MITSUBISHI HEAVY INDUSTRIES, LTD.
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TOKYO, JAPAN

September 2, 2011

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Attention: Mr. Jeffery A. Ciocco

Docket No. 52-021
MHI Ref: UAP-HF-11293

Subject: MHI's Response to US-APWR DCD RAI No. 806-5985 REVISION 3, (SRP 09.01.02)

Reference: 1) "REQUEST FOR ADDITIONAL INFORMATION 806-5985 REVISION 3, SRP Section: 09.01.02 - New and Spent Fuel Storage, Application Section: 9.1.2" dated 8/18/2011.

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. 806-5985 REVISION 3".

Enclosed is the response to one RAI contained within Reference 1. This transmittal completes the response to this RAI.

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,

Y. Ogata

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

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NRO

Enclosure:

1. Response to Request for Additional Information No. 806-5985 REVISION 3.

CC: J. A. Ciocco
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Enclosure 1

UAP-HF-11293
Docket No. 52-021

Response to Request for Additional Information No. 806-5985,
Revision 3

September, 2011

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

9/02/2011

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 806-5985 REVISION 3**
SRP SECTION:	**09.01.02 - NEW AND SPENT FUEL STORAGE**
APPLICATION SECTION:	**09.01.02**
DATE OF RAI ISSUE:	**8/10/2011**

QUESTION NO.: 09.01.02-25

DCD Tier 2 Section 9.1.2.1 states that the spent fuel rack is design to provide adequate natural coolant circulation to remove residual decay heat from the stored fuel. This statement is in accordance with the recommendations of SRP 9.1.2.III.2.I which states that:

I. The thermal-hydraulic analysis of the flow through the spent fuel racks is adequate for decay heat removal from the spent fuel assemblies during all anticipated operating and accident conditions. Furthermore, the analysis should show adequate natural circulation of the coolant during all anticipated operating conditions, including full core-offloads during refueling, to prevent nucleate boiling for all fuel assemblies.

The applicant has not provided the thermal analysis report that would demonstrate that the spent fuel racks has been design to provide adequate natural circulation of the coolant. The staff understands that the spent fuel racks are typically a purchased item and the thermal analysis report may not be completed until a particular spent fuel rack is chosen.

If the DCD applicant has chosen a specific rack design, the staff requests the applicant to provide the confirmatory thermal analysis report that would confirm that the spent fuel rack has been design with adequate natural circulation of the coolant to remove residual decay heat from the stored fuel.

If the DCD applicant has not chosen a specific rack design, the staff requests the applicant to create a COL information Item, or an ITAAC, that would instruct the COL applicant to provide the confirmatory thermal analysis report that would confirm that the spent fuel rack has been design with adequate natural circulation of the coolant to remove residual decay heat from the stored fuel.

ANSWER:

The rack design for the SFP has been chosen and the thermal-hydraulic analysis technical report has been provided to the NRC as MUAP-09014 [add MHI letter reference]. This report is Reference 9.1.7-26 in DCD Revision 3. This report is referenced in the last paragraph of DCD Section 9.1.2.3.2.

DCD Section 9.1.3.3.2 also refers to this report. However, DCD Section 9.1.3.3.2 incorrectly refers to Reference 9.1.3-26 which should be corrected to Reference 9.1.7-26.

Impact on DCD

Reference number 9.1.3-26 described in the last sentence of 9.1.3.3.2. will be corrected to 9.1.7-26 (See Attachment-1).

Impact on R-COLA

There is no impact on the COLA.

Impact on S-COLA

There is no impact on the S-COLA.

Impact on PRA

There is no impact on the PRA.

integrity is an SBO event (where there is total loss of cooling functions) during a full core offload and the SFP fully loaded with previously discharged spent fuel. One alternate AC (AAC) power source is promptly activated within 60 minutes from the onset of SBO where one train of SFPCS equipment is reactivated to resume SFP cooling, thus precluding boiling. Furthermore, the SFP water volume allows an approximate 2.5-hour margin prior to an unlikely boiling of SFP water during a total loss of cooling condition or SBO at full core offloads. A thermal-hydralulic analysis (9.1.~~3~~7.-26) of the SFP has been performed to evaluate the integrity of the SFPCS cooling function DCD_09.01.02-25

The need for SFP water makeup, therefore, is ultimately based on natural evaporation losses. Since the quantity of water lost from this event is very small compared to the evaporation rate necessary to remove decay heat equivalent to 0.3% of rated thermal power; makeup rates from the different sources discussed hitherto are based on the latter. The calculated rate is approximately 100 gpm and is assumed to be the most limiting.

Redundant seismic category I sources are provided for SFP water makeup. The RWSP, as a primary water source of the SFP, is a seismic category I structure. The RWSP is able to supply 200 gpm of boric acid water through a seismic makeup line to the SFP. The EFW pit, which itself is seismic category I, backs up the RWSP through a nonseismic connection to the SFP with a makeup capacity of 100 gpm. Makeup from the EFW pit is performed through gravity injection, hence eliminates the need for pumps. The nonseismic DW tank also has nonseismic connections to the SFP with a makeup capacity of up to 150 gpm.

9.1.3.3.3 Spent Fuel Pit Dewatering

The most serious failure of the SFPCS would be a complete loss of cooling water in the storage pit. In accordance with RG 1.13 (Ref. 9.1.7-12), the design of the SFPCS limits the loss of cooling water that would result from a malfunction or failure of system components so that the spent fuel does not become uncovered.

The SFP cooling pump suction connections are located near the normal water level. The return line contains a siphon breaker. These features are provided so that the pit cannot be gravity drained below a point approximately 24 ft above the top of the spent fuel assemblies, thus maintaining the minimum SFP water level for radiation shielding of 11 ft 1 in.

9.1.3.3.4 Water Quality

The purification loop removes fission products and other contaminants from the water to maintain occupational radiation exposure ALARA.

Weekly water sampling of the spent fuel pit will be performed to monitor the concentrations of boron, halogens, sulfate ions, and dissolved solids that account for turbidity. Silica will be monitored monthly. There is no set value for gamma isotopic concentration. However, the radioactivity of the SFP water will be monitored on an ongoing basis by a process sampling. The design value of the decontamination factor of 100 for the SFP demineralizers is verified by samples taken to ensure that the design decontamination factor is maintained, as per ANSI/ANS 57.2-1983. As a result, the