

# REQUEST FOR ADDITIONAL INFORMATION 868-6156 REVISION 3

11/14/2011

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 03.07.02 - Seismic System Analysis

Application Section: 3.7.2

QUESTIONS for Structural Engineering Branch 1 (AP1000/EPR Projects) (SEB1)

03.07.02-178

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."

In RAI 660-5134, Rev. 2, Question 3.7.2-54, the staff asked the applicant to describe the criteria used for selecting the lower boundaries of the SSI models per the soil profiles shown in Tables 3-3A through 3-3H of MHI's Technical Report, MUAP-10006 (R0). The applicant responded by stating that the placement of the lower boundaries of the SSI models was selected such that the depth was more than twice the base dimension of the structure and thus was consistent with the guidelines of SRP 3.7.2. Per the guidelines of SRP 3.7.2, the selection of the model depth should be verified by parametric studies. In order to safely evaluate the adequacy of the SSI model, the staff requests that the applicant provide a parametric study for the selection of the lower boundaries of the SSI models.

03.07.02-179

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."

Per SRP 3.7.2 Acceptance Criteria 1.A.iii, rocking and torsion should be considered in dynamic analysis. In Subsection 3.7.3.1 of the DCD (R3), the applicant states that the time-history seismic analysis of a subsystem can be performed by simultaneously applying the displacements and rotations at the interface point(s) between the subsystem and the system. It is also stated that the time history or response spectra generated at the support point of the subsystem are utilized as the input motion for performing the seismic dynamic analysis of the subsystem. However, where modal response spectra methods are discussed in Subsection 3.7.3, there is no indication that rotational information is contained in the response spectra. The applicant is requested to explain how rotational information is contained in the ISRS. The response should explain how the ISRS at the support point of a subsystem account for the building

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rocking effects when analyzing subsystems. The response should address how the rocking effects of the structure are characterized at the reference location of the structure (the point at which ISRS are generated) and also at the support point of the substructure. The response should include the situation in which the relative motion between the reference location and subsystem input location is significant.