

REQUEST FOR ADDITIONAL INFORMATION 512-3893 REVISION 1

12/15/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 03.11 - Environmental Qualification of Mechanical and Electrical Equipment
Application Section: 3.11

QUESTIONS for Health Physics Branch (CHPB)

03.11-29

This Request for Additional Information (RAI) was written prior to the receipt of DCD Revision 2, or MUAP-08015 Revision 1. Rather than delay issuance of the RAI to review the two revisions, the RAI is being issued as written.

The US-APWR DCD, Revision 1, Tier 2 Section 3.11 "Environmental Qualification of Mechanical and Electrical Equipment" and MUAP-08015(R0) "US-APWR Equipment Environmental Qualification Program" describe the equipment qualification process and methodology. Sections 10 CFR 50.49 and 10 CFR 52.79 require licensees to develop an Environmental Qualification program for equipment important to safety. SRP Section 3.11 notes that the applicant is to provide the conceptual approach, including the environmental design bases for identified equipment. SRP Section 3.11 and Regulatory Guide 1.206 note that applicant should identify equipment located in harsh environments.

RAI 358-2642, question 03.11-1 Item 1, requested additional information about the methodology and assumptions used to calculate the Total Integrated Dose (TID) to equipment. In their response, the applicant provided a narrative description of the method used to establish the source term, and then stated that MicroShield can be used to calculate the resultant gamma source strength. The applicant also provided a general formula for calculating beta dose rates in water and air. However, the applicant provided insufficient information on the source composition and MicroShield input parameters, to allow the staff to confirm the applicant's conclusions regarding the TID to components.

The applicant should provide the MicroShield input parameter values for calculating the gamma dose component the program used for calculating the integrated beta doses and the associated input parameters, or provide the specific alternative approaches used and the associated justification.

Reference: MHI's Response to US-APWR DCD RAI No. 358-2642, MHI Ref: UAP-HF-09371, dated July 10, 2009, ML091970103.

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03.11-30

The US-APWR DCD, Revision 1, Tier 2 Sections 3.11 "Environmental Qualification of Mechanical and Electrical Equipment" and MUAP-08015(R0) "US-APWR Equipment Environmental Qualification Program" describe the equipment qualification process and methodology. Sections 10 CFR 50.49 and 10 CFR 52.79 require licensees to develop an Environmental Qualification program for equipment important to safety. SRP Section 3.11 notes that the applicant is to provide the conceptual approach, including the environmental design bases for identified equipment. SRP Section 3.11 and Regulatory Guide 1.206 note that applicant should identify equipment located in harsh environments.

RAI 358-2642, question 03.11-1 Item 1, requested additional information about the methodology and assumptions used to calculate the Total Integrated Dose (TID) to equipment. In their response, the applicant provided a narrative description of the method used to establish the source term for the containment airborne activity concentration that is not consistent with the analysis methodology used in DCD Tier 2, Chapter 15. Based on the methodology described in this response, the Containment Airborne Activity values stated in DCD Tier 2 Table 15A-15 "Peak Concentration in Containment During LOCA" would not reflect the activity values used for equipment qualification TID. The applicant did not present containment airborne activity concentrations in this response, in MUAP-08015, or in DCD Tier 2 Chapter 3.11. Also, the applicant noted that the beta ray source strengths can be calculated by multiplying the airborne radioactive concentration in containment and the radioactivity in recirculation water by the effective energy of beta ray. However, in light of the previous discussion, the average beta energy is indeterminate, so insufficient information is available to allow the staff to allow the staff to confirm the applicant's data.

The applicant should revise and update MUAP-08015 or DCD Tier 2 Chapter 3.11 to provide the airborne activity concentrations used to determine equipment gamma and beta TID, or provide the specific alternative approaches used and the associated justification.

Reference: MHI's Response to US-APWR DCD RAI No. 358-2642, MHI Ref: UAP-HF-09371, dated July 10, 2009, ML091970103.

