RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

03/29/2013

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 858-6126 REVISION 3**
SRP SECTION:	**03.08.03 – Concrete and Steel Internal Structures of Steel or Concrete Containments**
APPLICATION SECTION:	**3.8.3**
DATE OF RAI ISSUE:	**10/25/2011**

QUESTION NO. 03.08.03-50:

Section 3.2 of MHI TR MUAP-11013-P (R1), which corresponds to Task 1-B Seismic Analysis for Structural Design, indicates that the results from Task 1-A will be used in this task to perform equivalent static and/or dynamic response spectrum analysis (RSA) of the CIS to determine the member forces in the various components (walls and slabs) of the CIS for use in design. Provide a description of the two methods of analyses (equivalent static and RSA) which may be used for the CIS. This should include a description of the models, input loading, analysis procedures, assumptions, and discuss any alternative approaches from the guidance presented in SRP 3.7.2, 3.8.3, and Regulatory Guides 1.61 and 1.92. For example, if an equivalent static analysis approach is used, explain whether the approach is consistent with the criteria presented in SRP Section 3.7.2.II.1.B – Equivalent Static Method, and if any differences exist discuss the basis for the alternative methods

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ANSWER:

This answer revises and replaces the previous MHI answer that was transmitted by letter UAP- HF-12051 (ML12075A108).

The seismic analysis for obtaining forces and moments to be used to design the containment internal structure (CIS) walls and slabs will consist of response spectrum analysis (RSA). RSA will be performed on both the Condition ‘A’ model and the Condition ‘B’ model. The results will be used in the associated load combinations as explained in the response to RAI 858-6126, Question 03.08.03-49.

The RSA methodology used for the CIS design directly follows the guidance of Regulatory Guide 1.92 Revision 2. More specifically, we are separating the in-phase and out-of-phase responses by the Lindley-Yow method, combining the out-of-phase modal responses by the complete quadratic combination method, and performing the static zero period accelerations (ZPA) method to obtain the in-phase response. The complete solution for each direction is obtained using RG 1.92 combination method ‘B’. The combined response due to the three earthquake spatial components is obtained by SRSS combination of the three components.

Importantly, it is necessary to verify the RSA results adequately envelope those obtained by the SSI analysis, in order to ensure the magnitude of the lateral inertia forces encompass any additional effects due to rigid body torsion or rocking. This verification will be performed by comparing the RSA-generated lateral shears and peak accelerations at various levels in the structure with those obtained from the SSI analysis. In the event that the RSA results do not envelope those of the SSI analysis, the RSA results will be sufficiently factored in the design load combinations.

The detailed procedures and results described above will be included in the calculation report associated with Task 1B described in MUAP-11013, 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 the Technical/Topical Report.

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