
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. 03.08.05-44:

Section 4.3.3 of MUAP-11007(R0) describes the procedure to calculate soil-bearing pressure and makes reference to a "large footing." This reference implies that the simple Terzaghi bearing capacity relation may be used, which is only appropriate for static load conditions. The applicant is requested to describe its methodology for determining the dynamic bearing capacity of the foundation soil under seismic Category I structures, including consideration that two sides of the R/B complex are adjoined by the PS/B, Aux Bldg, and Turbine Bldg.

ANSWER:

This response supplements the response to RAI 643-4967, Question 03.07.01-12. The minimum allowable bearing capacities in the Design Control Document (DCD) are designated based on the computed bearing pressures, calculated in conjunction with soil-structure interaction (SSI) analyses of standard plant structures.

Calculation of bearing capacities for purposes of confirmation that the standard plant design is suitable for a particular site is performed by the Combined License (COL) Applicant on a site-specific basis as required by COL Item 3.7(7).

The response to RAI 94-1491, Question 02.05.04-01, presents a methodology to calculate maximum bearing pressure demands for both static and dynamic cases. The methodology does not describe the procedure for computing bearing capacity but a procedure for computing only bearing pressures. The referral to a "large footing" is not meant to imply that the simple Terzaghi bearing capacity relation may be used. When calculating the ultimate bearing capacity at a specific site, the COL Applicant must use relations that are adequate for the type of subgrade and for the type of loading (i.e., static or dynamic). These relations will be subjected to approval by U.S. Nuclear Regulatory Commission (NRC). The requirement to determine the dynamic bearing capacity of the foundation soil under seismic Category I structures is described in Section 3.7.1.3 of the DCD.

The procedure for calculating seismic bearing capacity is decided by the COL Applicants as specified in COL Item 3.7(7).

The reactor building (R/B) complex structures are now placed on a common mat. Similarly, the turbine building (T/B) structures are placed on a common mat. The two large adjacent structures that may affect each other's bearing capacity are the R/B complex and the T/B. Presence of adjacent structures has a beneficial effect on ultimate bearing capacity since, in general, they increase to the lateral overburden pressures and therefore increase the surcharge factor (related to N_g) contribution in the bearing capacity equation. Therefore, considering isolated structures in bearing capacity analysis is conservative.

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.