REQUEST FOR ADDITIONAL INFORMATION 385-2293 REVISION 1

6/11/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 17.04 - Reliability Assurance Program (RAP)
Application Section: 17.4 Reliability Assurance Program

QUESTIONS for PRA Licensing, Operations Support and Maintenance Branch 1 (AP1000/EPR Projects) (SPLA)

17.04-40

In response to RAI 17.04-31, MHI stated that the reactor coolant pump (RCP) seal water injection filter (i.e., CVC10 in Figure 6A.4-1 of MUAP-07030(R1) or AFT-003B in Figure 9.3.4-1 of US-APWR DCD, Revision 1) is not risk-significant because of the redundancy provided by filter AFT-003A. For the following reasons, the staff found that MHI's response to RAI 17.04-31 does not provide a sufficient basis for excluding filter CVC10 from Table 17.4-1 of the US-APWR DCD.

1) Figure 9.3.4-1 of the US-APWR DCD shows that during normal operations, one seal water injection filter is aligned for flow, while the redundant filter is isolated by two manual isolation valves (i.e., VLV-170A/171A or VLV-170B/171B). If the non-isolated filter becomes plugged while operating during an initiating event, then is it realistic to take credit for operator action to open the manual isolation valves of the redundant filter (e.g., is this operator action proceduralized?).

2) Since valves CVC02, CVC03, CVC04 and CVC06 have a RAW of 24 and are considered risk-significant, it suggests that the common cause failure of the seal water injection filters (assuming successful operator action to open isolation valves of the redundant filter) may have a similar RAW and be risk-significant. Note, the PRA assumption that the seal water injection filters have a low failure probability does not provide a sufficient basis for excluding these filters from D-RAP. This assumption is only true if the filters are subjected to appropriate reliability assurance activities. Therefore, the assumption in the PRA that these filters have high reliability further emphasizes the need to include them in D-RAP (the intent of D-RAP is to ensure the reliability assurance activities that were accomplished prior to initial fuel load for the risk-significant systems, structures, and components (SSCs) provide reasonable assurance that the plant is designed and constructed in a manner that is consistent with the key assumptions and risk insights for the risk-significant SSCs).

3) Filters AFT-003A and AFT-003B are equal in function and failure behavior. The dissimilar risk significance between the two filters arise from assumptions made in the PRA (i.e., AFT-003B is aligned for service and AFT-003A is isolated).

Similarly, isolation valves for filter AFT-003A (i.e., VLV-170A and VLV-171A) may be considered risk-significant for the following reasons.

1) Isolation valves VLV-170B and VLV-171B are considered risk-significant in Table 17.4-1 of the US-APWR DCD.

2) Isolation valves VLV-170A and VLV-171A would need to be manually opened in order to credit use of RCP seal water injection filter AFT-003A.

3) Isolation valves 170A/171A and 170B/171B are equal in function and failure behavior. The dissimilar risk significance between these isolation valves arise from assumptions made in the PRA (i.e., valves 170B/171B are open to align flow through filter AFT-003B and 170A/171A are isolated).

The staff requests that MHI provide an acceptable basis for not including RCP seal water injection filters (i.e., AFT-003A and AFT-003B) and RCP seal water injection isolation valves (VLV-170A and VLV-171A) in Table 17.4-1 of the US-APWR DCD.

17.04-41

In response to RAI 17.04-26, MHI stated "ST01 and ST07 [EWS-OSR-001 A and D] is also considered to be equal to the ST03 and ST05 in their functions and failure behavior. Therefore, these 4 strainers will be included as 'A1-D1 ESWS sump outlet strainers 1 [EWS-OSR-001A (B,C,D)]' under Item 5 of ESWS in Table 17.4-1…" MHI excluded from Table 17.4-1 the strainers EWS-OSR-002A (B,C,D) because the US-APWR PRA showed them to have low risk importance. The dissimilar risk significance between strainers EWS-OSR-001A (B,C,D) and EWS-OSR-002A (B,C,D) may not be real and arise from assumptions made in the PRA (i.e., EWS-OSR-001A,B,C,D is aligned for service and EWS-OSR-002A,B,C,D is isolated). Based on the description provided in Section 9.2.1 of the US-APWR DCD, Revision 1, strainers EWS-OSR-002A (B,C,D) are equal to EWS-OSR-001A (B,C,D) in function and failure behavior. Therefore, strainers EWS-OSR-002A (B,C,D) should also be included in Table 17.4-1 of the US-APWR DCD.

The staff requests that MHI include strainers EWS-OSR-002A (B,C,D) in Table 17.4-1 of the US-APWR DCD. Otherwise, provide a basis for not including these strainers in Table 17.4-1 of the US-APWR DCD.

