US-APWRRAIsPEm Resource

From: Ward, William
Sent: Wednesday, February 13, 2013 7:07 PM
To: us-apwr-rai@mhi.co.jp; US-APWRRAIsPEm Resource
Cc: ODriscoll, James; Reyes, Ruth; McKirgan, John; Hamzehee, Hossein; Ciocco, Jeff
Subject: US-APWR Design Certification Application RAI 990-7011 (6.2.3)
Attachments: US-APWR DC RAI 990 SCVB 7011.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: 55

Mail Envelope Properties (C0A338EE37A11447B136119705BF9A3F01DAE80E23D3)

Subject: US-APWR Design Certification Application RAI 990-7011 (6.2.3)
Sent Date: 2/13/2013 7:06:43 PM
Received Date: 2/13/2013 7:06:45 PM
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Post Office: HQCLSTR02.nrc.gov

Files	**Size**	**Date & Time**
MESSAGE	780	2/13/2013 7:06:45 PM
US-APWR DC RAI 990 SCVB 7011.pdf	67435	
image001.jpg	3989	

Options
Priority: Standard
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Recipients Received:

REQUEST FOR ADDITIONAL INFORMATION 990-7011

Issue Date: 2/13/2013

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

Operating Company: Mitsubishi Heavy Industries

Docket No. 52-021

Review Section: 06.02.03 - Secondary Containment Functional Design
Application Section: 6.2.3

QUESTIONS

06.02.03-1

Based on the FSAR changes to DCD Section 6.2.3 accompanying the response dated June 7, 2012, to RAI 918-6316, Question 6.2.6-35, the staff performed a review of those SSCs described in the DCD that perform a partial secondary containment function using the review guidance in NUREG-0800, SRP section 6.2.3. Based on this review, the staff requests the following information as it relates to NUREG-0800, SRP section 6.2.3, Section II SRP Acceptance Criteria #1 through #4.

1) Design Basis description/Conformance with RG 1.206: The design basis of the partial secondary containment is unclear. The staff requests that this DCD section adhere to the guidance in RG 1.206 section C.I.6.2.3 with regard to format and content. As a minimum, a design basis section should be added to DCD section 6.2.3 that addresses what commission regulations apply to the design. The section should discuss those regulations discussed in NUREG-0800, SRP section 6.2.3, Section II acceptance criteria.

2) Analysis of secondary containment Pressure and Temperature Response - Heat Transfer from primary to secondary containment: The staff reviewed the functional capability of the secondary containment against NUREG-0800, Section 6.2.3, acceptance criteria 1A through H. Acceptance Criterion 1 calls for staff review of the applicant's analysis of the pressure and temperature response of the secondary containment to a LOCA in the primary containment. As described in DCD Tier 2, Chapter 16 Subsection B 3.7.11, the design basis capacity of the AEES is based on the large break LOCA safety analysis. In conjunction with the LOCA inside containment, the system evaluation assumes a passive failure outside containment, such as valve packing leakage and a passive failure of the ECCS outside containment, such as SI seal pump leakage. The radiological consequence analysis is provided in DCD Tier 2, Chapter 15 Subsection 15.6.5.5. As described in MUAP-10020 Revision 1, "US-APWR Safety-Related Air Conditioning, Heating Cooling, and Ventilation Systems Calculations," MHI provided calculations of the airflow requirements of the AEES, and the heat removal requirements for the safety related HVAC systems that serve to remove heat from within the annulus compartment boundaries. The analysis was performed to demonstrate the ability of the AEES to depressurize the Reactor Building and maintain sub-atmospheric pressure in the Reactor Building annulus compartment boundaries following a design-basis LOCA. This calculation defines the annulus compartment boundary as that which encompasses the safeguard component and

penetration areas. The LOCA is assumed to occur concurrently with a loss of offsite power and loss of one of the AEES trains.

