
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

03/29/2013

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: NO. 855-6090 REVISION 3
SRP SECTION: 03.08.05 – Foundations
APPLICATION SECTION: 3.8.5
DATE OF RAI ISSUE: 10/24/2011

QUESTION NO. 03.08.05-43:

a) Section 4.3.2 in MUAP 11007 (R0) indicates that the coefficient of friction between the basemat and supporting media will be taken as 0.7 for the sliding stability and overturning evaluations. The staff's previous experience has shown that a coefficient of friction value of 0.7 is difficult to achieve at all interfaces between the basemat and the supporting media. Therefore, the applicant is requested to provide a detailed technical basis for assuming a coefficient of friction of 0.7 for standard design.

(b) Section 4.3.2 in MUAP 11007 (R0) does not indicate what lateral pressures will be used to design the below grade walls. Only at-rest pressures are mentioned, which are not appropriate. The staff notes that the DCD (Revision 3), page 3.8-65, indicates that dynamic lateral earth pressures are calculated in accordance with ASCE 4-98 (Wood's methodology); however, the pressures obtained using the Wood's methodology can be substantially different from those obtained from an embedded SSI analysis. The effect of soil-water-structure interaction on the calculation of the lateral force and the overturning moment for the below grade walls could be significant and should be considered. Therefore, the applicant is requested to explain how the lateral pressure on the below grade walls is calculated considering the soil-water-structure interaction effects, and how it is applied in design of the below-grade walls.

ANSWER:

- a) As discussed in Section 4.4 of Technical Report MUAP-12002, Rev. 1, a static coefficient of friction, $\mu_s = 0.7$, at the concrete-subgrade interface is selected based on the results of a large number of laboratory and in-situ tests reported in the literature that were performed on subgrade materials similar to those corresponding to the Standard Plant. A reduced friction coefficient, $\mu_k = 0.50$, is used in the sliding stability analysis.
- b) The reactor building (R/B) complex is a fully embedded structure. The pressure distribution profiles on below-grade exterior walls are developed following the requirements of Standard Review Plan (SRP) 3.8.4 Acceptance Criterion II.4.H. A detailed description of lateral pressure development for designing the below grade

walls of the reactor building (R/B) complex, including the effects of groundwater level, is presented in the response to RAI 212-1950, Question 3.7.2-13.

Lateral earth pressure on the South side of the R/B complex may be affected by relative sliding between the R/B complex and the turbine building (T/B), which is addressed in the Technical Report MUAP-12002, Rev. 1. The pressure on the wall induced by relative sliding will be determined in the basic design of the R/B complex. The envelope of pressures from sliding and of lateral earth pressures presented in the response to RAI 212-1950, Question 3.7.2-13 is used for the design of the exterior below grade walls on the South side of the R/B complex.

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.