MUAP-07030(R2). The CDFs of the multiple fire scenarios from the MCR (FA2-308) to the I&C rooms (FA2-304, FA2-307, FA2-309 and FA2-312) are not the dominant contributor to the CDF.

<u>Multiple Fire Scenario ID</u>	<u>CDF(/RY)</u>	<u>Fire propagation</u>
FA2-308-M-01	2.0E-09	FA2-308 to FA2-304
FA2-308-M-02	1.8E-09	FA2-308 to FA2-307
FA2-308-M-03	3.5E-09	FA2-308 to FA2-309
FA2-308-M-04	3.4E-09	FA2-308 to FA2-312

Impact on DCD

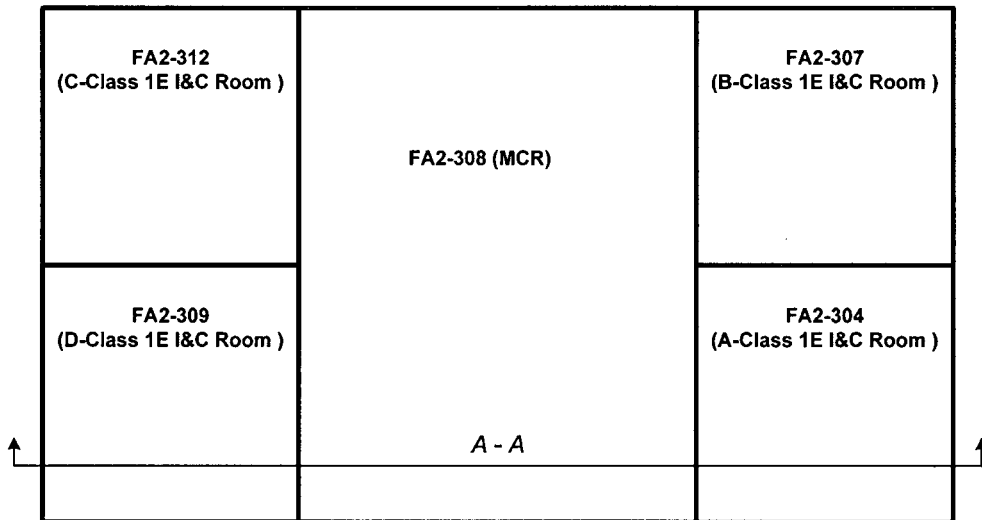
There is no impact on DCD.

Impact on COLA

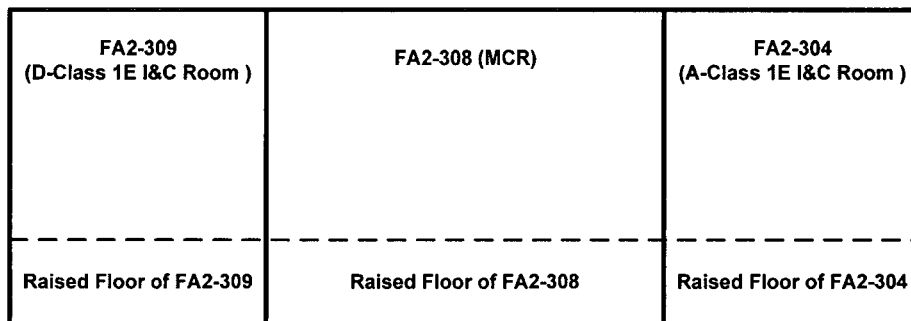
There is no impact on COLA.

Impact on PRA

There is no impact on PRA.



Ground floor plan of MCR and Class 1E I&C Rooms



Section A - A

- The boundary which is composed of fire resistant barrier
- - - - - The Boundary which is not composed of fire resistant barrier

Figure 1 Layout of MCR and class 1E I&C rooms



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**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

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09/29/2010

**US-APWR Design Certification**

**Mitsubishi Heavy Industries**

**Docket No.52-021**

**RAI NO.:** NO. 622-4949 REVISION 2  
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**QUESTION NO. : 19-446**

In the US-APWR Probabilistic Risk Assessment Report Attachment 23Q, page 23Q-3 of Section 3.4, the text does not match the drawing. Please modify the PRA to ensure that the text and the drawing are consistent. In addition, this attachment refers to sections of the containment as compartments, but there are no compartments in the containment, only fire zones. Please correct this inconsistency in the PRA and update the attachment as necessary.

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**ANSWER:**

The PRA report (MUAP-07030(R2)) Attachment 23Q describes the inside containment fire scenario analysis. The correct fire-causing compartment is "FA1-101-18" as described in the drawing on page 23Q-3 of Section 3.4. The text will be revised.

The word "Fire Compartment" described in the fire PRA report is a physical unit for fire PRA analysis and the boundary of the fire compartment is not necessarily comprised of a fire-rated barrier. In this analysis, the fire zones within containment have been defined individually as fire compartments in Attachment 23A of the fire PRA report.

The definitions of "Fire Compartment," "Fire Area," and "Fire Zone" will be clarified in the fire PRA report to avoid confusion.

"Fire Compartment" is a physical unit used in fire PRA and the extent is defined by the fire PRA analyst.

"Fire Area" is separated by a 3-hour fire rated wall, ceiling, and floors. All penetrations are protected with 3-hour rated penetration seals or fire dampers in HVAC systems to prevent fire propagation.

"Fire zone" is a subdivision of a fire area. The boundaries of the fire zone are not necessarily comprised of all fire rated barriers.

Impact on DCD

There is no impact on DCD.

Impact on COLA

There is no impact on COLA.

Impact on PRA

The definitions of "Fire Compartment," "Fire Area," and "Fire Zone" will be clarified in the fire PRA report, Attachment 23A and Attachment 23Q, as the marked-up pages.









