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**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

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05/31/2013

**US-APWR Design Certification**

**Mitsubishi Heavy Industries**

**Docket No. 52-021**

**RAI NO.:** NO. 909-6315 REVISION 3  
**SRP SECTION:** 03.07.02 - SEISMIC SYSTEM ANALYSIS  
**APPLICATION SECTION:** 3.7.2  
**DATE OF RAI ISSUE:** 03/05/2012

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**QUESTION NO.: 03.07.02-197**

In Section 5.4 of MUAP-11002(R1), "Structural Integrity Evaluation Methodology," the second paragraph (Page 42) states, "In addition, superstructure member end forces and moments are extracted from the SSI results. These forces and moments are used in lieu of the GT STRUDL calculated seismic forces and moments and substituted back into the controlling load combination for each member. A separate calculation is performed in order to determine the steel superstructure member stress ratios including the SSI results. These member stress ratios are also compared to the AISC N690-1994 (R2004) (Reference 6) allowable stress ratios to confirm the adequacy of the steel members."

The forces and moments obtained from ACS SASSI analyses may not be accurate due to the missing mass effect (see the 12th question of this RAI). The Applicant is requested to consider the missing mass effect in the evaluation of forces and moments, or to provide numerical data to show that the missing mass effect is negligible and conservative. Also, the staff is not able find any numerical results in MUAP-11002(R1) for the evaluation of the member stress ratios. The Applicant is requested to present those results.

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**ANSWER:**

This answer revises and replaces the previous MHI answer that was transmitted by letter UAP-HF-12124 dated June 5, 2012 (ML12158A478).

As discussed in the revised response to the 12<sup>th</sup> question of RAI 909-6315 (Question number 03.07.02-191) (transmitted by letter UAP-HF-13060 dated March 26, 2013), the missing mass issue does not apply to the SSI analysis because the ACS SASSI analyses are performed in the frequency domain not through the modal superposition time history analysis. The concerns regarding the contribution of high order modes with frequencies greater than the ACS SASSI cut-off frequency 50 Hz are justified based on review of the input motion. In the MUAP-11002 (Rev. 2) report, input motions are presented in terms of both the Fourier Amplitude and cumulative power in the frequency domain. As shown in MUAP-11002 (Rev. 2) Figures 4.2.1-1 to 4.2.1-18, nearly all the input motion's power (greater than 99.99 percent) is accounted for at the ACS SASSI analysis cut-off frequency of 50 Hz. The contribution of high order modes with frequencies greater than 50 Hz are negligible because there is almost no energy from input motion in those higher frequencies.

A structural integrity evaluation was performed as described in MUAP-11002 (Rev. 2), Section 5.0. Results of that evaluation show that all superstructure steel member stress ratios are less than or equal to 1.00. These member stress ratios are included in the calculation package available for audit as described in the DCD Seismic Closure Plan (UAP-HF-13034, dated February 15, 2013, (ML13050A601)).

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**Impact on DCD**

There is no impact on the DCD.

**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 a Technical/Topical Report.

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This completes MHI's response to the NRC's question.