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TOKYO, JAPAN

August 30, 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-11282

Subject: MHI's Response to US-APWR DCD RAI No. 791-5864 Revision 3 (SRP 03.07.02)

Reference: 1) "Request for Additional Information No. 791-5864 Revision 3, SRP Section: 03.07.02 – Seismic System Analysis," dated 7/262011.

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. 791-5864, Revision 3."

Enclosed is the response to the RAI contained within Reference 1. This transmittal provides an interim response to this RAI.

During the US-APWR NRC Weekly DCD Chapter 3 conference call, August 22, 2011, the NRC noted that an RAI cannot be closed until the associated Technical Report revision is finalized.
The attached RAI response identifies that changes to Technical Report MUAP-11001 will be required. This Technical Report also requires revision to complete seismic task force activities. As such, MHI will submit a supplemental response to this RAI in October 2011 following submittal of the revised Technical Report.

In the future, MHI will provide proposed changes to Technical Reports in the same manner as proposed DCD changes. The inclusion of Technical Report markups will be considered in the determination of a 30, 45, or 90 day response.

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.

D081
NRO

Sincerely,

Y. Ogata

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

Enclosure:

1. Response to Request for Additional Information No. 791-5864, Revision 3

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

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Enclosure 1

UAP-HF-11282
Docket No. 52-021

Response to Request for Additional Information No. 791-5864,
Revision 3

August, 2011

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

8/30/2011

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 791-5864 REVISION 3**
SRP SECTION:	**03.07.02 – Seismic System Analysis**
APPLICATION SECTION:	**3.7.2**
DATE OF RAI ISSUE:	**7/26/2011**

QUESTION NO. RAI 03.07.02-85:

Clarification RAIs for MUAP-11001 (R0)

1. In Subsection 1.1 of MUAP-11001 (R0), "Description of the A/B," the 6th sentence states "Steel Girder beams are used to provide additional support to the part of the roof slab and the third floor slab." This sentence does not describe which part of the roof slab is supported by the steel girder beams, and what kind of support is used for the rest of the roof slab. The Applicant is requested to clarify this sentence.

2. In Subsection 2.4 of MUAP-11001 (R0), "Detailed FE Structural Model," the second paragraph (page 24) states, "The seismic design demands are obtained from a response spectrum analysis of the detailed FE model as described in Section 4.2 below. "The Section 4.2 is entitled "Results of Lumped Mass Stick Model SSI Analyses". The staff is not able to find any descriptions for the response spectrum analysis of the detailed FE model in Section 4.2 of the Report. The staff, however, finds the descriptions in Sections 5.2 and 5.3. The Applicant is requested to correct this apparent mistake.

3. In Subsection 3.3 of MUAP-11001 (R0), "Validation of Model Translation from ANSYS to SASSI," the paragraph (page 37) states, "Figure 3.3-1 and Figure 3.3-2 present the results of the validation SASSI analyses for acceleration transfer functions at selected locations. These figures show that the peak amplifications of the transfer functions occur at or close to the values of the dominant frequencies shown in Table 3.3-1 and Figure 3.2-1 and Figure 3.2-2, which indicates that the translation of the A/B dynamic FE model into SASSI format is accurate." The Applicant is requested to provide legends for the dots and solid curves shown in Figures 3.3-1 and 3.3-2 indicating which one represents the ANSYS results and which one represents the SASSI results. Also, there is no Table 3.3-1. It should be Table 3.2-1. The Applicant is requested to correct this mistake.

4. In Subsection 4.2.1 of MUAP-11001 (R0), "Maximum Forces and Moments," the first paragraph (page 42) states, "The combined maximum seismic response axial, NS and EW shear forces and the maximum torsional and bending moments about the NS and EW axes obtained from SRSS combinations of the maximum seismic responses

generated from the three individual directions (horizontal NS and EW and vertical) of seismic input for all eight generic site profile cases considered are shown in Figures 4.2-1 through 4.2-6." The labels for the vertical axis of Figures 4.2-1 through 4.2-6 are not legible. The Applicant is requested to make the labels legible. This request applies to all figures in Chapter 4.

5. In Subsection 5.1.2 of MUAP-11001 (R0), "Live Loads (L)," the second paragraph (page 58) states, "The roof is conservatively designed for uniform snow live load of 75 50 psf per Table 1 of the SDC (Reference 7.9)." It appears that '75 50 psf' in the sentence is a typo. The Applicant is requested to clarify the meaning and correct any mistake.

