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November 28, 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-12307

Subject: MHI's Response to US-APWR DCD RAI No.953-6437 (SRP 04.02)

Reference: 1) "REQUEST FOR ADDITIONAL INFORMATION 953-6437" dated on August 10, 2012

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") documents entitled "Response to US-APWR DCD RAI No.953-6437".

In the enclosed documents, MHI provides a response to Questions 04.02-65 contained within Reference 1.

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,

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

Enclosures:

1. Response to US-APWR DCD RAI No. 953-6437

CC: J. A. Ciocco
J. Tapia

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Enclosure 1

UAP-HF-12307
Docket No. 52-021

Response to US-APWR DCD RAI No. 953-6437

November 2012

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION 953-6437

11/28/2012

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO.953-6437**
SRP SECTION:	**04.02 - Fuel System Design**
APPLICATION SECTION:	**04.02**
DATE OF RAI ISSUE:	**8/10/2012**

QUESTION NO. : 04.02-65

10CFR50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors", Section (b) (4), Coolable geometry requires that calculated changes in core geometry shall be such that the core remains amenable to cooling. Provide the results and description of assumptions made in the analysis for the design basis large break LOCA which demonstrates that coolable geometry can be maintained following a LOCA. This need not assume a concurrent seismic event.

ANSWER:

MHI performed stress analysis in accordance with ASME Code requirements and Leak-Before-Break (LBB) evaluation for RCL piping and Class 1 piping using the current seismic response spectrum. The LBB evaluation was performed under normal operating loads (i.e. dead weight, thermal expansion, and pressure) and earthquake conditions using the methodology described in DCD Section 3.6.3 and Appendix 3B, which is consistent withSRP3.6.3 recommendations. The exclusion of guillotine ruptures of the piping was determined based on the LBB methodology. As described in Reference 1, the evaluation demonstrated that RCL piping, Surge Line piping, and Accumulator Line piping satisfy allowable limits corresponding to the Boundary Analysis Curve(BAC) described in DCD Appendix 3B.By performing this analysis, MHI demonstrated that the dynamic effects of an instantaneous guillotine rupture of a large pipe in the primary coolant piping system for the US-APWR design do not have to be considered, and it is therefore unrealistic to have to account for the loads on the fuel assembly grids which would result from such large pipe ruptures.

In Reference 1, pipes which are not excluded by the LBB criteria are postulated to have breaks, and the accident loads are calculated by the response obtained from the RCL dynamic analysis assuming the pipe breaks. An 8 inch break in the cold leg (Residual Heat Removal (RHR) return line nozzle)and a 10 inch break in the hot leg (RHR/Safety Injection line nozzle), which are the maximum breaks of pipes that were not excluded by the LBB criteria, are used for the LOCA blowdown analysis. Based on the analysis results, an evaluation of coolable geometry following a LOCA event was performed. The best estimate results of maximum EOL impact force on the fuel grid spacers for a LOCA event are shown in Reference 2, MUAP-08007(R2),Table F2.4-1 to Table F2.4-4 and the results including

uncertainties are shown in Tables F2.5-1 to Table F2.5-4.The results show that the grid spacers of US-APWR fuel assembly do not deform under LOCA induced forces. Therefore, a coolable geometry can be maintained following a LOCA event.

References

[1] "Summary of Seismic and Accident Load Conditions for Primary Components and Piping", MUAP-09002 (R2), December 2010
[2] "Evaluation Results of US-APWR Fuel System Structural Response to Seismic and LOCA Loads", MUAP-08007 (R2), December 2010

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 the Technical/Topical Report.

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