RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

08/01/2013

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 1044-7140 REVISION 3**
SRP SECTION:	**03.08.04 – Other Seismic Category I Structures**
APPLICATION SECTION:	**3.8.4**
DATE OF RAI ISSUE:	**07/08/2013**

QUESTION NO. 03.08.04-57:

On April 3, 2013, the applicant submitted a markup of DCD Tier 2 Section 3.8 to provide updated information related to a seismic design change.

In Subsection 3.8.4.4.1.1, "Structural Design of Structural Elements," the description for "Section 4" (Page 3.8-76) states, "South exterior wall of R/B [reactor building], elevation 3 ft, 7 in. to elevation 115 ft, 6 in. This exterior wall is subjected to typical loads such as temperature gradients, seismic, hydrodynamic pressure, tornado missile, and hurricane missile."

The staff notices that the hydrostatic pressure is not included in the loads listed in the above quoted paragraph. The applicant is requested to include the hydrostatic pressure in the load combinations for the design, or provide a rationale for not including the hydrostatic pressure.

ANSWER:

Hydrostatic pressure was included in the load combinations for the design. The hydrostatic effects were included for the effects of the water contained in the chambers of the reactor building (R/B) complex and are considered in the analysis for the hydrostatic loading on the walls.

Impact on DCD

Subsection 3.8.4.4.1.1 of the Design Control Document (DCD) will be revised to include the hydrostatic pressure in the load combinations. See Attachment 1 for the DCD markup.

Impact on R-COLA

There is no impact on the R-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.

The 2032-100, 900-100, and 900-200 soil profiles for the uncracked model demonstrated that in combination they were the governing ARS compared to the remaining three soil profiles with the uncracked model and all soil profiles with the cracked model. In addition to the ARS comparison, the equivalent static load (ESL) calculated from the SSI time history analysis results are compared to select the two governing soil profiles for the Step-2 RSA as shown in Figure 3.8.4-28. MIC-03-03-00060

This confirmed the 2032-100 and 900-100 soil profiles were governing.

Validation of Response Spectrum Analyses for the R/B Complex

In order to validate the seismic force transfer from the SSI analysis results using a dynamic FE model to the more refined FE model for structural member design, the equivalent static load (ESL) calculated from the SSI analysis results was compared to the story shear and the vertical force (member design force) determined from the RSA results at each elevation. For appropriate validation, the story shear and the vertical force from the RSA must be greater than or approximately equal to the ESLs from SSI analyses.

3.8.4.4.1.1 Structural Design of ~~Critical Sections~~~~Structural Elements~~Critical Sections

MIC-03-03-00057
MIC-03-03-00060

This subsection summarizes the structural design of representative seismic category I structural elements in the R/B. These structural elements are listed below and the corresponding location numbers are shown on Figure 3.8.4-3.

SECTION 1 — West ~~exterior wall of R/B~~common wall between R/B and A/B, elevation ~~3~~26 ft, ~~7~~4 in. to elevation 101 ft, 0 in. ~~This exterior wall illustrates typical loads such as temperature gradients, seismic, and tornado missile, and hurricane missile.~~This wall illustrates a common wall resisting seismic loads carried by both buildings. MIC-03-03-00057 MIC-03-03-00060 DCD_02-03 S01

SECTION 2 — South interior wall of R/B, elevation ~~3~~26 ft, ~~7~~4 in. to elevation 101 ft, 0 in. ~~This is one of the most highly stressed shear walls.~~ MIC-03-03-00060 MIC-03-03-00057

SECTION 3 — The north exterior wall of spent fuel pit, elevation 30 ft, 1 in. to elevation 76 ft, 5 in. ~~and the slab of spent fuel pit at elevation 30 ft, 1 in.~~ The wall is subjected to temperature gradients, seismic, hydrostatic and hydrodynamic loads. MIC-03-03-00060 MIC-03-03-00057

AREA 3 — The slab of spent fuel pit at elevation 30 ft, 1 in. The slab is subjected to temperature gradients, seismic, hydrostatic and hydrodynamic loads. MIC-03-03-00057

SECTION 4 — South exterior wall of R/B, elevation ~~3~~26 ft, ~~7~~4 in. to elevation 115 ft, 6 in. This exterior wall is subjected to typical loads such as temperature gradients, seismic, hydrostatic and hydrodynamic ~~pressure~~loads, ~~and~~ tornado missile, and hurricane missile. MIC-03-03-00060 DCD_03.08.04-57 DCD_02-03 S01

AREA 4 — The slab of emergency feedwater pit at elevation 76 ft, 5 in. The slab is a unique area encompassing the water storage pit. The slab is subjected to hydrostatic, hydrodynamic, and seismic loads. MIC-03-03-00057