

---

---

**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

---

---

1/31/2013

**US-APWR Design Certification  
Mitsubishi Heavy Industries  
Docket No. 52-021**

**RAI NO.:** NO. 854-6088 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 03.07.02-153:**

(a) Section 3.1 in MUAP 11007 (R0) indicates that the seismic input ground motions are input at the elevation of the bottom of the foundation, presumably as in-column motions. Section 3.3 indicates that these motions are obtained from MUAP-10001(R3) and are the enveloping motions compatible with the CSDRS. In MUAP-10001(R3), however, the definition of the CSDRS at the bottom of foundation or at the ground surface or plant grade is equivalent because surface-mounted conditions are assumed. This is not the case for the MUAP-11007(R0) analyses because embedded conditions are assumed. Therefore, the applicant is requested to confirm consistency between the assumption in MUAP-11007(R0) and the assumption used in the MUAP-10001(R3) SSI analyses.

(b) Section 4.1.3 in MUAP 11007 (R0) indicates that the input motions will be developed using both the BNL and NEI methods outlined in DC/COL-ISG-017. In Section 4.1.3, the development of these in-column motions are based on probabilistic site response evaluations, using multiple realizations of the site profiles. These approaches are not compatible with the deterministic SSI evaluations used in SSI analyses, where only a single profile for a given generic site is defined. Therefore, the applicant is requested to clearly define the input motions used in the MUAP-11007(R0) calculations.

---

**ANSWER:**

Technical Report MUAP-10001, Rev. 3 has been superseded by Technical Report MUAP-10006, Rev. 3.

- (a) The groundwater study in Technical Report MUAP-11007, Rev. 2 uses the same model, methodology, and input location for evaluation of the unsaturated conditions as described in Technical Report MUAP-10006, Rev. 3 for the evaluation of saturated conditions as discussed in Section 2.5 of Technical Report MUAP-11007, Rev. 2. In both reports, the input motions are applied at the base of the reactor building complex as an in-column motion.
- (b) As discussed in Technical Report MUAP-11007 Section 2.5, the methodology to develop input motions in MUAP-11007 is same methodology described in Section 01.4.2 of

Technical Report MUAP-10006. The input motions described in Section 01.4.2 of Technical Report MUAP-10006 are BNL & NEI methodology-based but are deterministic inputs for the SSI analyses. The profiles are selected based on review of database information representative of the Central Eastern United States. The BNL and NEI methods are appropriate for the study of generic profiles because each of the generic profiles is considered as a particular site profile. The randomization of each individual profile selected is a probabilistic site response approach. The randomization of the profiles (below the basemat) for the standard plant employs random vibration theory. Many site response calculations are performed and the Best Estimate properties are determined from the mean of the resulting properties. Six soil profiles are considered, resulting in a wider range than the +/- one sigma values suggested for Upper Bound and Lower Bound profiles for a single site. Therefore, these methods are appropriate.

**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.

---

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