MITSUBISHI HEAVY INDUSTRIES, LTD.
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TOKYO, JAPAN

January 31, 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-12011

Subject: MHI's Response to US-APWR DCD RAI No. 889-6273 Revision 3 (SRP 15.4.1)

Reference: 1) "Request for Additional Information No. 889-6273 Revision 3, SRP Section: 15.04.01 - Uncontrolled Control Rod Assembly Withdrawal from a Subcritical or Low Power Startup Condition - Application Section: 15.4.1", dated January 17, 2012.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") the document entitled "MHI's Response to US-APWR DCD RAI No. 889-6273 Revision 3 (SRP 15.4.1)".

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

As indicated in the enclosed materials, this document 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 of the RAI response (Enclosure 2), a copy of the non-proprietary version of the RAI response (Enclosure 3), and the Affidavit of Yoshiki Ogata (Enclosure 1) which identifies the reasons MHI respectfully requests that all material designated as "Proprietary" in Enclosure 2 be withheld from disclosure pursuant to 10 C.F.R. § 2.390 (a)(4).

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.

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NRO

Enclosures:

1. Affidavit of Yoshiki Ogata
2. MHI's Response to US-APWR DCD RAI No. 889-6273 Revision 3 (SRP 15.4.1) (proprietary)
3. MHI's Response to US-APWR DCD RAI No. 889-6273 Revision 3 (SRP 15.4.1) (non-proprietary)

CC: J. A. Ciocco
J. Tapia

Contact Information

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ENCLOSURE 1

Docket No. 52-021

MHI Ref: UAP-HF-12011

MITSUBISHI HEAVY INDUSTRIES, LTD.

AFFIDAVIT

I, Yoshiki Ogata, being duly sworn according to law, depose and state as follows:

1. I am Director, 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 "MHI's Response to US-APWR DCD RAI No. 889-6273 Revision 3 (SRP 15.4.1)", dated January 31, 2012, and have determined that the document contains proprietary information that should be withheld from public disclosure. Those pages containing 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 information identified as "Proprietary" should be withheld from public disclosure pursuant to 10 C.F.R. § 2.390 (a)(4).

3. The basis for holding the referenced information confidential is that it describes the unique design of the safety analysis, developed by MHI (the "MHI Information").

4. The MHI Information is not used in the exact form by any of MHI's competitors. This information was developed at significant cost to MHI, since it required the performance of research and development and detailed design for its software and hardware extending over several years. Therefore public disclosure of the materials would adversely affect MHI's competitive position.

5. The referenced information has in the past been, and will continue to be, held in confidence by MHI and is always subject to suitable measures to protect it from unauthorized use or disclosure.

6. The referenced information is not available in public sources and could not be gathered readily from other publicly available information.

7. The referenced information is being furnished to the Nuclear Regulatory Commission ("NRC") in confidence and solely for the purpose of supporting the NRC staff's review of MHI's application for certification of its US-APWR Standard Plant Design.

8. Public disclosure of the referenced information would assist competitors of MHI in their design of new nuclear power plants without the costs or risks associated with the design and testing of new systems and components. Disclosure of the information identified as proprietary would therefore have negative impacts on the competitive position of MHI in the U.S. nuclear plant market.

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 31st day of January, 2012.

Y. Ogata

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

ENCLOSURE 3

UAP-HF-12011
Docket No. 52-021

MHI's Response to US-APWR DCD RAI No. 889-6273
Revision 3 (SRP 15.4.1)

January 2012

(Non-Proprietary)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

01/31/2012

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 889-6273 REVISION 3**
SRP SECTION:	**15.04.01 – UNCONTROLLED CONTROL ROD ASSEMBLY WITHDRAWAL FROM A SUBCRITICAL OR LOW POWER STARTUP CONDITION**
APPLICATION SECTION:	**15.4.1**
DATE OF RAI ISSUE:	**01/17/2012**

QUESTION NO.: 15.04.01-10

In response to RAI 2340, Question 15.4.1-5, MHI stated in UAP-HF-09344 that a bottom skewed axial power distribution was used in both TWINKLE-M and VIPRE-01M. Explain why the generic, top skewed axial power distribution given in DCD Chapter 4.4 used in the VIPRE-01M DNBR calculation is not used as the VIPRE-01M axial power shape.

ANSWER:

As described in US-APWR DCD Chapter 4.4, the design axial power distribution (W-hump in DCD Figure 4.4-4) is used for DNBR analysis at hot full power (HFP). However, this power distribution is not applied to the Uncontrolled Control Rod Assembly Withdrawal from Subcritical event described in DCD Section 15.4.1 since the initial condition for this event is hot zero power (HZP). The power shape in this condition is generally bottom-skewed since the RCCA banks are partially inserted along with the RCCA overlap sequence. The axial power distribution used in both the TWINKLE-M and VIPRE-01M calculations is a representative distribution which gives the maximum reactivity insertion rate during the RCCA withdrawal. The conservatism of the analysis is ensured by the large reactivity insertion rate (75 pcm/sec) which is determined by assuming the simultaneous withdrawal of two control banks while ignoring the overlap sequences.

The axial power distribution could be top-skewed in the TWINKLE-M and VIPRE-01M calculations since the timing when the reactor reaches prompt criticality depends on the initial subcriticality of the reactor. However, the axial offset is mostly negative (i.e. the axial power shape is bottom-skewed) during RCCA withdrawal including the RCCA overlap sequence, as shown in Figure 15.04.01-10.1. Some representative axial power distributions along with the RCCA positions are shown in Figure 15.04.01-10.2. As expected, the axial power distribution is more top-skewed for higher bank position. However, as Figure 15.04.01-10.3 shows, the reactivity insertion rate during RCCA bank withdrawal is much lower than the DCD reactivity insertion rate (75 pcm/sec).

MHI conducted a sensitivity analysis using the power distributions shown in Figure 15.04.01-10.2 and the associated (realistic) reactivity insertion rates shown in Figure 15.04.01-10.3. The sensitivity analysis results are shown in Figures 15.04.01-10.4 and 15.04.01-10.5. The figures show that the peak reactor power and minimum DNBR for these sensitivity cases are bounded by the DCD case.

Figure 15.04.01-10.1 Axial Offset versus Bank Step

Figure 15.04.01-10.2 Axial Power Distributions in Representative Cases

Figure 15.04.01-10.3 Reactivity Insertion Rate versus Bank Step

Figure 15.04.01-10.4 Reactor Power versus Time

Figure 15.04.01-10.5 DNBR versus Time

Impact on DCD

There is no impact on the DCD.

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 Report

There is no impact on a Technical/Topical Report.

This completes MHI's response to the NRC's question.