03.11-31

The US-APWR DCD, Revision 1, Tier 2 Sections 3.11 "Environmental Qualification of Mechanical and Electrical Equipment" and MUAP-08015(R0) "US-APWR Equipment Environmental Qualification Program" describe the equipment qualification process and methodology. Sections 10 CFR 50.49 and 10 CFR 52.79 require licensees to develop an Environmental Qualification program for equipment important to safety. SRP Section 3.11 notes that the applicant is to provide the conceptual approach, including the environmental design bases for identified equipment. SRP Section 3.11 and Regulatory Guide 1.206 note that applicant should identify equipment located in harsh environments.

RAI 358-2642, question 03.11-1 Item 1, requested additional information about the methodology and assumptions used to calculate the Total Integrated Dose (TID) to equipment. In their response, the applicant provided a narrative description of the

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methodology (Item 1b) used to establish the source term for the containment airborne activity concentration used for equipment qualification. However, the section of the response for this item entitled "Impact on DCD", does not include this description in DCD Tier 2 Sections 3.11, DCD Tier 2 Section 12.2 or MUAP-08015.

The applicant should revise and update MUAP-08015 or DCD Tier 2 Chapter 3.11 to provide the discussion of the methodology used to determine equipment gamma and beta TID, or provide the specific alternative approaches used and the associated justification.

Reference: MHI's Response to US-APWR DCD RAI No. 358-2642, MHI Ref: UAP-HF-09371, dated July 10, 2009, ML091970103.

03.11-32

The US-APWR DCD, Revision 1, Tier 2 Sections 3.11 "Environmental Qualification of Mechanical and Electrical Equipment" and MUAP-08015(R0) "US-APWR Equipment Environmental Qualification Program" describe the equipment qualification process and methodology. Sections 10 CFR 50.49 and 10 CFR 52.79 require licensees to develop an Environmental Qualification program for equipment important to safety. SRP Section 3.11 notes that the applicant is to provide the conceptual approach, including the environmental design bases for identified equipment. SRP Section 3.11 and Regulatory Guide 1.206 note that applicant should identify equipment located in harsh environments.

RAI 358-2642, question 03.11-1 Item 2, requested additional information about the methodology and assumptions used to calculate the Total Integrated Dose (TID) to equipment. In their response, the applicant provided a narrative description of the methodology used to establish the source term for the Main Steam/Feedwater piping area, during a Main Steam Line Break (MSLB). The response presents a table "Radioactivity Release into the Main Steam/Feedwater piping area during MSLB" that indicates that iodine and other activities in the secondary coolant will be 16% of primary coolant. However, justification for the use of these values is not present in this section or in DCD Tier 2 Chapter 15.

The applicant should revise and update MUAP-08015 or DCD Tier 2 Chapter 3.11 to provide clarification of the methodology used to determine equipment gamma and beta source term for a MSLB in Tier 2 Section 3.11, DCD Tier 2 Section 12.2, or MUAP-08015, or provide the specific alternative approaches used and the associated justification.

Reference: MHI's Response to US-APWR DCD RAI No. 358-2642, MHI Ref: UAP-HF-09371, dated July 10, 2009, ML091970103.

03.11-33

The US-APWR DCD, Revision 1, Tier 2 Sections 3.11 "Environmental Qualification of Mechanical and Electrical Equipment" and MUAP-08015(R0) "US-APWR Equipment Environmental Qualification Program" describe the equipment qualification process and

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methodology. Sections 10 CFR 50.49 and 10 CFR 52.79 require licensees to develop an Environmental Qualification program for equipment important to safety. SRP Section 3.11 notes that the applicant is to provide the conceptual approach, including the environmental design bases for identified equipment. SRP Section 3.11 and Regulatory Guide 1.206 note that applicant should identify equipment located in harsh environments.

RAI 358-2642, question 03.11-1 Item 3, requested additional information about the methodology and assumptions used to calculate the Total Integrated Dose (TID) to equipment resulting from a loss of ventilation during a LOCA event. The response to this item noted that the HVAC system restoration would occur as soon as possible, so that the TID would be small compared to the 60-year operational TID. However, based on the information provided in MUAP-08015 New Table 5-5 sheet 4 of 7, the Zone 6 beta dose (an indication of airborne activity present in the area), may be higher than the total (operational plus accident) gamma dose in Zone 6, even with the assumption of HVAC operation. Since the applicant does not provide any criteria for the restoration of HVAC, or limits for airborne radioactivity concentration or the resultant dose rates following a loss of HVAC, insufficient information is available to allow the NRC staff to confirm that the loss of HVAC will result in an insignificant impact on equipment TID.

