



**MITSUBISHI HEAVY INDUSTRIES, LTD.**

16-5, KONAN 2-CHOME, MINATO-KU  
TOKYO, JAPAN

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

Attention: Mr. Jeffrey A. Ciocco

Docket No. 52-021  
MHI Ref: UAP-HF-11290

**Subject: Updated Completion Plan for US-APWR Seismic and Structural Analyses**

- Reference:**
- (1) Letter (ML11136A235) from Y. Ogata (MHI) to U.S. NRC, "Revised Completion Plan for US-APWR Seismic and Structural Analyses" dated May 12, 2011
  - (2) File (ML111080683), Summary of the March 31, 2011, Public Meeting with Mitsubishi Heavy Industries, Ltd., Discuss Its Proposal to the Seismic Analysis and Containment Design, Design Control Document, Section 3.7 and Section 3.8 as Part of the United States – Advanced Pressurized Water Reactor Nuclear Power Plant Combined License Application
  - (3) Letter (MHI Ref: UAP-HF-11211) from Y. Ogata (MHI) to U.S. NRC, "Submittal Plan of Supplemental Technical Reports for the US-APWR Containment Internal Structure (CIS)" dated July 8, 2011
  - (4) Letter (MHI Ref: UAP-HF-11279) from Y. Ogata (MHI) to U.S. NRC, "Technical Report MUAP-10023 "Initial Type Test Result of Class 1E Gas Turbine Generator System" Revision 2" dated August 31, 2011

At the public meeting for US-APWR DCD Sections 3.7 and 3.8 on March 31, 2011 (Reference 2), the seismic task team formed by Mitsubishi Heavy Industries, Ltd. (MHI) and the US-APWR Design Center Working Group (DCWG) members, Dominion and Luminant, presented twelve topics related to remaining NRC staff questions and RAIs of analytical methodologies and results associated with DCD Sections 3.7 and 3.8, including related technical reports. The overall schedule for submittal of impacted technical reports for the US-APWR DCD Sections 3.7 and 3.8 was summarized in Reference 1. MHI recognizes that the documents for submittal and audit identified in Attachments 1 and 2 occur late in the staff's Phase 2 review. The dates proposed have focused on providing methodology documents early, with the results later for confirmation.

DOB/1120

Preliminary SSI analysis results using conservative inputs have identified certain assumptions that require refinement. As a result, efforts are ongoing to examine and modify the following inputs that will be incorporated into the final analyses:

- Removal of soil profile 560-100, which was identified to be a unique profile not suitable to the assessment for the US-APWR Standard Design, and modification of soil profiles 270-200, 270-500, 560-200, 900-100, and 900-200. The modification of soil profiles will remediate the shear wave velocity decrease with depth.
- An adjustment to time history seeds to better reflect CSDRS seismicity
- Adjustment to the layout of standard plant structures to improve stability and ensure the integrity of Category I Structures

The above changes have no impact on the current methodologies submitted, but will impact the design inputs to be used in the seismic and structural evaluations. These modifications should have limited effect on current submittal schedule provided in Reference 1. Technical report MUAP-10001 will be updated in October 2011 for modified inputs, and the results of the final seismic analyses will still be provided in revisions to technical reports in October 2011. In addition, revisions to technical reports MUAP-11001 and MUAP-11002 containing the results of stability assessments for the Auxiliary Building and Turbine Building, respectively, plan to be submitted in October 2011 opposed to the previously committed schedule of September 2011.

MHI is still evaluating the above modifications and impact on schedule. MHI plans to discuss the details of the modifications and associated impacts on the submitted materials with the NRC at the next meeting that is currently planned at the end of September, 2011.

This letter therefore updates the progress of the completion plan provided in Attachment 1 of Reference 1. Changes to the attached table have been identified by revision bar in the right-hand margin. Attachment 1 includes additional technical reports which have been referred in Reference 3 for Containment Internal Structure (CIS) related and Reference 4 for Gas Turbine Generator. The submitted materials under on-going evaluation are identified with an asterisk (\*) in Attachment 1. Attachment 1, 2 and 3 of Reference 1 will be finalized by the end of September 2011.

