MITSUBISHI HEAVY INDUSTRIES, LTD.

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TOKYO, JAPAN

August 25, 2010

Document Control Desk U.S. Nuclear Regulatory Commission Washington, DC 20555-0001

Attention: Mr. Jeffrey A. Ciocco

Docket No. 52-021 MHI Ref: UAP-HF-10233

NRD

Subject: MHI's Responses to US-APWR DCD RAI No.612-4828 Revision 0

Reference: 1) "Request for Additional Information 612-4828 REVISION 0, 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)" dated July 21, 2010.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Responses to Request for Additional Information No.612-4828 Revision 0."

Enclosed are the responses to Questions 06.01.01-20 through 06.01.01-23 that are contained within Reference 1.

Please contact Dr. C. Keith Paulson, Senior Technical Manager, Mitsubishi Nuclear Energy Systems, Inc. if the NRC has questions concerning any aspect of the submittals. His contact information is below.

Sincerely,

4. Ogata

Yoshiki Ogata, General Manager- APWR Promoting Department Mitsubishi Heavy Industries, LTD.

Enclosure:

1. Responses to Request for Additional Information No.612 Revision 0

CC: J. A. Ciocco C. K. Paulson

Contact Information

C. Keith Paulson, Senior Technical Manager Mitsubishi Nuclear Energy Systems, Inc. 300 Oxford Drive, Suite 301 Monroeville, PA 15146 E-mail: ck_paulson@mnes-us.com Telephone: (412) 373-6466

Docket No. 52-021 MHI Ref: UAP-HF-10233

Enclosure 1

UAP-HF-10233 Docket No. 52-021

Responses to Request for Additional Information No.612-4828 Revision 0

August 2010

8/25/2009

US-APWR Design Certification Mitsubishi Heavy Industries Docket No. 52-021

RAI NO.:	NO. 612-4828 REVISION 0
SRP SECTION:	06.01.01 - ENGINEERED SAFETY FEATURES MATERIALS
APPLICATION SECTION:	6.1.1
DATE OF RAI ISSUE:	7/21/2010

QUESTION NO.: 06.01.01-20

In response to RAI 06.01.01-13, the applicant revised Table 6.1-1 and 6.1-2. The staff noticed that the applicant did not list Alloy 52/152 weld filler material. The applicant indicated, in an earlier RAI response, that Alloy 52/152 will be used to join the accumulator to the outlet piping. The staff requests that the applicant modify Tables 6.1-1 and 6.1-2 to include the appropriate specifications and classifications for Alloy 52/152.

ANSWER:

Table 6.1-1 and 6.1-2 will be modified.

Impact on DCD

The following materials will be added in Table 6.1-1 and Table 6.1-2

Table 6.1-1 Principle Engineered Safety Feature Pressure Retaining Material Specifications

ESF Component	Material	Class, Grade or Type
Weld Filler Material		
	<u>SFA-5.11</u>	ENiCrFe-7
	<u>SFA-5.14</u>	ERNiCrFe-7

Table 6.1-2 Principle Engineered Safety Features Materials Exposed to Core Coolant and Containment Spray

ESF Component	Material	Class, Grade or Type
Weld Filler Material		
· · · · · · · · · · · · · · · · · · ·	SFA-5.11	ENiCrFe-7
	<u>SFA-5.14</u>	ERNiCrFe-7

Impact on COLA

There is no impact on the COLA.

Impact on PRA

8/25/2009

US-APWR Design Certification Mitsubishi Heavy Industries Docket No. 52-021

RAI NO.:	NO. 612-4828 REVISION 0
SRP SECTION:	06.01.01 – ENGINEERED SAFETY FEATURES MATERIALS
APPLICATION SECTION:	6.1.1
DATE OF RAI ISSUE:	7/21/2010

QUESTION NO.: 06.01.01-21

In response to RAI 06.01.01-14, the applicant provided a proposed revision to Table 10.4.9-7. Although the proposed Table lists austenitic stainless steel components and piping, the applicant did not list the specifications and classifications of the stainless steel weld filler material that will be used. The staff requests that the applicant list stainless steel weld filler materials in Table 10.4.9-7 that will be used in the EFWS.

ANSWER:

Table 10.4.9-7 will be revised to add the stainless steel weld filler materials.

