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TOKYO, JAPAN

July 28, 2010

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-10221

Subject: MHI's Response to US-APWR DCD RAI No. 604

Reference: 1) "Request for Additional Information No. 604-4775 Revision 0, SRP Section: 03.09.04 – Control Rod Drive Systems, Application Section: 3.9.4," dated 6/25/2010

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. 604-4775, Revision 0"

Enclosed is the response to 1 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 provided below.

Sincerely,

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

Enclosures:

1. Response to Request for Additional Information No. 604-4775, Revision 0

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

Contact Information

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NRC

Docket No. 52-021
MHI Ref: UAP-HF-10221

Enclosure 1

UAP-HF-10221
Docket No. 52-021

Response to Request for Additional Information No. 604-4775,
Revision 0

July 2010

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

07/28/2010

**US-APWR Design Certification
Mitsubishi Heavy Industries
Docket No. 52-021**

RAI NO.: NO. 604-4775 REVISION 0
SRP SECTION: 03.09.04 - CONTROL ROD DRIVE SYSTEMS
APPLICATION SECTION: 3.9.4
DATE OF RAI ISSUE: 06/25/2010

QUESTION NO.: 03.09.04-7

This question is a follow-up to question 03.09.04-4, RAI 570-4428.

In its response, MHI stated.

"The stepping and the rod drop test are performed as post-refueling startup test. Additionally, the stepping test is also performed in plant operation periodically. Those frequency and criteria are specified in Subsections 14.2 referring to Chapter 16."

MHI also stated it would make the following change to the DCD.

Post-Refueling Startup Test

- The stepping and the rod drop tests are performed as in-service/post-refueling startup tests. The criteria of this test are applicable to all CRDMs as described in Subsection 14.2. In addition, the stepping test is also performed in plant operation periodically, and the frequency is specified in Chapter 16.

This intended DCD change is contrary to the response above. The change is fine if the word "in-service/" is removed from the first line. MHI need to remove this one word to the change acceptable.

Reference: MHI's Response to US-APWR DCD RAI No.570-4428; MHI Ref: UAP-HF-10140; dated May 19, 2010; ML101450199.

ANSWER:

The word "in - service/" will be removed from the first line.

Impact on DCD

DCD Revision 3 will incorporate the following changes:

Post-Refueling Startup Test

- The stepping and the rod drop tests are performed as ~~in-service/~~post-refueling startup tests.

The criteria of this test are applicable to all CRDMs as described in Subsection 14.2. In addition, the stepping test is also performed in plant operation periodically, and the frequency is specified in Chapter 16.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

07/28/2010

**US-APWR Design Certification
Mitsubishi Heavy Industries
Docket No. 52-021**

RAI NO.: NO. 604-4775 REVISION 0
SRP SECTION: 03.09.04 - CONTROL ROD DRIVE SYSTEMS
APPLICATION SECTION: 3.9.4
DATE OF RAI ISSUE: 06/25/2010

QUESTION NO.: 03.09.04-8

This question is a follow-up to question 03.09.04-6, RAI 570-4428.

In its response, MHI listed on-site checks and the prerequisites for the preoperational tests. The staff requests that these details be included in the next revision in the DCD.

Reference: MHI's Response to US-APWR DCD RAI No.570-4428; MHI Ref: UAP-HF-10140; dated May 19, 2010; ML101450199.

ANSWER:

Those details concerning the on-site checks and the prerequisites for the preoperational tests will be incorporated into the next revision of DCD.

Impact on DCD

DCD Revision 3 will incorporate the following changes:

- In Subsection 3.9.4.4, the following will be inserted before "Preoperational Test" which will be revised as "Initial Startup Test" in DCD Revision 3:

On-site checks

- Visual inspection of the CRDM Pressure Housings, which contain the Latch Assemblies, upon receipt at the site to confirm no physical damage has occurred to the Shipping Container or to the Pressure Housings.

Criteria: no harmful physical damage on the Shipping Container and the Pressure Housings

- The Coil Stack Assemblies are individually installed on the Latch Housing on site using time-tested written assembly procedures.

