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January 15, 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-09007

Subject: MHI's Response to US-APWR DCD RAI No. 113-786 Revision 0

Reference: 1) "Request for Additional Information No. 113-786 Revision 0, SRP Section: 06.02.01.04, Application Section: 6.2.1.4" dated December 3, 2008.

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. 113-786 Revision 0."

Enclosed is the response to one 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,

Y. Ogata

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

Enclosure:

1. Response to Request for Additional Information No. 113-786 Revision 0

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

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Enclosure 1

UAP-HF-09007
Docket Number 52-021

Response to Request for Additional Information
No. 113-786 Revision 0

January 2009

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

1/15/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**113-786**
SRP SECTION:	**06.02.01.04 - MASS AND ENERGY RELEASE ANALYSIS FOR POSTULATED SECONDARY SYSTEM PIPE RUPTURES**
APPLICATION SECTION:	**SRP 6.2.1.4**
DATE OF RAI ISSUE:	**12/3/2008**

QUESTION NO. : 06.02.01.04-2

6.2.1.4: The Containment Design Temperature is 300 °F (per Section 6.2.1.1.1, and able 6.2.1-2). However, the calculated temperatures for some transients from Table .2.1-8 and from Figs. 6.2.1-39 – 65 are well over 300 °F, i.e. 324 and 355 °F. Please, discuss the implications of these above-design-value temperatures, and/or provide an analysis of the consequences of their occurrence.

ANSWER:

The current design of the containment documented in the DCD is based on the temperature and pressure conditions associated with loss-of-coolant accident (LOCA). Figures 6.2.1-18 and 6.2.1-19 of the DCD present the pressure and temperature transients during LOCA. Because they are associated with higher pressures concurrent with the temperature, and are of longer duration, the LOCA conditions result in higher thermal stresses in the pre-stressed concrete containment vessel (PCCV) structure than the main steam line break (MSLB). The selected design temperature of 300 °F is in excess of the peak temperature in the LOCA temperature transient. LOCA is therefore selected as the more appropriate and conservative for the design of the PCCV.

Although the peak temperatures for MSLB exceed the design temperature of 300 °F, these transients are of short duration. All the MSLB transients presented in Figures 6.2.1-39 through 6.2.1.-65 are shorter duration compared to the LOCA and are associated with significantly smaller transient pressures.

Additionally, due to the thermal resistance of the condensed liquid film on the surface of the liner plate, the generalized liner temperatures during the MSLB transients are less than the peak containment atmosphere temperatures exhibited in the transients, and less than the design temperature of 300 °F. This is based on the evaluation of the heat transferred from the containment atmosphere through the condensed liquid film to the containment vessel (CV). In

order to evaluate the containment liner temperature, a small heat sink with the surface area of 1 ft^2 and the thickness of 0.257 inch was additionally set to simulate the thermal response of the liner plate in each of the MSLB analyses. This heat sink is small enough to provide no effect to the MSLB transient itself. The heat transfer model of the small heat sink assumes that the back face is insulated and has the smallest heat capacity with the thin thickness similar to that of the liner. The heat transfer coefficient between the liner surface and the containment atmosphere incorporates a multiplier of 1.2 as a reasonable enhancement for conservatism, as described in ML063190467. Table 1 presents the surface temperature of the small heat sink for all MSLB events, and illustrates that they are less than the structural design temperature.

In conclusion, the CV design temperature (300 °F), in conjunction with the coincident design pressure based on the LOCA conditions reasonably assures that the CV design accomplishes the safety function to maintain a barrier to the radiological release during and after the accident conditions.

Table 1 Peak Liner Temperature for Various Cases of MSLB (Sheet 1 of 2)

Case	1	2	3	4	5
Break Type	Double Ended	Double Ended	Double Ended	Double Ended	Double Ended
Cd or Break Area	Cd=1.0	Cd=1.0	Cd=1.0	Cd=1.0	Cd=1.0
Power Level, %	102	75	50	25	0
Offsite Power	Available	Available	Available	Available	Available
Available ESFs	2 Safety Injection Pumps 2 Containment Spray Pumps	2 Safety Injection Pumps 2 Containment Spray Pumps	2 Safety Injection Pumps 2 Containment Spray Pumps	2 Safety Injection Pumps 2 Containment Spray Pumps	2 Safety Injection Pumps 2 Containment Spray Pumps
Peak Containment Atmosphere Temperature, °F	355	349	348	348	347
Peak Liner Temperature (by Small Heat Sink), °F	270	268	269	269	273

Table 1 Peak Liner Temperature for Various Cases of MSLB (Sheet 2 of 2)

Case	6	7	8	9
Break Type	Split	Split	Double Ended	Double Ended
Cd or Break Area	$1.65ft^2$	$1.71ft^2$	Cd=1.0	Cd=1.0
Power Level, %	102	0	102	0
Offsite Power	Available	Available	Lost	Lost
Available ESFs	2 Safety Injection Pumps 2 Containment Spray Pumps	2 Safety Injection Pumps 2 Containment Spray Pumps	2 Safety Injection Pumps 2 Containment Spray Pumps	2 Safety Injection Pumps 2 Containment Spray Pumps
Peak Containment Atmosphere Temperature, °F	328	324	355	347
Peak Liner Temperature (by Small Heat Sink), °F	268	271	261	258

Impact on DCD

There is no impact on the DCD

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

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