US-APWRRAIsPEm Resource

From: Ciocco, Jeff
Sent: Thursday, May 02, 2013 11:05 AM
To: us-apwr-rai@mhi.co.jp; US-APWRRAIsPEm Resource
Cc: Haider, Syed; McKirgan, John; Reyes, Ruth
Subject: US-APWR Design Certification Application RAI 1029-7076 (6.2.1)
Attachments: US-APWR DC RAI 1029 SCVB 7076.pdf

MHI,

The attachment contains the subject request for additional information (RAI). This RAI was sent to you in draft form. Your licensing review schedule assumes technically correct and complete responses within 30 days of receipt of RAIs. However, MHI requests and we grant 45 days to respond to the RAI. We will adjust the schedule accordingly.

Please submit your RAI response to the NRC Document Control Desk.

Thank you,

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Hearing Identifier: Mitsubishi_USAPWR_DCD_eRAI_Public
Email Number: 95

Mail Envelope Properties (320204600EA7B9408FE833FF15E4FF7DD657B74C14)

Subject: US-APWR Design Certification Application RAI 1029-7076 (6.2.1)
Sent Date: 5/2/2013 11:04:51 AM
Received Date: 5/2/2013 11:04:53 AM
From: Ciocco, Jeff

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Post Office: HQCLSTR01.nrc.gov

Files	**Size**	**Date & Time**
MESSAGE	603	5/2/2013 11:04:53 AM
US-APWR DC RAI 1029 SCVB 7076.pdf	69479	
image001.jpg	3989	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

REQUEST FOR ADDITIONAL INFORMATION 1029-7076

Issue Date: 5/2/2013

Application Title: US-APWR Design Certification - Docket Number 52-021

Operating Company: Mitsubishi Heavy Industries

Docket No. 52-021

Review Section: 06.02.01 - Containment Functional Design
Application Section: Section 1.9.5

QUESTIONS

06.02.01-25

Fukushima US-APWR Containment Thermal-Hydraulics Analysis
In order to comply with the Commission's requirements documented in the Staff Requirements Memorandum to SECY-12-0025 "Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami", MHI formally submitted technical report MUAP-13002 Revision 0, "US-APWR Evaluation and Design Enhancement to Incorporate Lessons Learned from TEPCO's Fukushima Dai-ichi Nuclear Power Station Accident" to the US-APWR DC docket. As required by Order EA-12-049, the report describes the guidance and mitigation strategies to maintain or restore core cooling, containment and SFP cooling capabilities under an Extended Loss of all ac Power (ELAP) and a simultaneous loss of normal access to the ultimate heat sink (UHS), following a beyond-design-basis (BDB) external initiating event. The US-APWR Fukushima mitigation strategies follow a three-phase approach of using the on-site and off-site equipment toward the beyond-design-basis (BDB) event, as guided by NEI-12-06.

On Page 27, the technical report mentions, "The containment heat removal safety function includes maintaining containment pressure control, heat removal and key containment instrumentation". One of the objectives of establishing the US-APWR baseline coping capability is to maintain or restore containment heat removal safety function. On Page 29, the report concludes that "Throughout the entire period after a BDB external event with simultaneous loss of all ac power and loss of normal access to UHS, containment functions of the US-APWR, i.e. containment isolation and confinement of radioactive materials will be maintained without any design enhancement or short-term operator actions in Phase 1 or 2." The report also draws a safety conclusion on Page 38, "Containment internal pressure is maintained below its design pressure as no major pipe breaks are postulated inside the containment."

The report does not reference or document any analysis or justification to support its Fukushima event mitigation conclusions for containment safety functions. The report does discuss the supporting M-RELAP5 analysis results and conclusions for the operational strategy for core cooling and maintaining the integrity of the reactor coolant pressure boundary (RCPB) and the main steam system pressure boundary after a small RCP seal leakage. However, MHI had used GOTHIC computer code to perform various containment pressure and temperature calculations that were reported in the US-APWR DCD Section 6.2.1. MHI has not referred to any such containment analysis in their Fukushima submittal to justify their mitigation strategy for containment cooling and depressurization. So, no supporting analysis is submitted by MHI for the integrity of the containment pressure boundary.

The applicant should reference specific analyses that demonstrate that the US-APWR containment design safety functions are accomplished as documented in the report and the containment pressure and temperature are maintained below their design values for all six modes of operation during the postulated BDB event. These analyses should appropriately reflect any credits taken for containment venting or use of sprays. The staff expects that such analyses may identify timing necessary to mitigate containment pressurization transients in Phase 1, and would reconcile the overall BDB event timeline with the on-site availability of the required equipment. The staff would also like to understand the safety significance of the on-site Class 1E ac gas turbine generators (AAC GTGs) in attaining the containment functions during the BDB event.

The staff asks MHI to update the FSAR to provide a summary description of the containment analyses used to support the safety conclusions, and make the supporting calculations and documentation available for a staff audit. MHI may reference existing documents and calculations that have already been submitted, or audited by the staff during the course of the design review. However, when relying on previous calculations, MHI must justify the applicability of the calculations and explain why the assumptions and initial/boundary conditions of the analysis are appropriate with the Fukushima design enhancements.


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