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## RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

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1/31/2013

### US-APWR Design Certification

### Mitsubishi Heavy Industries

Docket No. 52-021

**RAI NO.:** NO. 776-5851 REVISION 3  
**SRP SECTION:** 03.07.02 – Seismic Systems Analysis  
**APPLICATION SECTION:** 3.7.2  
**DATE OF RAI ISSUE:** 06/15/11

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#### QUESTION NO. RAI 03.07.02-80:

In Subsection 5.2.3 of MUAP-11001 (R0), "Combined Modal Responses: Lindley-Yow Method," the paragraph (page 63) states, "The periodic response portion of the Lindley-Yow method is implemented by using ANSYS "Grouping Method" and the rigid response portion is implemented by using "Static ZPA Method" per Regulatory Position 1.4.2 of RG 1.92, Rev. 2. The directional effect from each direction is combined by 100-40-40 method."

The staff noticed that so far the Applicant has not reported the use of the Lindley-Yow method for combining modal responses in the DCD (Rev. 3) and in seismic analyses reports of various category I structures and the Turbine building. The applicant is requested to discuss the unique circumstances and aspects of the A/B seismic analyses that require the use of Lindley-Yow method for combining modal responses. In RG. 1.92, one limitation on the use of Lindley-Yow's method is specified, "The Lindley-Yow's method should not be used for SSCs that have natural frequencies less than the frequency of the lowest-frequency spectral acceleration peak."

Thus, the applicant is requested to discuss the effect of the Lindley-Yow's method limitation on the seismic analyses responses. The Applicant is also requested to discuss how the periodic response component is combined with the rigid response portion and provide the technical basis and justification for the combination used.

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#### ANSWER:

This answer revises and replaces the previous MHI answer that was transmitted by letter UAP-HF-11281 (ML11243A163).

Technical Report MUAP-11001 has been superseded and the relevant information incorporated into Technical Report MUAP-10006, Rev. 3. The reactor building (R/B), prestressed concrete containment vessel (PCCV), containment internal structure (CIS), east and west power source buildings (PS/Bs), auxiliary building (A/B), and essential service water pipe chase (ESWPC) are now structurally integrated and supported on a common basemat to form the R/B complex. Technical Report MUAP-10006, Rev. 3 presents the information relevant to the added A/B and PS/Bs as well as the other buildings that make up the R/B complex.

The seismic evaluations of the A/B discussed in MUAP-11001 included structural integrity evaluations that were based on loads from static and response spectrum analyses for the

purposes of design load generation in the components of the A/B. The response spectrum analyses of the A/B documented in Technical Report MUAP-11001 utilized the Lindley-Yow method for modal response combination. However, the evaluations discussed in Technical Report MUAP-10006, Rev. 3, no longer utilize response spectrum analyses. Section 03.3.7 of Technical Report MUAP-10006, Rev. 3, discusses the computation of quasi-static seismic loads that are based directly on the soil-structure interaction (SSI) analysis results. These loads are used in the structural integrity evaluations of the R/B complex, including the A/B, that are part of the standard plant structural design calculations. The above question is therefore no longer applicable to the SSI analyses of the A/B.

**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.

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