The applicant should revise and update MUAP-08015 or DCD Tier 2 Chapter 3.11 to provide clarification regarding the criteria for equipment TID with respect to allowable HVAC unavailability during design basis events, or provide the specific alternative approaches used and the associated justification.

Reference: MHI's Response to US-APWR DCD RAI No. 358-2642, MHI Ref: UAP-HF-09371, dated July 10, 2009, ML091970103.

03.11-34

The US-APWR DCD, Revision 1, Tier 2 Sections 3.11 "Environmental Qualification of Mechanical and Electrical Equipment" and MUAP-08015(R0) "US-APWR Equipment Environmental Qualification Program" describe the equipment qualification process and methodology. Sections 10 CFR 50.49 and 10 CFR 52.79 require licensees to develop an Environmental Qualification program for equipment important to safety. SRP Section 3.11 notes that the applicant is to provide the conceptual approach, including the environmental design bases for identified equipment. SRP Section 3.11 and Regulatory Guide 1.206 note that applicant should identify equipment located in harsh environments.

RAI 358-2642, question 03.11-2 Item 3, requested additional information about the location of each piece of equipment addressed in Table 3D-2. This topic is also relevant to Question 358-2642 03.11-3 Item 2. The applicant provided an EQ Zone location in Table 3D-2 in lieu of listing the location of each piece of equipment. However, in some cases, the EQ Zones listed in Table 3D-2 are inconsistent with dose rate data provided in DCD Tier 2 Figures 12.3-1 and 12.3-3. For instance, Table 3D-2 Sheet 4 of 64, shows RHS-PT-610 in EQ Zone 13.3 (Reactor Building Passage), and a Harsh Radiation Condition. In contrast, Figure 12.3-3 Sheet 1 of 10 list the post accident dose

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rate in the passage as ≤ 15 mrem/h and Figure 12.3-1 Sheet 4 of 34, list the operational dose rate in that same area as ≤ 2.5 mrem/h. The dose rates from Figures 12.3-1 and 12.3-3 do not support the conclusion that the piece of equipment is located in a Harsh Radiation Condition. The applicant has not stated any other criteria (e.g. extra conservatism for some equipment, or other radiation sources), for classification of the Radiation Condition for equipment.

The applicant should revise and update MUAP-08015 or DCD Tier 2 Chapter 3.11 to provide clarification regarding the criteria for equipment Radiation Condition stated in Table 3D-2, or provide the specific alternative approaches used and the associated justification.

Reference: MHI's Response to US-APWR DCD RAI No. 358-2642, MHI Ref: UAP-HF-09371, dated July 10, 2009, ML091970103.

03.11-35

The US-APWR DCD, Revision 1, Tier 2 Sections 3.11 "Environmental Qualification of Mechanical and Electrical Equipment" and MUAP-08015(R0) "US-APWR Equipment Environmental Qualification Program" describe the equipment qualification process and methodology. Sections 10 CFR 50.49 and 10 CFR 52.79 require licensees to develop an Environmental Qualification program for equipment important to safety. SRP Section 3.11 notes that the applicant is to provide the conceptual approach, including the environmental design bases for identified equipment. SRP Section 3.11 and Regulatory Guide 1.206 note that applicant should identify equipment located in harsh environments.

RAI 358-2642, question 03.11-3 Item 3, requested additional information regarding the time based units for determination of the TID. The applicant referenced the response to Question RAI 358-2642 03.11-2 Item 4. While the response to that question contained the information asked for in this question, the DCD Impact statement did not indicate how this information would be presented in DCD Tier 2 Sections 3.11 or DCD Tier 2 or MUAP-08015.

The applicant should revise and update DCD Tier 2 Sections 3.11 or MUAP-08015 to include the TID time base information provided in Question RAI 358-2642 03.11-2 Item 4, or provide the specific alternative approaches used and the associated justification.

Reference: MHI's Response to US-APWR DCD RAI No. 358-2642, MHI Ref: UAP-HF-09371, dated July 10, 2009, ML091970103.