


MITSUBISHI HEAVY INDUSTRIES, LTD.
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TOKYO, JAPAN

March 30, 2010

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-10086

Subject: MHI's Responses to US-APWR DCD RAI No. 542-4262

Reference: 1) "Request for Additional Information No. 542-4262 Revision 2, SRP Section: 03.07.02 - Seismic System Analysis," dated 3/02/2010.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Responses to Request for Additional Information No. 542-4262, Revision 2."

Enclosed are the responses to 3 RAIs contained within Reference 1. This transmittal completes the response to this RAI.

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,



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

Enclosure:

1. Response to Request for Additional Information No. 542-4262, Revision 2

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

Contact Information

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Docket No. 52-021
MHI Ref: UAP-HF-10086

Enclosure 1

UAP-HF-10086
Docket No. 52-021

Response to Request for Additional Information No. 542-4262,
Revision 2

March, 2010

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

3/30/2010

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: NO. 542-4262 REVISION 2
SRP SECTION: 03.07.02 – Seismic System Analysis
APPLICATION SECTION: 3.7.2
DATE OF RAI ISSUE: 3/2/2010

QUESTION NO. RAI 03.07.02-33:

In Section 3.7.2.3.1, "General Discussion of Analytical Models," of Rev 1 of the DCD it is stated that the NASTRAN finite element models are used for validation of the dynamic lumped mass stick models. The response to RAI 3.7.2-19 showed a comparison of ISRS between the NASTRAN and ANSYS models of the reactor building and containment internal structure. The response also stated that further results and details of the NASTRAN and ANSYS FE models will be provided in Rev 2 of the DCD. However, all mention of the NASTRAN models has been omitted from Section 3.7.2.3.1 of Rev 2 of the DCD.

Provide an updated response to RAI 3.7.2-19 that explains the role of the NASTRAN models, if any. Describe the validation procedure for the lumped mass stick models, and update the description of how the various finite element models that were developed for validation of the lumped mass stick models meet the guidelines of SRP Sections 3.7.2.II.3.C.ii and iii.

ANSWER:

The updated response to RAI 3.7.2-19 is that NASTRAN models are no longer used in the analysis and design of the standard plant. The static (structural) analysis of the R/B complex utilizes a detailed ANSYS finite element (FE) model.

The dynamic (seismic) analysis of the R/B complex utilizes an enhanced model for the R/B complex consisting of ANSYS stick models set on an ANSYS FE shell model of the R/B basement. The enhanced R/B complex model is analyzed dynamically in SASSI using generic soil profiles. The enhanced dynamic analysis and modeling approach are described in MHI Technical Report, MUAP-10001(R0), "Seismic Design Bases of the US-APWR Standard Plant". The report will be updated at a later date and used as the basis for a later revision to the DCD.

The validation procedure for the R/B complex in Section 3.7.2.3.10 of the DCD, and how the validation meets the guidelines of SRP 3.7.2.II.C.ii and iii, will be described in more detail in a subsequent technical report, which will also be used to update the DCD discussion of lumped mass stick model validation.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

3/30/2010

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

RAI NO.: NO. 542-4262 REVISION 2
SRP SECTION: 03.07.02 – Seismic System Analysis
APPLICATION SECTION: 3.7.2
DATE OF RAI ISSUE: 3/2/2010

QUESTION NO. RAI 03.07.02-34:

In Section 3.7.5, "Combined License Information," of Revision 2 of the DCD, the applicant's action item COL 3.7 (11) has been deleted. The original action item from DCD Rev 1 stated that, "It is the responsibility of the COL Applicant to confirm the masses and frequencies of the PCCV polar crane and fuel handling crane and to determine if coupled site-specific analyses are required." Provide the basis for deleting this action item from Rev 2 of the DCD. Also, provide the criteria that are used to model the PCCV polar crane and fuel handling crane in the seismic model of the reactor building and containment internal structures. What criteria will be used to determine if coupled site-specific analyses are required and who will be responsible for making such a determination?

ANSWER:

The cranes are required to be designed to ASME NOG-1 (and other applicable codes) as discussed in DCD Subsection 9.1.5. The determination of whether coupled analyses of the polar crane and fuel handling crane are required will be in accordance with ASME NOG-1 requirements. Since the cranes are vendor supplied by the COLA Applicant and are not designed at the time of DCD issue, it will be the responsibility of the COLA Applicant to determine whether coupled site-specific analyses are required. The coupling requirements that are applicable to the cranes are provided in Subsection 3.7.2.3.4, and require that the crane coupling criteria be addressed as part of the site-specific analysis of the R/B, which is covered collectively by COL Applicant items including but not limited to COL Items 3.7(4), 3.7(23), and 3.7(25).

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

3/30/2010

US-APWR Design Certification

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Docket No. 52-021

RAI NO.: NO. 542-4262 REVISION 2
SRP SECTION: 03.07.02 – Seismic System Analysis
APPLICATION SECTION: 3.7.2
DATE OF RAI ISSUE: 3/2/2010

QUESTION NO. RAI 03.07.02-35:

In the response to RAIs 3.7.2-3, 3.7.2-17, and 3.7.2-10, demonstration of sufficient resolution in the various finite element models and comparison and validation of lumped mass stick models with distributed mass finite element models was deferred until Rev 2 of the DCD. However, this information has not been provided in Rev 2 of the DCD. In order to close out several open RAIs, the requests that the applicant provide this information.

ANSWER:

The PS/B modeling approach has been enhanced such that lumped mass stick models are not used for the dynamic analysis. The PS/B dynamic finite element model and its validation are discussed in MHI Technical Report, MUAP-10001(R0).

With respect to Questions 3.7.2-3, 3.7.2-17, and 3.7.2-19 as they relate to the R/B complex, the validation of the enhanced R/B complex lumped mass stick models, which are presented in MHI Technical Report, MUAP-10001(R0), will be addressed in a subsequent technical report as described in the question above. The DCD will be revised at a later date based on the validation documented in the technical report.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

This completes MHI's responses to the NRC's questions.