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

Sincerely,

A handwritten signature in black ink, appearing to read "Y. Ogata". The signature is written in a cursive style with a large initial "Y" and a long horizontal stroke extending to the right.

Yoshiki Ogata,

General Manager – APWR Promoting Department  
Mitsubishi Heavy Industries, LTD.

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

Contact Information

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Attachment 1 - Submittal Dates of Technical Reports

Doc. #	Title	Current Contents	Updates and Future Contents	Date to NRC
MUAP-10001	Seismic Design Bases of the US-APWR Standard Plant	Rev. 2: - Description of Model for R/B (LMSM) and PS/B (FE model) - Validation of Model for R/B (LMSM) and PS/B (FE model) - Methodology of Concrete Cracking Effects	Rev. 3: - Description of Model for R/B (updated to FE model) and PS/B (update for design changes and stiffness) - Validation of Model for R/B (updated to FE model) and PS/B (update to reflect minor design changes) - Update Methodology of Concrete Cracking Effects (including stiffness reduction, damping values) - Update reference to SASSI to clarify that version 2.3.0 includes module updates through Nov 2009	June 2011 Completed (UAP-HF-11179)
			Rev. 4 - Update development of soil profiles and strain compatible properties - Update time history methodology - Update description of structures and layout	Oct 2011
MUAP-10006	Soil-Structure Interaction Analyses and Results for the US-APWR Standard Plant	Rev. 1: - Results of SSI Analysis for R/B (LMSM) and PS/B (FE model)	Rev. 2: - Results of SSI Analysis for R/B (updated to FE model) and PS/B (updated design and stiffness) based on the updated MUAP-10001 - Update reference to SASSI to clarify that version 2.3.0 includes module updates through Nov 2009 - Update to reflect gap assessment - Update to reflect results of SSSI analysis report MUAP-11011 if required - Update to include appendix containing parametric study of soil profile for compliance with SRP 3.7.2 - Update to include missing soil properties observed by NRC staff	Oct 2011*
MUAP-11001	A/B Model Properties, SSI Analyses, and Structural	Rev. 0: - Description of Model for A/B (FE model) - Results of SSI for A/B	Rev. 1: - Description of Model for A/B (unchanged) - Methodology of Stability and relative displacement for A/B (previously excluded)	June 2011 Completed (UAP-HF-11182)

	Integrity Evaluation		Rev. 2: - Results of SSI for A/B relative displacement (change for reduced stiffness) - Results of Stability of A/B (previously excluded) - Update to reflect gap assessment	-Sep Oct 2011*
MUAP-11002	T/B Model Properties, SSI Analyses, and Structural Integrity Evaluation	Rev. 0: - Description of Model for T/B (FE model) - Results of SSI for T/B	Rev. 1 - Update the methodology for T/B to be compatible with the methodology used in A/B - Results of SSI for T/B with the T/B to be consistent with DCD Rev. 3 and based on the updated MUAP-10001 - Update to reflect gap assessment - Update to reflect RAIs 766-5819 (03.07.02) and 767-5821 (03.08.04)	-Sep Oct 2011*
MUAP-11006	Validation of LMSM for R/B Complex	N/A	Rev. 0: - Description of Model for R/B (LMSM) – used only for sliding stability and sensitivity studies - Validation of Model for R/B (LMSM)	June 2011 Completed (UAP-HF-11196)
MUAP-11007	Results of Evaluation using LMSM for R/B Complex	N/A	Rev. 0: - Methodology of Sliding Stability - Methodology of Sensitivity Study on Water Table Effect - Methodology on Sensitivity Study on Embedment Effect	June 2011 Completed (UAP-HF-11196)
			Rev. 1: - Results of Sensitivity Study on Water Table Effect - Results of Sensitivity Study on Embedment Effect - Results of Sliding Stability	Oct 2011
MUAP-11011	Effects of Structure-Soil-Structure Interaction (SSSI) on Standard Seismic Design of US-APWR Plant	N/A	Rev. 0: - Methodology of SSSI Analysis	June 2011 Completed (UAP-HF-11196)
			Rev. 1: - Results of SSSI Analysis based on the updated MUAP-10001	Oct 2011*

