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June 24, 2013

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-13150

**Subject: Transmittal of Technical Report "US-APWR Sump Strainer Stress Report,"
MUAP-08012, Revision 2**

With this letter, Mitsubishi Heavy Industries, Ltd. (MHI) transmits to the U.S. Nuclear Regulatory Commission (NRC) revision 2 of the technical report "US-APWR Sump Strainer Stress Report." This document is being submitted electronically on CD.

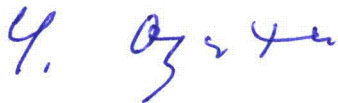
Additionally, this technical report revision resulted in the following changes to the DCD.

- Update the technical report revision number and issue date (Tier 2 Table 1.6-2 and Section 6.2.9)
- Correct report number and DCD section number (Tier 2 Table 1.6-2)
- Correct ASME code year to be consistent with the revised technical report (Tier 2 Sections 6.2.2.3.14 and 6.2.9)

This letter includes the DCD markups as discussed above (Enclosure 1) and a copy of the non-proprietary version of the report on CD 1 (Enclosure 2).

Please contact Mr. Joseph Tapia, General Manager of Licensing Department, 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,
Executive Vice President
Mitsubishi Nuclear Energy Systems, Inc.
On behalf of Mitsubishi Heavy Industries, LTD.

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Enclosures:

1. DCD Markups associated with MUAP-08012-NP Revision 2
2. CD 1: "US-APWR Sump Strainer Stress Report," MUAP-08012-NP, Revision 2
– Version not containing Proprietary information

The files contained in each CD are listed in Attachment 1 hereto.

CC: J. A. Ciocco
J. Tapia

Contact Information

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Enclosure 1

UAP-HF-13150
Docket No. 52-021

DCD Markups Associated with MUAP-08012-NP Revision 2

June 2013

1. INTRODUCTION AND GENERAL
DESCRIPTION OF THE PLANT

US-APWR Design Control Document

Table 1.6-2 Material Referenced as Technical Reports (Sheet 2 of 6)

Report Number ⁽¹⁾	Title	DCD Section Number ⁽²⁾
MUAP-07029-P MUAP-07029-NP	Probabilistic Evaluation of Turbine Valve Test Frequency, Revision 2, January 2011.	3.5.1, 10.2.3
MUAP-07030	US-APWR Probabilistic Risk Assessment, Revision 3, June 2011.	6.2.5, 7.1.3, 7.5.1, 17.4.7, 18.6.3, 19.0, 19.1.4, 19.2.3 16 (B3.3.1), 16 (B3.3.2), 16 (B3.3.5) 19B
MUAP-07031-P MUAP-07031-NP	Subcompartment Analysis for US-APWR Design Confirmation, Revision 1, October 2009.	6.2.1
MUAP-07032-P MUAP-07032-NP	Criticality Analysis for US-APWR New and Spent Fuel Storage Racks, Revision 1, December, 2009.	9.1.1
MUAP-07033-P MUAP-07033-NP	Mechanical Analysis for US-APWR New and Spent Fuel Racks, Revision 0, March, 2009.	9.1.2
MUAP-07035	Structural Analysis for US-APWR Reactor Coolant Pump Motor Flywheel, Revision 0, December 2007.	5.4.1
MUAP-07036	Justification for Deviations Between NUREG-1431 Revision 3.1 and US-APWR Technical Specifications, Revision 2, November 2009.	16
MUAP-08001-P MUAP-08001-NP	US-APWR Sump Strainer Performance, Revision 5, August 2011	5.2.3, 6.2.2, 6.3.2
MUAP-08002	Enhanced Information for PS/B Design, Revision 1, January 2011.	3.7.2
MUAP-08007-P MUAP-08007-NP	Evaluation Results of US-APWR Fuel System Structural Response to Seismic and LOCA Loads, Revision 2, December 2010.	4.2.3
MUAP-08009	US-APWR Test Program Description, Revision 1, October 2009.	14.2.1, 14.2.2, 14.2.3, 14.2.4, 14.2.5, 14.2.6, 14.2.13, 14.3.4
MUAP-08011-P MUAP-08011-NP	US-APWR Sump Debris Chemical Effects Test Results, Revision 0, November 2008.	6.2.2
MUAP-08012-P MUAP-08012-NP	US-APWR Sump Strainer Stress Report, Revision 1, March 2011 , June 2013.	3.9.2.2
MUAP-08013-P MUAP-08013-NP	US-APWR Sump Strainer Downstream Effects, Revision 2, August 2011.	6.2.2, 6.3.2
MUAP-08014-P MUAP-08014-NP	Human System Interface Verification and Validation (Phase 1a), Revision 1, May 2011.	1.5.2, 18.1.1, 18.1.5, 18.2.3
MUAP-08015	US-APWR Equipment Qualification Program, Revision 1, November 2009.	3.11, 3.11.4, 3.11.5, 3.11.6, 3.11.7, 3D.1.7, 7.1.3, 7.5.1
MUAP-09001-P MUAP-09001-NP	Summary of Design Transient, Revision 0, January 2009.	3.9.1
MUAP-09002-P MUAP-09002-NP	Summary of Seismic and Accident Load Conditions for Primary Components and Piping, Revision 2, December 2010.	3.7.2, 3.8.5, 3.9.2, 3.9.3
MUAP-09004-P MUAP-09004-NP	Summary of Stress Analysis Results for Core Support Structures, Revision 1, January 2011.	3.9.3, 3.9.4