Based on review of the of MUAP-10020 Revision 1, and DCD Tier 2 Section 9.4.5, the staff understands that any heat load due to heat transfer from the primary to the secondary containment would be removed via the Safeguard Component Area Air Handling Units and the Penetration Areas Air Handling Units which are part of the Safeguard Component Area HVAC System and the AEES respectively. Tables 5.3.1-1 and 5.5.1-4 of this calculation summarizes the heat gains to the Safeguard Component Areas and Penetration Areas respectively due to heat transfer through concrete structures. Table 2.4.5-1 shows values for heat gain from piping and supports for the Safeguard Component Area and Penetration Area, but the basis of either of these sets of values are not provided. The calculation assumes heat transfer through walls exposed to the outside environment, but it is not apparent if heat transfer via conduction from the primary containment structure to the secondary containment structure is considered.

NUREG-0800 Section 6.2.3 recommends that heat transfer from the primary containment atmosphere to the primary containment structure should be calculated by methods provided in BTP 6-2. Based on review of the MUAP-10020 Revision 1, supplied to the staff, the staff needs the following information as it applies to NUREG-0800, Section 6.2.3, acceptance criteria 1A. Please state in the DCD or indicate where in the DCD it is stated:

a. What calculation was used as the basis for determining the pressure and temperature response of the secondary containment (i.e. add a reference MUAP-10020, or other calculation).
b. How heat transfer from the primary containment atmosphere to the secondary containment was considered, what heat transfer coefficients were used, and if selection of the coefficients conform to BTP 6-2 guidance.
c. If conductive heat transfer through the primary containment structure and convective heat transfer to the secondary containment atmosphere was considered when developing the heat loads due to structures shown in MUAP-10020, Revision 1, Tables 5.3.1-1 and 5.5.1-4.

3) Analysis of secondary containment Pressure and Temperature Response- AEES fan performance characteristics: Based on review of MUAP-10020 Revision 1, section 2, section 5.6.1, the staff understands that some assumed secondary containment inleakage values and some AEES fan performance characteristics were considered when you determined the period of time for secondary containment depressurization and steady state secondary containment negative pressure. The staff understands that the AEES Exhaust fan airflow requirement is determined through a calculation that assumes a draw down the Safeguard Component Areas and Penetration areas pressure to -6.35 mm (-0.25 in.) water gauge in 180 seconds. The staff understands that this time is much less than the 240 second draw down time assumed in the LOCA radiological consequence analysis, as is therefore conservative with respect to the system performance assumed in the radiological analyses. The calculation also imposed a 15% capacity margin on this airflow requirement. The calculation states that the system including the fan is conservatively sized to achieve a steady state negative pressure of -10.16 mm (-0.4 in.) water gauge. Based on the above review, the staff

needs the following information as it applies to NUREG-0800, Section 6.2.3 Acceptance Criteria 1H. Please state in the DCD or indicate where in the DCD it is stated:

a. That the AEES fan is conservatively designed to achieve a steady state negative pressure of -10.16 mm (-0.4 in.) water gauge in the secondary containment spaces.
b. The values and the justification for the assumed inleakage values to the secondary containment spaces.
c. How or if the as-built fan characteristic curve is used to evaluate secondary containment leak tightness.

4) Based on the review of information in the DCD, the staff needs the following information as it applies to NUREG-0800, Section 6.2.3 Acceptance Criteria 3C.

a. Please describe in the DCD or indicate where in the DCD it is described how preoperational tests (DCD Tier 2, Section 14.2.12.1.70) will confirm the evaluated effect of open doors or hatches on the functional capability of the depressurization and filtration system.
b. Please describe in the DCD Tier 2 section 6.2.6 that all secondary containment space openings like personnel doors and equipment hatches are under administrative control, or have position indicators and alarms in the main control room. In addition, in your RAI response, please describe how MCR operators would use this or other MCR instrumentation to identify a degraded/inoperable secondary containment barrier (i.e. discovery of and entry into TS 3.7.11 Condition B).
c. Please describe in DCD or indicate where in the DCD it is described how preoperational tests (DCD Tier 2, Section 14.2.12.1.70) will confirm a uniform negative pressure throughout the secondary containment spaces. Please specify in the DCD if the acceptance criteria for this test includes verification of adequate negative pressure and drawdown time in all Safeguard Component Areas and Containment Penetration Areas.


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