

REQUEST FOR ADDITIONAL INFORMATION 544-4267 REVISION 0

3/2/2010

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 06.01.01 - Engineered Safety Features Materials

Application Section: 6.1.1

QUESTIONS for Component Integrity, Performance, and Testing Branch 1 (AP1000/EPR Projects)
(CIB1)

06.01.01-13

In response to RAI 06.01.01-1, the applicant modified DCD Tables 6.1-1 "Principle Engineered Safety Feature Pressure Retaining Material Specifications" and 6.1-2 "Principle Engineered Safety Features Materials Exposed to Core Coolant and Containment Spray." The staff reviewed the revised Table and requests that the applicant address the following.

1. There appears to be several typographical errors in Tables 6.1-1 and 6.1-2 which include but are not limited to the following:
 - a. Material grades listed under SA-182 use the prefix "TP" which is inconsistent with SA-182 and ASME Code, Section II, Part D, Table 1A.
 - b. Materials specification SA-155 is not listed in ASME Code Section II or ASME Code, Section II, Part D, Table 1A.
 - c. Table 6.1-1 lists SA-181 Grade 70 material. The applicant's reference to Grade 70 is inconsistent with material specification SA-181. SA-181 does list a Class 70 material.

The staff requests that the applicant perform a complete review of Tables 6.1-1 and 6.1-2 to verify their consistency with ASME Section II materials specifications and modify the DCD as necessary.

2. In RAI 06.01.01-2 the staff stated that each ESF system should be identified and broken down by components, such as valves, piping, fittings, accumulators, pumps, heat exchanges etc., so the staff can identify the application of each material. The applicant lists plate, casting, and shape materials but does not identify what components will be fabricated from these materials. The staff requests that the applicant modify Tables 6.1-1 and 6.1-2, to be more specific and provide details related to components that will be fabricated from the materials listed in the Tables.

3. Tables 6.1-1 and 6.1-2 do not identify materials that will be used to fabricate the RWSP, containment liner or containment liner penetrations. The staff requests that the applicant include these materials and the welding filler materials that will be used to fabricate these components.

REQUEST FOR ADDITIONAL INFORMATION 544-4267 REVISION 0

4. DCD Section 6.0 identifies the containment systems, emergency core cooling systems, habitability systems and fission product removal systems as ESF systems but it is unclear from Tables 6.1-1 and 6.1-2 which materials will be used in these systems as well as the subsystems within each of these systems. The staff requests that the applicant provide the materials specifications and grades for all ESF systems and subsystems, by component type, in Tables 6.1-1 or 6.1-2, including weld filler materials, or provide a reference to the section of the DCD where this information is located.

5. DCD Subsection 6.1.1.1 states that all ESF components in contact with core coolants and containment spray solutions are either fabricated from austenitic stainless steel or ferritic materials clad with austenitic stainless steel. Tables 6.1-1 and 6.1-2 identify materials other than austenitic stainless steels. For example; Alloy 690 is listed in both Tables as well as low-alloy steels and carbon steels. If the applicant intended to state that all pressure retaining ESF components in contact with core coolants and containment spray solutions are either fabricated from Alloy 690, fabricated from stainless steel or clad with austenitic stainless steel, the staff requests that the applicant modify the DCD accordingly. If this is not the case the staff requests that the applicant modify the DCD to appropriately address this inconsistency.

06.01.01-14

(a) In response to RAI 06.01.01-3, the applicant added Table 10.4.9-7 "Principle Emergency Feedwater Materials" to the DCD. In addition, the applicant stated in its response that the EFWS welding filler materials are located in Table 10.3.2-5. The staff reviewed Table 10.4.9-7 and determined that the applicant did not provide enough detail for the staff to complete its review because the applicant lists component types such as plate, shapes, casings, forgings and bars. The applicant did not identify the actual components that will be fabricated from the aforementioned product forms. The staff also reviewed Table 10.3.2-5 and could not find a reference to Table 10.4.9-7 or Section 10.4.9 in Table 10.3.2-5. In addition, Table 10.4.9-7 lists stainless steel materials but Table 10.3.2-5 does not specify stainless steel welding filler materials. The staff requests that the applicant address the above and modify the DCD accordingly.

(b) In the applicant's response to RAI 06.01.01-3 the applicant verified, but did not include in the DCD, that the recommendations of RGs 1.31, 1.37, 1.44, and 1.50 are applied during fabrication of the EFWS. In addition, the applicant stated that preheat guidelines in ASME Code Section III, Appendix D, Article D-1000 for carbon steel and low alloy steel are applied to EFWS components. Although the staff finds the applicant's use of the above referenced RGs and ASME Code Section III preheat guidelines acceptable, the above information should be included in the DCD Section 10.4.9. The applicant should also discuss its use of RG 1.36. The staff requests that the applicant address the above and modify the DCD accordingly.

