
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

03/22/2013

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: NO. 766-5819 REVISION 3
SRP SECTION: 03.07.02 – Seismic System Analysis
APPLICATION SECTION: 3.7.2
DATE OF RAI ISSUE: 06/09/2011

QUESTION NO. RAI 03.07.02-42:

In MUAP-11002 (R0) Subsection 6.3, "Modal Analysis," the first paragraph (page 20) states, "Software and hardware constraints limited the maximum frequencies that could be analyzed using GT STRUDL. For the combined T/B and Electrical Room fine mesh model, the modal analyses could be performed up to a frequency of 21 Hz."

Also, in subsection 6.4, "Mode-Superposition Transient Dynamic Analysis," the fourth paragraph (page 22) states, "The results for the models with a cut-off frequency of 21 Hz do not match with the models with a cut-off frequency of 50 Hz at higher frequencies, because contributions greater than 21 Hz are not represented in the models with a cut-off frequency of 21 Hz."

The staff noticed that 21 Hz is much less than the zero period acceleration (ZPA) frequency of 50 Hz. In Figure 6-9, the cumulative dynamic mass participation for the fine and coarse models does not exceed more than 55%, therefore, the fine or the coarse mesh models are not adequate to capture the dynamic properties of the structure. The SRP Acceptance Criteria 1.A.iv(1) of SRP 3.7.2 states, "all modes with frequencies less than the ZPA (or PGA [peak ground acceleration]) frequency of the corresponding spectrum are adequately represented in the dynamic solution." The coarse mesh model used in ACS SASSI analyses was derived from the fine mesh model. Since the modal analyses for the fine mesh model could be performed up to 21 Hz, the ability for the coarse mesh model to capture all modes less than the ZPA frequency (50 Hz) is therefore questionable. The Applicant is requested to provide data to demonstrate that the seismic models (fine and coarse mesh) meet the SRP 3.7.2 Acceptance Criteria.

ANSWER:

This answer revises and replaces the previous MHI answer that was transmitted by letter UAP-HF-11393, dated November 16, 2011 (ML11326A130).

The validation models were reanalyzed using ANSYS to achieve the zero period acceleration (ZPA) frequency of at least 50 Hz per the SRP Acceptance Criteria. Results from these models, including revised cumulative mass participation plots, are provided in Subsections 3.1.2 and 3.1.3 of Technical Report MUAP-11002 Rev. 2.

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

There is no impact on a Technical/Topical Report.

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