MITSUBISHI HEAVY INDUSTRIES, LTD.
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TOKYO, JAPAN

May 20, 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-09254

Subject: MHI's Responses to US-APWR DCD RAI No. 323-2071

Reference: 1) "Request for Additional Information No. 323-2071 Revision 1, SRP Section: 03.05.01.03 – Turbine Missiles, Application section Tier 2 FSAR Section 3.5.1.3," dated April 08, 2009.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Responses to Request for Additional Information No. 323-2071 Revision 1"

Enclosed is the response to 3 RAIs 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,

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

Enclosure:

1. Responses to Request for Additional Information No. 323-2071 Revision 1

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

Contact Information
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Docket No. 52-021
MHI Ref: UAP-HF-09254

Enclosure 1

UAP-HF-09254
Docket Number 52-021

Responses to Request for Additional Information
No. 323-2071 Revision 1

May 2009

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

05/20/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 323-2071**
SRP SECTION:	**03.05.01.03- Turbine Missiles**
APPLICATION SECTION:	**Application Section: Tier 2 FSAR Section 3.5.1.3**
DATE OF RAI ISSUE:	**04/08/2009**

QUESTION NO.: 03.05.01.03-1, RAI 3.5.1.3-1

The US-APWR DCD, Revision 1, Tier 2, FSAR Section 3.5.4 and Table 1.8-2 provide COL information item COL 3.5(2), which states that the COL applicant will commit to actions to maintain P1 within acceptable limits as provided by turbine and rotor design features, material specifications and recommended inspections during preservice and inservice periods based on Mitsubishi Technical Report MUAP-07028, "Probability of Missile Generation from Low Pressure Turbines." However, the NRC staff notes that inservice testing of the overspeed protection system is also needed to prevent destructive overspeed conditions and maintain the turbine missile probability within acceptable limits as discussed in Mitsubishi Technical Report MUAP-07029, "Probabilistic Evaluation of Turbine Valve Test Frequency." Therefore, the COL information item should also include inservice testing based on Mitsubishi Technical Report MUAP-07029.

ANSWER:

COL information (COL 3.5(2)) in Section 3.5.4 will be revised with your request.

Impact on DCD

COL information (COL 3.5(2)) in Section 3.5.4 will be revised as follows.

COL 3.5(2) The COL Applicant is to commit to action to maintain P_1 within this acceptable limit as provided by turbine and rotor design features, material specifications and recommended inspections during preservice and inservice periods based on Technical Report, MUAP-07028~~070028~~-NP, Probability of Missile Generation From Low Pressure Turbines and Technical Report, MUAP-07029-NP, Probabilistic Evaluation of Turbine Valve Test Frequency.

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

05/20/2009

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

RAI NO.:	**NO. 323-2071**
SRP SECTION:	**03.05.01.03- Turbine Missiles**
APPLICATION SECTION:	**Application Section: Tier 2 FSAR Section 3.5.1.3**
DATE OF RAI ISSUE:	**04/08/2009**

QUESTION NO.: 03.05.01.03-2, RAI 3.5.1.3-2

In addition USAPWR DCD, Revision 1, Tier 2, FSAR Sections 3.5.4, 3.5.5, and Table 1.8-2 reference Mitsubishi Technical Report MUAP-070028, Revision 0, "Probability of Missile Generation from Low Pressure Turbines." The staff notes that the applicant submitted Mitsubishi Technical Report MUAP-07028, Revision 0. Confirm that Mitsubishi Technical Report MUAP-07028, Revision 0 is the correct report and correct the reference to this report in the applicable sections.

ANSWER:

As the correct number of Technical Report is MUAP-07028 Revision 0, the applicable sections in this report will be revised.

Impact on DCD

COL 3.5(2) in Section 3.5.4, 3.5-17 in section 3.5.5 and COL 3.5(2) in Table 1.8-2 will be revised as follows.

COL 3.5(2) The COL Applicant is to commit to action to maintain P_1 within this acceptable limit as provided by turbine and rotor design features, material specifications and recommended inspections during preservice and inservice periods based on Technical Report, MUAP-07028~~070028~~-NP, Probability of Missile Generation From Low Pressure Turbines and Technical Report, MUAP-07029-NP, Probabilistic Evaluation of Turbine Valve Test Frequency.

3.5-17 Probability of Missile Generation From Low Pressure Turbines, MUAP-07028~~070028~~-NP (R0), Mitsubishi Heavy Industries, Ltd., Tokyo, Japan, December 2007.

Table 1.8-2 Compilation of All Combined License Applicant Items
for Chapters 1-19 (Sheet 4 of 44)

COL ITEM NO.	COL ITEM
COL 3.5(2)	*The COL Applicant is to commit to actions to maintain P_1 within this acceptable limit as provided by turbine and rotor design features, material specifications and recommended inspections during preservice and inservice periods based on Technical Report, MUAP-07028~~070028~~-NP, Probability of Missile Generation From Low Pressure Turbines.*

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

05/20/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 323-2071**
SRP SECTION:	**03.05.01.03- Turbine Missiles**
APPLICATION SECTION:	**Application Section: Tier 2 FSAR Section 3.5.1.3**
DATE OF RAI ISSUE:	**04/08/2009**

QUESTION NO.: 03.05.01.03-3, RAI 3.5.1.3-3

Table 2.7.1.1-1 in US-APWR DCD, Revision 1, Tier 1, Section 2.7.1.1, provides an ITAAC (commitment 1) for the arrangement of the turbine generator. The acceptance criteria for this ITAAC states, "The as-built turbine generator conforms to the functional arrangement as described in Subsection 2.7.1.1.1." However, the NRC staff notes that FSAR Section 2.7.1.1.1 does not provide arrangement criteria, except that the orientation of turbine generator is such that high-energy missiles would be directed at approximately 90 degrees away from safety-related equipment. This is not completely consistent with RG 1.115 and FSAR Section 3.5.1.3.1 of US APWR DCD, Revision 1, Tier 1, which state the high energy, low-trajectory missile strike zone is the area bounded by lines inclined at 25 degrees to the turbine wheel planes and passing through the end wheels of the low pressure stages. Therefore, the staff requests that the ITAAC or FSAR Section 2.7.1.1.1 provides an accurate acceptance criteria, or reference criteria of the applicable Tier 2 FSAR Section or RG 1.115.

ANSWER:

Section 2.7.1.1.1 will be revised with your request.

Impact on DCD

Paragraph, "Key Design Features" in Section 2.7.1.1.1 will be revised as follows.

Key Design Features

The turbine is an 1800 rpm, tandem compound, six exhaust flow, reheat, unit. Two eternal moisture separator/reheaters (MS/R) with two stage of reheating are located on each side of the T/G centerline. The generator is direct-driven, three-phase, 60 Hz, four-pole synchronous generator with water-cooled stator and hydrogen-cooled rotor.

The turbine rotors, valves and control/protection system are designed to minimize the possibility of turbine missile generation less than 1.0E-5 per year. Orientation of the T/G is

such that a high-energy missile to be directed at an approximately 90 degree angle away from safety-related structure, systems, and components. On the top of this, any safety-related systems, structures and components are located outside the low-trajectory missile strike zones, which are defined by ±25-degree lines emanating from the centers of the first and last low-pressure turbines wheels as measured from the plane of the wheels. For the purpose to keep the probability equal or less than the above, turbine rotor integrity is provided by the integrated combination of rotor design, fracture toughness requirements, test, and inspections.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.