RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

03/29/2013

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 657-5135 REVISION 2**
SRP SECTION:	**03.08.05 – Foundations**
APPLICATION SECTION:	**3.8.5**
DATE OF RAI ISSUE:	**11/15/2010**

QUESTION NO. 03.08.05-40:

In the response to Part 1 of Question 03.08.05-31, MHI provides a technical rationale for choosing 1/3 of the estimated maximum settlement for the differential settlement. The staff reviewed this response and considers the answer to be acceptable. However, the staff notices that in US-APWR DCD Revision 2 Table 2.0-1, Key Site Parameters, the last row specifies that the maximum tilt of R/B complex foundation generated during operational life of the plant is limited to1/2000. Given the size of the R/B foundation, B_{equiv}, as 240ft, 1/2000 of 240ft is 1.44 in. However, 1/3 of the maximum settlement specified is 2 in. which is larger than 1.44 in. MHI is requested to clarify this discrepancy. In the response to Part c of the question, MHI states that the stresses generated by the 2 in. differential settlement are not critical for the design of the mat. The staff accepts this answer; however, in the response, MHI did not address the effects of the 2 in. on the super structure and supported equipment. For example, the p-Δ effect on the structural members and the possibility of pounding between structures and supported equipment should be considered. MHI is requested to provide information that indicates these effects have been included in the study.

ANSWER:

This answer revises and replaces the previous MHI answer that was transmitted by letter UAP-HF-10351 (ML110040127).

1) Settlements and differential settlements have been re-calculated for the new layout of the Standard Plant structures, with common mat. The new results will be listed in the Design Control Document (DCD), Tier 2, Table 2.0-1, and Tier 1, Table 2.1-1 and are also listed in the answer to RAI 340-2004, Question 03.08.05-13. Regarding the discrepancy between values of differential settlement and tilt, the specified 5.5 in. differential settlement is related with the overall structural integrity of the building and includes the differential settlement of the building generated during construction and operation of the plant. The 1/2000 tilt limitation is defined based on the demands for safe operation of nuclear steam supply system components and includes the post construction differential settlements generated during the operation of the plant.

2) The gap between the basemats of the reactor building (R/B) complex and the turbine building (T/B) is chosen to provide ample space to ensure that the buildings do not pound each other due to tilting, considering all applicable loads, including seismic. With regard to supported equipment, story-to-story differential displacement is insignificant with respect to typical equipment installation clearances, and therefore typical clearances are sufficient to prevent pounding between equipment and walls.

3) In addition the *P-*δ effect of the lateral deflection due to tilting of the structure (maximum of 1.14 in.) for the columns in the R/B complex was considered in the verification of the columns and found to be of no consequence. The 1/2000 out of plumb for columns is within the acceptable limits. The *P-*δ effect on the walls is even less severe and does not control nor has any effect on the design of the walls.

For further definition and details on calculation for differential settlements and tilt, refer to the response to RAI 855-6090, Question 03.08.05-42.

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.