


MITSUBISHI HEAVY INDUSTRIES, LTD.
16-5, KONAN 2-CHOME, MINATO-KU
TOKYO, JAPAN

December 07, 2011

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Attention: Mr. Jeffery A. Ciocco

Docket No. 52-021
MHI Ref: UAP-HF-11421

Subject: 2nd MHI's Response to US-APWR DCD RAI No. 798-5876 Revision 3 (SRP 03.07.01)

Reference: 1) "Request for Additional Information No. 798-5876 Revision 3, SRP Section: 03.07.01 – Seismic Design Parameters," dated 8/5/2011.
2) "MHI's Responses to US-APWR DCD RAI No. 798-5876 Revision 3 (SRP 03.07.01)," UAP-HF-11296, dated 09/07/2011.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "2nd Response to Request for Additional Information No. 798-5876, Revision 3."

Enclosed is the response to RAI 03.07.01-17 contained within Reference 1. The enclosed response is in addition to 3 RAI responses previously provided in Reference 2.

Please contact Dr. C. Keith Paulson, Senior Technical Manager, Mitsubishi Nuclear Energy Systems, Inc. if the NRC has questions concerning any aspect of this submittal. His contact information is provided below.

Sincerely,

Y. Ogata

Yoshiki Ogata,
General Manager- APWR Promoting Department
Mitsubishi Heavy Industries, LTD.

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MHO

Enclosure:

1. 2nd Response to Request for Additional Information No. 798-5876, Revision 3

CC: J. A. Ciocco
C. K. Paulson

Contact Information

C. Keith Paulson, Senior Technical Manager
Mitsubishi Nuclear Energy Systems, Inc.
300 Oxford Drive, Suite 301
Monroeville, PA 15146
E-mail: ck_paulson@mnes-us.com
Telephone: (412) 373-6466

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Enclosure 1

UAP-HF-11421
Docket No. 52-021

2nd Response to Request for Additional Information No. 798-5876,
Revision 3

December, 2011

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

12/07/2011

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

RAI NO.: NO. 798-5876 REVISION 3
SRP SECTION: 03.07.01 – Seismic Design Parameters
APPLICATION SECTION: 3.7.1
DATE OF RAI ISSUE: 8/5/2011

QUESTION NO. RAI 03.07.01-17:

In Subsection 3.7.1.3 of DCD (R3), "Supporting Media for Seismic Category I Structures", the last sentence of the fourth paragraph (page 3.7-11) states, "Note that for purposes of development of compression wave velocities, the profiles are analyzed in the saturated condition."

The Applicant should describe the sensitivity studies performed to address the effect of variability of the ground water table (i.e., dry versus saturated soil) on the SSI analysis results. Also, the applicant should describe how the variability in pore water and the variability of ground water level with time affect the seismic response of the structures per SRP Section 3.7.2.1.4.

ANSWER:

The NRC Staff requested similar information in RAI 660-5134, Revision 2, Question 03.07.02-60. MHI's response to Question 03.07.02-60 (ML110040071) addressed the NRC's areas of concern including the effect of variability of the pore water and the groundwater table on the SSI analysis results.

The groundwater table elevation sensitivity evaluations utilize the latest SSI results. The results of these evaluations are documented in Technical Report MUAP-11007 (Revision 1) with data provided in Appendix B. This report provides supplemental sensitivity evaluation results to support the MHI response to RAI 660-5134 Question No. 03.07.02-60. Section 4.2.3 of Technical Report MUAP-11007 (Revision 1) discusses the variability in pore water.

As discussed in Part 1 of the response to RAI 657-5135 Question 03.08.05-39 (ML110040127), use of saturated unit weight for the soils provides the most conservative case for including the effects of ground pore water in the calculations of the dynamic earth pressures because it considers that the response of the two phases of the system, the groundwater and the soil, to be completely in-phase and does not consider the dissipation of energy due to the viscous flow of the pore water. The total dynamic lateral pressure is based on the total unit weights for the saturated soil and assumes that the water table is at plant grade elevation.

The response to RAI 660-5134, Revision 2, Question 03.07.02-60 concluded that the comparison of ARS results obtained considering dry and submerged soil conditions indicates that the presence of water within the top 40 ft below the nominal plant grade has a small influence on the SSI response of the building, where the subgrade below 40 ft is saturated. Section 6.2 of Technical Report MUAP-11007 (Revision 1) states, "The results for transfer functions and 5% damped ARS indicate that the lower water table elevation can slightly lower the peak frequencies and amplify the magnitude of the peak responses. The frequency shifts and the peak response amplifications are small and do not have a significant impact on the standard seismic design. The uncertainty introduced in the standard design by the effects of ground water fluctuations on the seismic response are small and within the general level of variation present in the seismic response analyses. As such, it is deemed unnecessary to directly address in the standard design the effect that the water table fluctuations can have on the seismic response." This is reasonable considering the requirement of COLA Action Item 3.7(8), which requires the COL Applicant to evaluate the strain-dependent variation of the material dynamic properties for site materials.

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 responses to the NRC's questions.