
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

1/31/2013

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

RAI NO.: NO. 660-5134 REVISION 2
SRP SECTION: 03.07.02 – Seismic System Analysis
APPLICATION SECTION: 3.7.2
DATE OF RAI ISSUE: 11/15/10

QUESTION NO. RAI 03.07.02-37 (03.07.02-64):

This request for additional information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR Part 50, Appendix A, General Design Criteria 2; 10 CFR Part 50 Appendix S; and 10 CFR Part 100; as well as the guidance in NUREG-0800, 'Standard Review Plan for the Review of Safety Analysis for Nuclear Power Plants,' Chapter 3.7.2, "Seismic System Analysis."

Appendix H of MHI's Topical Report, MUAP-10006 (R0) provides bubble plots of the maximum accelerations in the PS/Bs. However, the report does not describe how the bubble plots were created, what assumptions were made, or how the plots will be used. Because the bubble plots appear to represent the loads to which the PS/Bs will be designed, the staff is requesting that the applicant provide the following information to better evaluate the appropriateness of the design loads:

1. A detailed description of how the bubble plots were created and what contributions are included in the resulting accelerations. Include a step-by-step example of how the bubble plots were created and will be used in the design.
 2. Discuss whether the number of points in the bubble plots matches the number and location of nodes in the PS/B structural models. If the numbers and locations do not match, provide an explanation as to how bubble plot accelerations were determined at points where nodes do not exist in the structural model and also how nodal accelerations from the structural model may have been combined to create accelerations in the bubble plots.
 3. Discuss if and how the accelerations in the bubble plots account for multi-modal behavior in the PS/Bs.
 4. Provide the basis for not constructing and providing bubble plots for R/B and what effect it has on the design of the R/B complex.
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ANSWER:

This answer revises and replaces the previous MHI answer that was transmitted by letter UAP-HF-10355 (ML110040071).

The reactor building (R/B) and power source buildings (PS/Bs) are no longer separate buildings but now are structurally integrated with the auxiliary building (A/B) to form the R/B complex supported on a common basemat.

Instead of bubble plots, Technical Report MUAP-10006, Rev. 3 has maximum acceleration contour plots. The contour plots serve as a replacement for the bubble plot function, which was to envelope the absolute maximum acceleration (also known as zero period acceleration, or zero period accelerations (ZPA)) results obtained from the site-independent soil-structure (SSI) analyses of the R/B complex dynamic finite element (FE) model.

1. The description of how the contour plots were created is presented in Sections 03.3.7 and 03.4.3 of Technical Report MUAP-10006. Figures 03.4.3-13 through 03.4.3-15 of Technical Report MUAP-10006 present example contour plots of the enveloped ZPA values at the R/B ground floor elevation.
2. The contour plots are generated using the ANSYS post processing module and reflect locations of the dynamic FE model nodes.
3. The accelerations of the R/B complex SASSI dynamic FE model account for multi-modal behavior as described for frequencies and amplified transfer functions in Sections 03.3.3.2, 03.3.3.5, and 03.3.5 of Technical Report MUAP-10006 including Appendix 3-C.
4. As described in Section 03.3.7 of MUAP-10006, contour plots of the R/B complex, which now includes the east and west PS/Bs are created instead of bubble plots.

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.