Criteria: installation in the right position

- Each Drive Rod is positioned and engaged with the associated RCCA following fuel loading using certified and proven installation procedures

Criteria: installation in the right position

- Subsection 14.2.12.1.10 will be revised as follows:

14.2.12.1.10 CRDM Motor-Generator Set Preoperational Test

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B. Prerequisites

1. Required construction testing is completed.
The construction testing includes installation inspection, generator and motor inspection, control panel inspection, and insulation resistance measurement.
2. Component testing and instrument calibration is completed.
This includes power incoming circuit inspection, excitation relays test, protection relays test, resistance measurement of relays, automatic voltage regulator test, timer relays test, automatic synchronization device test, and instruments test.
3. Test instrumentation is available and calibrated.

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- Subsection 14.2.12.1.11 will be revised as follows:

14.2.12.1.11 CRDM Initial Timing Preoperational Test

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B. Prerequisites

1. Required construction testing is completed.
The construction testing includes installation inspection and wiring continuity check.
2. Component testing and instrument calibration is completed.
This includes initial energization check of CRDM control system.
3. Test instrumentation is available and calibrated.

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Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

07/28/2010

**US-APWR Design Certification
Mitsubishi Heavy Industries
Docket No. 52-021**

RAI NO.: NO. 604-4775 REVISION 0
SRP SECTION: 03.09.04 - CONTROL ROD DRIVE SYSTEMS
APPLICATION SECTION: 3.9.4
DATE OF RAI ISSUE: 06/25/2010

QUESTION NO.: 03.09.04-9

This question is a follow-up to question 03.09.04-2, RAI 569-4433.

The staff does not find the applicant's response to be adequate.

In the applicant's response on page 2, "Since the Latch Assembly is supported by the CRDM pressure housing which is classified as seismic category I, the motion of the Latch Assembly is not jammed." The applicant is requested to clarify how the latch assembly cannot be jammed.

The applicant is also requested to provide a justification to explain why the latch mechanism does not need to be seismically qualified to comply with GDC 2, or to revise the seismic qualification for the safety functions of the Control Rod Drive System.

The applicant is also requested to clarify the deletions to be incorporated into DCD Revision 3 of the 2nd paragraph of Subsection 3.9.4.2.3.

~~Sticking and galling of the latch mechanism are safety-related.~~ The design, fabrication, inspection, and testing of the ~~safety-related~~ latch mechanism comes under the quality assurance requirement regarding safety components in 10 CFR 50.55a (Reference 3.9-29).

Reference: MHI's Response to US-APWR DCD RAI No.570-4428; MHI Ref: UAP-HF-10132; dated May 13, 2010; ML101380128.

ANSWER:

The integrity of the Latch Assembly was confirmed by the endurance test described in the Reference-1 of UAP-HF-08278. The Latch Assembly was continually operated in ten million steps during the test, and the motion of the Latch Assembly was not jammed. As far as we know through the gathering of trouble information, a jamming event of the type L-106A latch assembly does not occur around the world. However, a transitory behavior such as misstepping or slipping occurs at a fairly low rate of occurrence. Since the Latch Assembly is supported by the CRDM pressure housing which is classified as seismic category I, the seismic loads on the latch assembly are not significant. And, the release motion of the Latch Assembly is not jammed.

Additionally, several research programs for the control rod behavior during earthquakes had been carried out in Japan. One of those test results was already shown in the Attachment-1 of UAP-HF-09273, another test result was published in the Nuclear Engineering International, April 1990 issue.

Those test results show that the control rods were released into the core during earthquakes, and the release function of the Latch was maintained during earthquake.

The Latch Assembly is classified as non-safety component. The release function of the latch assembly by gravity is maintained during earthquake.

Therefore, the latch assembly does not need to be seismically qualified to comply with GDC 2.

Since the latch assembly does not categorize as "safety-related", the descriptions of "safety-related" were deleted.

Impact on DCD

DCD Revision 3 will incorporate the following changes:

- 2nd paragraph of Subsection 3.9.4.2.3 will be changed as follows:

The ASME Code requirements do not apply to non-pressurized components such as latch mechanism, the drive rod and the coil assembly. These non-pressurized components are classified as non-safety components. This is based upon having a gravity drop for coil mechanism or electric failure. If the coil assembly or electric device of the CRDM fails, the control rods are dropped/inserted into the core by gravity and reduce the reactivity. If the drive rod fails, the control rods drop into the core and reduce reactivity. ~~Sticking and galling of the latch mechanism are safety-related.~~ The design, fabrication, inspection, and testing of the ~~safety-related~~ latch mechanism comes under the quality assurance requirement regarding safety components in 10 CFR 50.55a (Reference 3.9-29).

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PR