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May 21, 2009

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-09252

Subject:

MHI's 2nd Part Responses to the NRC's Requests for Additional Information on Topical Report MUAP-07011-P (R0) "Large Break LOCA

Code Applicability Report for US-APWR"

Reference:

 "REQUEST FOR ADDITIONAL INFORMATION MUAP-07011 REV2", US-APWR TOPICAL REPORT Large Break LOCA Code Applicability MUAP-07011-P(R0), dated March 25, 2009.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") an official document entitled "MHI's 2nd Part Responses to the NRC's Requests for Additional Information on Topical Report MUAP-07011-P (R0) 'Large Break LOCA Code Applicability Report for US-APWR'". In the enclosed document, MHI submits the remaining 6 (six) out of 46 (forty-six) responses requested in Reference 1. The first part of responses to the RAI in Reference 1 were already transmitted to the NRC by the preceding correspondence, on April 24, 2009 (30 days after the issuance of the formal RAI), as mutually agreed by NRC and MHI.

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 in this package (Enclosure 3). Any proprietary information that is written inside a bracket in the proprietary-version is replaced by the designation "[]" without any text, in the non-proprietary-version.

This letter includes a copy of proprietary version (Enclosure 2), a copy of non-proprietary version (Enclosure 3), and the Affidavit of Yoshiki Ogata (Enclosure 1) which identifies the bases of MHI request 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

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Mitsubishi Heavy Industries, LTD.

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Enclosures:

- 1. Affidavit of Yoshiki Ogata
- 2. MHI's 2nd Part Responses to the NRC's Requests for Additional Information on Topical Report MUAP-07011-P (R0) "Large Break LOCA Code Applicability Report for US-APWR" (proprietary)
- 3. MHI's 2nd Part Responses to the NRC's Requests for Additional Information on Topical Report MUAP-07011-P (R0) "Large Break LOCA Code Applicability Report for US-APWR" (non-proprietary)

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

Contact Information

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

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ENCLOSURE 1

Docket No.52-021 MHI Ref: UAP-HF-09252

MITSUBISHI HEAVY INDUSTRIES, LTD. AFFIDAVIT_

- I, Yoshiki Ogata, being duly sworn according to law, depose and state as follows:
- 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 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 "MHI's 2nd Part Responses to the NRC's Requests for Additional Information on Topical Report MUAP-07011-P (R0) 'Large Break LOCA Code Applicability Report for US-APWR'" and have determined that portions of the report contain 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 technical report 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 in the report identified as proprietary by MHI 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 codes and files developed by MHI for the fuel of the US-APWR and also contains information provided to MHI under license from the Japanese Government. These codes and files were developed at significant cost to MHI, since they required the performance of detailed calculations, analyses, and testing extending over several years. The referenced information is not available in public sources and could not be gathered readily from other publicly available information. MHI knows of no way the information could be lawfully acquired by organizations or individuals outside of MHI and the Japanese Government.
- 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.
- 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 of new fuel 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 21st day of May, 2009.

Yoshiki Ogata

General Manager- APWR Promoting Department

Mitsubishi Heavy Industries, LTD.

Enclosure 3

UAP-HF-09252

MHI's 2nd Part Responses to the NRC's Requests for Additional Information on Topical Report MUAP-07011-P (R0) "Large Break LOCA Code Applicability Report for US-APWR"

May 2009 (Non-Proprietary)

INTRODUCTION

This document presents MHI's 2nd part responses to the NRC's requests for additional information (RAI) on Topical Report MUAP-07011-P (R0) "Large Break LOCA Code Applicability Report for US-APWR" dated March 25, 2009.

This document provides the remaining 6 (six) out of 46 (forty-six) items requested in this RAI. The first part of responses to the RAI were already transmitted to the NRC by preceding correspondence, on April 24, 2009 (30 days after the issuance of the formal RAI), as mutually agreed by NRC and MHI.

MHI's	2nd	Part	Responses	to	the	NRC's	Requests	for	Additional
Inform	ation	on To	pical Report	ΜU	JAP-	07011-P	(R0) "Lar	ge B	reak LOCA
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REQUEST 3.10
RESPONSE
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MHI's 2nd Part Responses to the NRC's Requests for Additional Information on Topical Report MUAP-07011-P (R0) "Large Break LOCA Code Applicability Report for US-APWR"

REQUEST 3.11

General comment. The stored energy release should be important as it affects coolant conditions. How does total heat release from the reactor system (excluding fuel rods) structures compare to the decay heat? Why is the reactor system stored energy not considered in the PIRT?

RESPONSE

MHI's	2nd	Part	Responses	to	the	NRC's	Requests	for	Additional
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REQUEST 3.13.2

COBRA-TRAC (M1.0) has been modified to model the flow field in the unheated flow channel, hot wall flow regime, for the flow channels in NR. Provide a reference or explanation for the following questions. Are the flow regimes described for hot wall and normal flow regimes applicable to flow channels in the neutron reflector? Does the model switch to normal wall flow regime when wall cools below T_{CHF} ? Is the limit used for T_{CHF} valid for channel flow of neutron reflector, if so why?

RESPONSE

Reference 3.13-2-1 Neutron Reflector Reflooding Confirmatory Test, MUAP-08008-P(R0) (2008).

MHI's 2nd Part Responses to the NRC's Requests for Additional Information on Topical Report MUAP-07011-P (R0) "Large Break LOCA Code Applicability Report for US-APWR"

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REQUEST 3.13.4

Provide a reference or explanation to the following questions. How much stored energy is in NR and how does the heat transfer to fluid compare to decay heat?

RESPONSE					
Figure RAI-3.13.4-1 compares the amount of heat release from NR with total decay heat of fuel rod in the US-APWR reference calculation of Reference 3.13.4-1.					

REQUEST 3.14.5

In Subsection 3.6.3.2, Homologous Pump Curves for the US-APWR RCP, the report describes the pump model. Figures 3.6-11 and 3.6-12 are shown as for US-APWR. Specific speed indicates similarity of pump performance in single phase flow. However, in case of two phase flow there are other length scales (bubble size) that are independent of pump size. It has been found that smaller pump degrades more than larger pumps with same pump specific speed (NUREG/CR-5249, App L). Provide a reference or discussion to why the 1/3 scale data will represent US-APWR for two phase degradation?

RESPONSE

The MHI shows two references as to why the 1/3 scale two-phase data is able to used for the US-APWR RCP.

The first reference (Ref. 3.14.5-1) revealed that "scaling down the size of the pump while maintaining the same design specific speed produces very similar performance characteristics both in single and two-phase flows. Effects due to size and operating speed were not discernible within the range of test conditions and within experimental uncertainties."

Also, similar results were observed in the two-phase pump experiments using the different geometrically scaled pumps (scale 1:5 and 1:4) conducted by KWU (Ref. 3.14.5-2).

References

- 3.14.5-1 Kamath, P. S. and Swift, W. L., "Two-Phase Performance of Scale Models of a Primary Coolant Pump," EPRI NP-2578, Final Report, 1982
- 3.14.5-2 Kastner, W. and Seeberger, G. J., "Pump Behavior and Its Impact on a Loss of Coolant Accident in a Pressurized Water Reactor," Nuclear Technology, Vol. 60, 1983