RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

1/31/2013

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 856-6094 REVISION 3**
SRP SECTION:	**03.07.02 – Seismic System Analysis**
APPLICATION SECTION:	**3.7.2**
DATE OF RAI ISSUE:	**10/24/11**

QUESTION NO. RAI 03.07.02-166:

In Subsection 3.1 of MUAP-11011 (R0), "SSSI Analyses Methodology," the first paragraph (Page 5) states, "The main focus of the analyses is to assess the effect of SSSI on the in-structure response spectra (ISRS) used for the design of Seismic Category I and II systems and components located in the West PS/B. For that purpose, the SSSI analyses will use the same dynamic finite element (FE) model of PS/B as that used for generating the seismic responses from the site-independent SSI analyses of the standalone PS/B that serve as the basis for development of the standard plant design input. To develop the combined SSSI model in a manageable size, the lumped mass stick (LMS) models of the R/B Complex and A/B are coupled through soil with the PS/B dynamic FE model, to represent the global dynamic properties of the adjacent buildings. The development and calibration of LMS models against the dynamic FE models for R/B Complex and A/B to be used for these SSSI analyses are documented in MUAP-11006 (Reference 3) and MUAP-11001 (Reference 4) respectively."

The first sentence in the above quoted sentences states that the ISRS will be used to assess the effect of SSSI; however, in the NRC public meeting for US-APWR DCD Chapter 3 held on 3/31/2011, the applicant acknowledged that LMS models of R/B and CIS have a limited ability to capture high frequency responses. Therefore, the calculated ISRS will potentially miss the high frequency responses and, therefore, are not appropriate to assess the SSSI effect. The applicant is requested to provide technical rationale to show that the effect of SSSI is negligible in the high frequency range. Otherwise, the applicant is requested to explain how the models will be modified to assure that they capture these higher frequencies.

ANSWER:

Technical Report MUAP-11011, Rev. 0, and Technical Report MUAP-11001, Rev. 1 have been superseded and the relevant information on the structure-soil-structure interaction (SSSI) analysis methodology has been incorporated into Technical Report MUAP-10006, Rev. 3. Technical Report MUAP-11006, Rev. 0 has been withdrawn.

The reactor building (R/B) complex consists of the 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) combined into a single

dynamic model supported on a common basemat, represented by a finite element (FE) model instead of the lumped mass stick models. (A lumped mass stick model is used for the reactor coolant loop). A SSSI analysis of the influence of the turbine building (T/B) on the R/B complex was performed as described in Sections 03.2.2, 03.3.3, and 03.3.4.2 of Technical Report MUAP-10006, Rev. 3. The SSSI analysis used FE models of both the R/B complex and the T/B complex, and was performed for four of the six soil cases. The SSSI analysis produced some instances where the results were higher than the soil-structure interaction (SSI) results. As such, the design basis envelop for the US-APWR includes the structure-soil-structure interaction results as appropriate to capture the structure-soil-structure interaction effects in the high frequency range.

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 Technical/Topical Report

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