6. In Subsection 5.1.5 of MUAP-11001 (R0), "SSE Loads (E_{ss})," the second paragraph (page 59) states, in part, "Dynamic soil pressures are taken from Table 4-12 of MHI TR MUAP-10006 (Reference 7.2)." The staff is aware that the Applicant is preparing extensive revisions to TR MUAP-10006, and therefore the dynamic soil pressures may be significantly affected by these changes. The Applicant is requested to describe how these changes will be factored into the seismic stability evaluation of the A/B.

7. In Section 6.0 of MUAP-11001 (R0), "Conclusion," the second paragraph (page 79) states, "The detailed FE models used for static and RSA are described and validated as presented in Section 2.4." In Section 2.4, the Applicant refers to Section 4.2 for the detailed FE model. The staff did not find the description and validation of the detailed FE model used for RSA in Section 4.2 (see question number 2 above). The staff, however, finds the FEM model description in Section 2.3 and the validations in Sections 3.1, 3.2 and 3.3. The Applicant is requested to correct this mistake.

ANSWER:

1. The steel girders are located between Column Line 1A to 5A and Column Line AA to CA to support the roof slab. The remaining roof slab is supported by concrete girders, concrete columns and concrete walls.

   In Subsection 1.1, the sentence will be revised in revision 2 of MUAP-11001 to read as follows: "The steel girders are located between Column Line 1A to 5A and Column Line AA to CA to support the roof slab at Elevation 76.42' and the 3rd floor slab at Elevation 50.17'. The remaining roof slab is supported by concrete girders, concrete columns and concrete walls. "

2. The sentence in Subsection 2.4 will be revised in revision 2 of MUAP-11001 to correct the typographical error as follows: "The seismic design demands are obtained from a response spectrum analysis of the detailed FE model as described in Sections 5.2."

3. Figures 3.3-1 and 3.3-2 include a legend for the solid curves. A legend will be added in revision 2 of MUAP-11001 for the dots and the legend will identify which is ANSYS and which is SASSI. The correct table reference was fixed in MUAP-11001, Revision 1, submitted June 2011.

4. The labels for the vertical axis of Figures 4.2-1 through 4.2-6 will be revised in revision 2 of MUAP-11001 such that they are legible. A review of all of the labels in the figures in Chapter 4 will be done to ensure all labels are legible, as requested, and any changes for ease of legibility will be included in revision 2 of MUAP-11001.

5. The sentence in Subsection 5.1.2 will be revised in revision 2 of MUAP-11001 to correct the typographical error as follows: "The roof is conservatively designed for uniform snow live load of 75 psf per Table 1 of the SDC (Reference 7.9)."

6. The dynamic soil pressures cited in Subsection 5.1.5 are used for design of structural members such as basement exterior walls. The revised dynamic soil pressures contained in revision 2 of MUAP-10006 will be used as input to confirm the structural design of the A/B. The stability evaluations of the A/B follow the methodology documented in MUAP-11007 Revision 0, Section 4.3.2. The dynamic earth pressures are not explicitly included in the stability evaluations since the site-independent SSI analysis of the A/B are performed considering a surface mounted structure. The stability evaluations are performed using the nodal acceleration results of the site-specific SSI analyses and considering the dynamic equilibrium of the A/B at each time step of the input ground excitation. The effect of the embedment soil is considered as "at rest" static. Therefore, any revisions to the numerical values for dynamic soil pressures given in MUAP-10006 do not affect the stability evaluations.

7. This sentence in Subsection 6.0 will be revised in a future revision of MUAP-11001 as follows: "The detailed FE models used for static and RSA are described in Section 2.3 and validated in Section 3.1, 3.2 and 3.3"

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

As provided in this response, there is no impact on the Technical/Topical Report for item 6.

As provided in this response, there are only minor textual changes to the Technical Report for items 1, 2, 5, and 7 as given above. There is no need to provide a report mark-up to the NRC for these responses. A revision to the Technical Report is required to support the substance of this RAI response to items 3 and 4. A mark-up of the Technical Report will be provided to the NRC as supplementary information to these response items in conjunction with the issuance of MUAP-11001 Revision 2, which is scheduled for October 2011.