17.04-42

In response to RAI 17.04-33, MHI stated “these 4 orifices will be included as “Minimum flow line orifices 3 A(B,C,D) [FE972(973,974,975)].” These orifices correspond to PRA orifices FE862A(B,C,D). Orifices 3A(B,C,D) in the PRA correspond to RV injection line orifices (between VLV-012 A(B,C,D) and MOV-0011 A(B,C,D). A similar occurrence exists in Table 17.4-1, page 17.4-22, item 2 “Safety injection pump outlet orifices 1A(B,C,D) [FE962(963,964,965)]” which in the PRA correspond to FE858A(B,C,D). These two cases should be clarified here as well as any other similar DCD occurrences. For example, simply removing the text 1A(B,C,D) and 3A(B,C,D) in these two occurrences may clarify these instances since orifices 1A(B,C,D) and 3A(B,C,D) exist elsewhere in the PRA within the same system.

The staff requests that MHI further clarify what is meant by 1A(B,C,D) and 3A(B,C,D) in these two occurrences and any other DCD occurrences.

17.04-43

In response to RAI 17.04-23, MHI stated that inlet manual valves CCW0002A(B,C,D) of the Safety Injection (SI) pump cooling line are not risk-significant based on risk importance. For the following reason, the staff found that MHI's response to RAI 17.04-23 does not provide a sufficient basis for excluding these components from Table 17.4-1 of the US-APWR DCD.

- Manual valves CCW0002A(B,C,D) are equal in function and failure behavior. The risk achievement worth (RAW) for manual valve CCW0002C is 6.7 (internal events) as shown in Table 19.1-42 of Chapter 19 of the US-APWR DCD, Revision 1. The shutdown and flooding PRA models also show this valve to have a high RAW. The RAW values associated with manual valve CCW0002C are consistent with the RAW values associated with the other manual valves in the SI pump cooling lines (i.e., 133A(B,C,D), 132A(B,C,D), 160A(B,C,D), and 161A(B,C,D)), which are considered risk-significant. This would suggest that manual valves CCW0002A(B,C,D) may also be risk-significant.

The staff requests that MHI include SI pump cooling line inlet manual valves CCW0002A(B,C,D) in Table 17.4-1 of the US-APWR DCD. Otherwise, provide a sufficient basis for not including these components in Table 17.4-1 of the US-APWR DCD.

Also, given that the plugging of outlet orifices 1260A(B,C,D) or 1266A(B,C,D) would fail the SI pump cooling lines (RAW of 8.1 in Table 19.1-69 of Chapter 19 of the US-APWR DCD, Revision 1), provide the basis for not including these orifices in Table 17.4-1 of the US-APWR DCD (note that similar orifices of the RHR pump cooling line were included in Table 17.4-1, see MHI's response to RAI 17.04-24).

17.04-44

In response to RAI 17.04-30, MHI did not include outlet manual valves 300A(B) of the Charging Injection System (CHI) pump cooling line (see Figure 19.1-2 of Chapter 19 of the US-APWR DCD, Revision 1). Outlet manual valves 300A(B) are equal in function and failure behavior. The risk achievement worth (RAW) for manual valve 300A is 120 (from Low Power/Shutdown PRA) as shown in Table 19.1-90 of Chapter 19 of the US-APWR DCD, Revision 1. The RAW values associated with manual valves 300A(B) are consistent with the RAW values associated with the other manual valves in the CHI pump cooling lines (i.e., 224A(B), 225A(B), and 226A(B)), which are considered risk-significant. This would suggest that outlet manual valves 300A(B) may also be risk-significant.

The staff requests that MHI include CHI pump cooling line outlet manual valves 300A(B) in Table 17.4-1 of the US-APWR DCD. Otherwise, provide a sufficient basis for not including these components in Table 17.4-1 of the US-APWR DCD.

Also, given that the plugging of outlet orifices FE1257(8) or 1254(5) would fail the CHI pump cooling lines, provide the basis for not including these orifices in Table 17.4-1 of the US-APWR DCD (note that similar orifices of the RHR pump cooling line were included in Table 17.4-1, see MHI's response to RAI 17.04-24).

17.04-45

In RAI 17.04-19 the staff asked “what specific components are included under the description “SSCs that compose CCW boundary.”” This question is answered in part by responses to RAIs 17.04-23, 17.04-24, and 17.04-30, but the phrase “SSCs that compose CCW boundary” is not removed from the Table 17.4-1 markup provided in this RAI response. Are there other components that are covered by the “SSCs that compose CCW boundary,” or do RAI responses 17.04-23, 17.04-24, and 17.04-30 cover all these components in their entirety? If the above mentioned RAI responses contain all the “SSCs that comprise CCW boundary,” should this phrase be removed from Table 17.4-1? If the above mentioned RAI responses are not a complete list of the “SSCs that comprise CCW boundary” then please provide the complete list in Table 17.4-1.