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 03.07.02-33 (03.07.02-60):

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 MHI’s Topical Report, MUAP-10006 (R0), It appears from the relatively high values of Poisson’s ratios in Tables 3-3A through 3-3G of MUAP-10006 (R0) that the soil profiles selected for the analyses represent saturated soils. To better understand the analysis presented in the tables, the staff request that the applicant describe the assumptions regarding ground water level that were used in developing the soil profiles used in the SSI analysis. Discuss the sensitivity studies performed to address the effect of variability of the ground water table (i.e., dry versus saturated soil) on the SSI analysis results. Also, the applicant should describe how the variability in pore water and the variability of ground water level with time affect the seismic response of the structures per SRP Section 3.7.2.I.4.

ANSWER:

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

The standard design of US-APWR plant considers the water table elevation to be located 1 ft below the nominal plant grade elevation. For the development of the generic soil profiles used for site-independent soil-structure interaction (SSI) analyses of Technical Report MUAP-10006, Rev. 3, the elevation of the water table is considered to be at the plant grade. Technical Report MUAP-10006, Rev. 3, Section 01.4.2.1 provides justification for the use of plant grade elevation instead of the design groundwater level at 1 ft below the plant grade.

Technical Report MUAP-11007, Rev. 2, provides a sensitivity study of the effect of water table on the US-APWR standard design. The study includes a comparison of seismic responses obtained from unsaturated soil profiles with the responses obtained from the design-basis saturated soil profiles. MUAP-11007 concludes that the effects of groundwater level on the seismic design basis response for the R/B complex are minor and that the use of saturated soil profiles will result in a standard plant design that envelops the seismic demands at a majority of candidate sites within the CEUS.

With regard to pore water, as discussed in Section 2.2 of Technical Report MUAP-11007, Rev. 2, the site response and SSI analyses implement a single phase continuum approach in which the mass of the groundwater is lumped with the mass of the soil skeleton, and the responses of the groundwater and the soil skeleton are considered to be completely in phase.

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.