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Analysis of the strainer assembly was performed by using elastic methods for the defined loads. The structural qualification of the strainer assembly was performed using a combination of manual calculations and finite element analyses. The allowable stresses are primarily based on the ASME Code (Ref. 6.2-50) and are supplemented, as required, for stresses induced by special components or loading conditions. The strainer assemblies are non-ASME equipment because they are non-pressure retaining components. The strainers are provided to prevent debris from entering the ECCS and CSS systems. Therefore, the strainer assemblies are defined as Equipment Class 2, seismic category I.

MIC-03-06-00071

Equipment Class 2 components are analyzed in accordance with the ASME Code, Section III, Class 2 rules. Therefore, the detailed strainer evaluations were performed using the rules of the ASME Boiler and Pressure Vessel Code, Class 2 Components, as presented in ASME Section III, Division 1, Subsection NC. The structural support components were evaluated as component supports per Subsection NF-3350. Load combinations are developed based on Table 3.9-3 and 3.9-4 for ASME Section III, Class 2 component, and are utilized for stress analysis of the strainer assembly. The Strainer Stress Report (Ref. 6.2-49) concluded that all components of a sump strainer are in compliance with the requirements of the ASME Code, 2004~~7~~ edition, up to and including the 2003~~8~~ Addenda (Ref. 6.2-50).

DCD_06.02.02-55

MIC-03-06-00071

MIC-03-06-00076

6.2.2.3.15 Debris Interceptor Analysis

DCD_03.09.03-30

The US-APWR is designed with debris interceptors installed in the SG compartments and in the header compartment to prevent large debris from clogging the overflow pipes in the post-LOCA return flow path of recirculation water to the Refueling Water Storage Pit (RWSP).

The SG compartment debris interceptors are box-type steel mesh structures with 8 inch x 8 inch openings on the sides and a grating on top. The header compartment debris interceptors are a vertical riser-type frame with 8 inch x 8 inch mesh. For all debris interceptors, the mesh extends to a height higher than the postulated flooding level. The 8 inch x 8 inch mesh openings are sized to capture large debris that could potentially clog the overflow piping. See Figure 6.2.1-14 for the debris interceptor schematic drawing.