(c) In the applicant's response to RAI 06.01.01-3, the applicant states that the main materials used in the EFWS are ferritic materials. The staff notes that carbon and low alloy steels are susceptible to general corrosion. Therefore, the staff requests that the applicant modify FSAR Section 10.4.7 to identify the corrosion allowance for low-

REQUEST FOR ADDITIONAL INFORMATION 544-4267 REVISION 0

alloy and carbon steel materials and state the technical basis for the corrosion allowance for low-alloy and carbon steels used in the EFWS systems to ensure that it is sufficient for the design life of the plant.

06.01.01-15

In RAI 06.01.01-4, the staff requested that the applicant modify DCD Section 6.1.1 to identify the corrosion allowance for ferritic materials. The applicant stated in its response to RAI 06.01.01-4 that the failure of ferritic materials due to corrosion does not occur because their environmental conditions are not severe. The staff notes that DCD Section 6.1.1.2.1 states that general corrosion is negligible with the exception of low-alloy and carbon steels. If general corrosion is not negligible for low-alloy and carbon steels, there must be a corrosion allowance and a basis for the corrosion allowance for these materials. Therefore, the staff requests that the applicant modify FSAR Section 6.1.1 to identify the corrosion allowance for low-alloy and carbon steel materials and state the technical basis for the corrosion allowance for low-alloy and carbon steels used in ESF systems to ensure that it is sufficient for the design life of the plant.

06.01.01-16

In RAI 06.01.01-9, the staff requested that the applicant modify FSAR Section 6.1.1 and Table 6.1-1 to limit the carbon content of austenitic stainless steel to 0.03% maximum or provide a technical basis for why this is not necessary. In response to the above RAI, the applicant revised DCD section 6.1.1.1 to limit the carbon content of pressure retaining austenitic stainless steel components to 0.03% maximum, however, the applicant did not provide a note to Table 6.1-1 that states that all pressure retaining austenitic stainless steel components have a maximum carbon content of 0.03%. The staff requests that the applicant provide a note to Table 6.1-1 to address the above.

06.01.01-17

In response to RAI 06.01.01-7, the applicant modified DCD Subsection 6.1.1.2.2 to state that it follows the recommendations of RG 1.50. The staff notes that the applicant has placed the above statement in its application Subsection which specifies controls for austenitic stainless steels. Given that RG 1.50 applies to low alloy steels, the staff requests that the applicant modify the DCD to place this information in the appropriate DCD Subsection which is Subsection 6.1.1.1. In addition, the staff requests that the applicant modify Subsection 6.1.1.1 to include the applicants preheat requirements for carbon steel and low-alloy steel components. Staff guidance recommends the preheat guidelines in ASME Code Section III, Appendix D, Article D-1000 for carbon steel and low alloy steel components.

06.01.01-18

In RAI 06.01.01-5, the staff requested that the applicant provide additional information regarding dissimilar metal welds in ESF systems. In the applicant's response, it discussed process controls to minimize weld metal dilution and welding flaws. The applicant also identified the accumulator as a component that has dissimilar metal welds

REQUEST FOR ADDITIONAL INFORMATION 544-4267 REVISION 0

between carbon steel and austenitic stainless steel using Alloy 52/152 weld filler material. In order to provide clarity as to the use of dissimilar metal welds in ESF systems, the staff requests that the applicant address the following in the DCD.

(a) Provide a lists of ESF components, in the DCD, that utilize dissimilar metal welds, In addition, discuss how these welds are performed and verify that austenitic stainless steels are not subjected to post weld heat treatment as part of the process.

(b) Specify the maximum amount of weld metal dilution (min amount of Chromium in completed weld) and state how maximum dilution is verified when performing weld procedure qualifications.

(c) State process controls used to minimize welding defects in DMWs. In the applicant's response to RAI 06.01.01-5, the applicant stated that interpass treatment is performed but it is not clear to the staff what the interpass treatment entails.

(d) State the maximum normal operating temperature of DMWs

06.01.01-19

The staff was unable to locate ITAAC for the containment liner system relative to verifying compliance with ASME Codes for fabrication, welding and nondestructive examination. The staff requested, in RAI 06.01.01- that the applicant identify where the aforementioned information is addressed in FSAR Tier 1 or modify the FSAR accordingly. The applicant responded to the above RAI and stated that the information is located in Tier 1, Table 2.11.1-2 which references Tier 1, Table 2.2-4. The staff reviewed the aforementioned Tier 1 Tables and finds them to be unclear and vague. Therefore, the staff requests that the applicant modify Tier 1 ITAAC for the pre-stressed concrete containment vessel (PCCV) to provide clear ITAAC requirements for verifying that the PCCV liner meets ASME Code, Section III for materials, fabrication, welding and non-destructive examination of welds.