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TOKYO, JAPAN

March 21, 2014

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

Attention: Mr. Perry Buckberg

Docket No. 52-021
MHI Ref: UAP-HF-14029

Subject: MHI's Response to US-APWR DCD RAI No. 1083-7433 (SRP 03.09.04)

References: 1) "Request for Additional Information No. 1083-7433," SRP Section: 03.09.04 – Control Rod Drive Systems, Application Section: 3.9.4, dated February 27, 2014

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") documents entitled "Response to Request for Additional Information No. 1083-7433"

Enclosed is the response to Question No. 03.09.04-15 of the RAI 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 letter. His contact information is provided below.

Sincerely,

Y. Ogata

Yoshiki Ogata,
Executive Vice President
Mitsubishi Nuclear Energy Systems, Inc.
On behalf of Mitsubishi Heavy Industries, Ltd.

Enclosure:

1. Response to Request for Additional Information No. 1083-7433

CC: P. Buckberg
J. Tapia

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NRO

Contact Information

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Enclosure 1

UAP-HF-14029
Docket No. 52-021

Response to Request for Additional Information
No. 1083-7433

March 2014

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

03/21/2014

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 1083-7433**
SRP SECTION:	**03.09.04 - CONTROL ROD DRIVE SYSTEMS**
APPLICATION SECTION:	**3.9.4**
DATE OF RAI ISSUE:	**2/27/2014**

QUESTION NO.: 03.09.04-15

In DCD Tier 2, Section 3.9.4.2.1 the operating temperature for the control rod drive mechanism (CRDM) pressure housing and internals parts is listed as 617F. However, during the February 3-5, 2014 design specification audit, the CRDM design specification listed the operating temperature as 550.6F. The staff requests the applicant to clarify the reason for this discrepancy and provide a DCD markup as applicable.

ANSWER:

The operating temperature of 617F for the CRDM pressure housing and internal parts in DCD Revision 4 Tier 2, Subsection 3.9.4.2.1 is intended to be the temperature up to which L-106A type CRDM is proven to perform its intended function based on the MHI's experience. On the other hand, the operating temperature of 550.6F in the CRDM design specification is the US-APWR service condition for the CRDM, and the CRDM should be designed to this operating temperature. Therefore, for clarity and consistency, the operating temperature in DCD Tier 2, Subsection 3.9.4.2.1 will be changed to the operating temperature of 550.6F as shown in Attachment-1.

Impact on DCD

The operating temperature of 617F in DCD Tier 2, Subection 3.9.4.2.1 will be changed to 550.6F. (Attachment-1)

Impact on R-COLA

There is no impact on the R-COLA.

Impact on PRA

There is no impact on the PRA.

Impact on Topical Report/ Technical Report

There is no impact on the Topical Report/ Technical Report.

movable gripper coil energized is a back-up to hold the drive rod if the stationary gripper coil current is interrupted by some single failure.

To trip the control rods, the current is cut off to both the movable gripper and stationary gripper coils. The movable gripper and stationary gripper latches are swung out from engagement with the drive rod by spring force in the latch mechanisms and gravity, and without support, the RCCA will insert, causing a “scram.”

3.9.4.1.5 Testing Program

The test program of the CRDM is described in Subsection 3.9.4.4.

3.9.4.2 Applicable CRDS Design Specifications

According to 10 CFR 50.55a (Reference 3.9-29) and GDC 1, 2, 4, 14, and 29 requirements, the CRDM is designed, fabricated, and tested in accordance with quality standards commensurate with the safety functions to be performed so as to assure an extremely high probability of accomplishing the safety functions in the event of AOOs, postulated accidents, and natural phenomena, such as earthquakes.

The CRDM materials are discussed in Subsection 4.5.1. The rod position indicator is discussed in Subsection 7.7.1.4.

3.9.4.2.1 CRDM Functional Requirements

The functional requirements of the CRDM are as follows:

- Step length: 0.625 inch per step
- Maximum speed: 72 steps per minute (45 inches per minute)
- Travel length: 165.472 inches (nominal full steps at cold condition)
- Design drive line load: 374.8 pounds
- Trip delay time: Less than or equal to 0.15 seconds

  This is the response time of the latch mechanism (i.e., between when the coil current is cut off and the rod drop begins).

- Design life: 60 years
- Rapid RCCA insertion: Coil current is cut off to initiate dropping the RCCA and the drive rod. The RCCA and the drive rod are inserted by gravity.
- Design temperature for pressure housing and internal parts: 650°F
- Operating temperature for pressure housing and internals parts: ~~617~~550.6°F MIC-04-03-00020
- Design pressure inside of pressure housing: 2,500 psia
- Operating pressure inside of pressure housing: 2,250 psia