MUAP-11013	Design Criteria for SC Modules		Rev. 0: <ul style="list-style-type: none"> <li>- Design Criteria for SC modules</li> <li>- Methodology for SC modules</li> </ul>	June 2011 Completed (UAP-HF-11196)
			Rev. 1: <ul style="list-style-type: none"> <li>- Further clarify design approach for the CIS (ACI 349 methodology)</li> </ul>	August, 2011 Completed (UAP-HF-11265)
MUAP-08002	PS/B Enhanced Information for PS/B Design	Rev. 0: <ul style="list-style-type: none"> <li>- Provide results of the lumped mass stick model analysis of east and west PS/Bs</li> </ul>	Rev. 1: <ul style="list-style-type: none"> <li>- Superseded by MUAP-10001 and MUAP-10006</li> </ul>	N/A
MUAP-08005	Dynamic Analysis of the Coupled RCL-R/B-PCCV-CIS Lumped Mass Stick Model	Rev. 0: <ul style="list-style-type: none"> <li>- Provide dynamic seismic analysis of the coupled system including the RCL, R/B, PCCV, and CIS.</li> <li>- Frequencies and mode shapes of dominant modes</li> <li>- Acceleration and displacement responses of structures</li> <li>- Forces and moments in selected building structures</li> <li>- ISRS</li> </ul>	Rev. 1: <ul style="list-style-type: none"> <li>- Superseded by MUAP-10001 and MUAP-10006</li> </ul>	N/A
MUAP-11018	CIS: Stiffness and Damping for Analysis	N/A	Rev. 0: [Task 1-A] <ul style="list-style-type: none"> <li>- Applied stiffness and damping for each part of CIS</li> </ul>	Mid- August 2011 Completed (UAP-HF-11256)
MUAP-11019	CIS: SC Wall Design Criteria (For In-Plane and Out-of-Plane Behavior)	N/A	Rev. 0: [Task 2-A] <ul style="list-style-type: none"> <li>- Design criteria for in-plane behavior</li> <li>- Design criteria for out-of-plane behavior</li> <li>- Design criteria for interaction equation</li> <li>- Scope and description of additional testing, if needed</li> </ul>	First half of Sept 2011

MUAP-11020	CIS: Anchorage, Connection, and Section Design and Detailing	N/A	Rev. 0: [Task 2-C, 2-D (excluding design adequacy check)] - Design criteria for anchorage - Design criteria for connections - Design criteria for section design and detailing - Scope and description of additional testing, if needed	End of Sept 2011
MUAP-08012	Sump Strainer Stress Report	Rev. 1: - Stress Results based on SSI Analysis for R/B (LMSM)	Rev. 2: - Stress Results based on SSI Analysis for R/B (FEM)	Feb 2012*
MUAP-07033	Mechanical Analysis for US- APWR New and Spent Fuel Racks	Rev. 1: - Stress Results based on SSI Analysis for R/B (LMSM)	Rev. 2: - Stress Results based on SSI Analysis for R/B (FEM)	Feb 2012*
MUAP-08007	Evaluation Results of US- APWR Fuel System Structural Response to Seismic and LOCA Loads	Rev. 2: - Stress Results based on SSI Analysis for R/B (LMSM)	Rev. 3: - Stress Results based on SSI Analysis for R/B (FEM)	Apr 2012*
MUAP-10023	Initial Type Test Result of Class 1E Gas Turbine Generator System	Rev. 2: - GTG seismic test results based on the bounding seismic input.	Rev. 3: - Re-evaluation of the test results based on SSI Analysis for PS/B. - Stress Results of the other components (e.g., the Generator and Air Receiver Assembly) based on SSI Analysis for PS/B.	TBD*

\*: Due to the updated seismic conditions, those reports are under evaluation. The planned dates will be finalized by the end of September, 2011.