The debris Interceptor is non-ASME equipment because it is not a pressure retaining component, but is defined as Equipment Class 2 Seismic Category-I based on its safety function, as shown in Table 3.2-2. The debris interceptor will be evaluated using the applicable ASME Section III, Class 2 stress analysis limits. Mesh structure which is an element of the debris interceptor uses ASME Code, Subsection NC, Class 2 stress limit conservatively, and evaluated using load combinations that are listed in the DCD Table 3.9-3. The remaining steel structures that are considered component supports use ASME Code, Subsection NF, Class 2 stress limit, and evaluated using load combinations that are listed in the DCD Table 3.9-4.

The structural qualification of the debris interceptor is performed using a combination of manual calculations and finite element elastic analyses. The analysis is performed for the defined loads, including SSE and jet impingement loads.

6.2-40	<u>NRC Staff Review Guidance Regarding GL 2004-02 Closure in the Area of Strainer Head Loss and Vortexing, March 2008, USNRC, NRR.</u>	DCD_06.02. 02-55
6.2-41	<u>Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants, Regulatory Guide 1.54 Revision 1, July, 2000, USNRC.</u>	
6.2-42	<u>Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities, ANSI N101.2.</u>	
6.2-43	<u>Standard Test Method for Evaluating Coatings Used in Light-Water Nuclear Power Plants at Simulated Design Basis Accident (DBA) Conditions, ASTM D 3911.</u>	
6.2-44	<u>WCAP-16530-NP, Topical Report "Evaluation of Post-Accident Chemical Effects on Containment Sump Fluids to Support GSI-191 (ML073521072).</u>	
6.2-45	<u>U.S. Nuclear Regulatory Commission, Regulatory Guide 1.54, Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants, Revision 2.</u>	
6.2-46	<u>Letter from William H. Ruland (NRR) to Alexander Marion (NEI) dated April 6, 2010, Revised Guidance regarding Coatings Zone of Influence for Review of Final Licensee Responses to Generic Letter 2004-02, Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized Water Reactors. (ML100960495)</u>	
6.2-47	<u>Letter from William H. Ruland (NRR) to Alexander Marion (NEI) dated July 29, 2010, Draft version of Table 3-2 for protective coating ZOIs including NEI 04-07. (ML100900172)</u>	
6.2-48	<u>Letter from Thomas O. Martin (NRR) to J.A. Gresham (WEC) dated July 14, 2006, Nuclear Regulatory Commission Response to Westinghouse Letter LTR-NRC-06-46 regarding Pressurized Water Reactor (PWR) Containment Sump Downstream Effects. (ML062070451)</u>	
6.2-49	<u>US-APWR Sump Strainer Stress Report, MUAP-08012-NP (R12), March-2011 June 2013.</u>	MIC-03-06- 00076
6.2-50	<u>ASME Boiler & Pressure Vessel Code, Section III, Division 1, 20047 edition, up to and including 20038 Addenda</u>	
6.2-51	<u>U.S. Nuclear Regulatory Commission, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants, NUREG-0800, Branch Technical Position 6-3, Determination of Bypass Leakage Paths in Dual Containment Plants, Revision 4, 2007.</u>	DCD_06.02. 06-34
6.2-52	<u>National Electrical Manufacturers Association, Enclosures for Electrical Equipment (1000 Volts Maximum), NEMA 250-2008.</u>	DCD_03.02. 02-25
6.2-53	<u>"Safety-Related Air Conditioning, Heating, Cooling and Ventilation Systems Calculations," MUAP-10020-P Rev. 2 (Proprietary) and MUAP-10020-NP Rev. 2 (Non-Proprietary), March 2013.</u>	DCD_06.02. 03-1

ATTACHMENT 1

FILES CONTAINED IN CD 1

CD 1: "US-APWR Sump Strainer Stress Report," MUAP-08012-NP, Revision 2

Contents of CD

<u>File Name</u>	<u>Size</u>	<u>Sensitivity Level</u>
001 MUAP-08012-NP(R2).pdf	16.9 MB	Non-Proprietary