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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. 212-1950 REVISION 1  
**SRP SECTION:** 03.07.02 – Seismic System Analysis  
**APPLICATION SECTION:** 3.7.2  
**DATE OF RAI ISSUE:** 02/25/09

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#### QUESTION NO. RAI 03.07.02-01 (03.07.02-21):

In Tier 1 Table 2.1-1 and Tier 2 Table 2.0-1 of the DCD, it specifies maximum ground water level is 1ft below plant grade; however the SSI analysis discussed in section 3.7.2.4 is based on four soil profiles that are all linear elastic half-space uniform dry materials (no layer and water table considered). Provide justification for not considering soil layering and location of water table in the SSI analysis.

Also, clarify the last paragraph in Section 3.7.2.4 of the DCD. What model is used for SSI analysis that takes into account the site-specific conditions? What does the lumped parameter model consists of - a stick model of a building on layered soil media, or a stick model that uses lumped impedance parameters for the soil? If it is the former, how are the damping characteristics of the layered media compared to impedance function values?

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#### ANSWER:

This answer revises and replaces the previous MHI answer that was transmitted by letter UAP-HF-09113 (ML090930727).

The seismic category I reactor building (R/B) complex, which includes 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) is supported on a combined basemat and is dynamically analyzed with a finite element (FE) model using ACS SASSI.

As stated in the RAI question, maximum ground water level is 1 ft below plant grade as specified in Tier 1 Table 2.1-1 and Tier 2 Table 2.0-1 of the DCD. The seismic methodology has been updated. The design basis soil-structure interaction (SSI) analysis is performed with SASSI and is now based on an embedded dynamic FE model instead of the previous lumped parameter stick model. Soil layering media is now included in the standard plant design basis SSI analyses by considering generic layered soil profiles as described in Technical Report MUAP-10006, Rev. 3, Sections 01.1.0, 01.3.2, 01.4.2.1, and 01.5.2 with the water table of the soil-structure interaction (SSI) analyses set at the ground surface to envelope the 1 foot below grade maximum ground water level. The effects of lower water table levels are documented in the study presented in Technical Report MUAP-11007, Rev. 2.

Subsection 3.7.2.4 of the DCD has been revised to clarify the ACS SASSI FE model is used for SSI

analyses.

**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.