Impact on DCD

Table 10.4.9-7 will be revised as following:

Table 10.4.9-7 Prin	ciple Emergency	/ Feedwater S	ystem Materials
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ESF Component	Material	Class, Grade or Type
Emergency Feedwater Pump		
Pressure casting	SA-351	Gr. CF3 or CF3M
<u></u>		Gr. CF8 or CF8M
Pressure forgings	SA-182	Gr. F304 or F304L/LN
	· .	Gr. F316 or F316L/LN
· · · · · ·	SA-266	Gr.2
Tubes and pipes	SA-213	Gr. TP304 or TP304L
	SA-312	Gr. TP316 or TP316L
Closure Stud Bolts	SA-193	Gr. B6 or B7
·	SA 638	G660
Closure Stud Nuts	SA-194	Gr. 6 or 7
	SA-564	630
Cladding, Buttering	Type 308L/309L Stainless	-
	Steel Strip Electrode	
Piping	SA-106	Gr. B
· · · · · · · · · · · · · · · · · · ·	<u>SA-312</u>	<u>Gr. TP304 or TP304L</u>
Valves	SA-105	

	SA-266	Gr.2
	SA-216	Gr. WCB
Fitting / Flange	SA-105	
	<u>SA-234</u>	Gr. WPBW
	<u>SA-403</u>	Gr.WP304-W
	SA-216SA-266	Gr. WCBGr. 2
Weld Filler Material	SFA-5.1	E6018, E7018, E6016,
		E7016
	SFA-5.18	ER70S-2, ER70S-3,
		ER70S-4, ER70S-6
	SFA-5.4	E308, E309, E308L
	SFA-5.9	ER308, ER309,
		ER308L

Impact on COLA

There is no impact on the COLA.

Impact on PRA

8/25/2009

US-APWR Design Certification Mitsubishi Heavy Industries Docket No. 52-021

RAI NO.:	NO. 612-4828 REVISION 0
SRP SECTION:	06.01.01 - ENGINEERED SAFETY FEATURES MATERIALS
APPLICATION SECTION:	6.1.1
DATE OF RAI ISSUE:	7/21/2010

QUESTION NO.: 06.01.01-22

a) In the applicant's amended response to RAI 06.01.01-9 dated March 30, 2010, MHI stated that it will modify DCD Subsection 6.1.1.1 to state "Austenitic stainless steel base metal used for the pressure retaining materials, which conditions are similar to the RCS, has a limited carbon content not exceeding 0.05% (heat analysis) and 0.06% (product analysis) when the standard grade stainless steel is used." In order to provide clarity and make it clear that the carbon content limits will be applied to all ESF components, the staff requests that the applicant delete ", which conditions are similar to the RCS" from its proposed DCD modification.

b) The applicant's amended response to RAI 06.01.01-9 states "If, during the detailed design, MHI determines there are local areas where significant flow stagnation may be present (that could produce locally elevated dissolved oxygen levels), then other parameters, such as temperature will be considered to determine the potential for SCC. MHI determines that the SCC potential is sufficient, then stainless steel with carbon content less than or equal to 0.03% will be applied for portions around that area." In order to provide clarity and ensure that the intent of RG 1.44 is followed, the staff requests that the applicant state the following in DCD Subsection 6.1.1.1.

During the detailed design, MHI will determine if there are local areas where flow stagnation may be present resulting in dissolved oxygen content greater than 0.10 ppm in piping and components that have a normal operating temperature above 200F. For piping and components where the above conditions exists, stainless steel with a carbon content less than or equal to 0.03% will be used.

ANSWER:

- a) The portion ", which conditions are similar to the RCS," of its proposed DCD modification will be deleted.
- b) DCD Subsection 6.1.1.1 will be revised.

Impact on DCD

 a) The impact on DCD in the response "Amended MHI's Responses to US-APWR DCD RAI No. 379-2756 Rev0", UAP-HF-10085, will be modified to delete ", which conditions are similar to the RCS," as follows: The following sentence will be added in the last of 4th paragraph in the DCD Subsection 6.1.1.1.

Austenitic stainless steel base metal used for the pressure retaining materials has a limited carbon content not exceeding 0.05% (heat analysis) and 0.06% (product analysis) when the standard grade stainless steel is used.

b) The following sentence will be added in the last of 4th paragraph in the DCD Subsection 6.1.1.1:

During the detailed design, the applicant will determine if there are local areas where flow stagnation may be present resulting in dissolved oxygen content greater than 0.10 ppm in piping and components that have a normal operating temperature above 200 °F. For piping and components where the above conditions exist, stainless steel with a carbon content less than or equal to 0.03% will be used.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

8/25/2009

US-APWR Design Certification Mitsubishi Heavy Industries Docket No. 52-021

RAI NO.: NO. 612-4828 REVISION 0

SRP SECTION:	06.01.01 - ENGINEERED SAFETY FEATURES MATERIALS
APPLICATION SECTION:	6.1.1
DATE OF RAI ISSUE:	7/21/2010

QUESTION NO.: 06.01.01-23

The staff requested, in 06.01.01-17, that the applicant modify DCD Subsection 6.1.1 to reference the preheating guidelines in ASME Code Section III, Appendix D, Article D-1000 for carbon steels and low alloy steels used in ESF systems or provide an alternative including a technical basis for any alternative. The staff also requested that the applicant move its discussion of RG 1.50 from DCD Subsection 6.1.1.2.2 to the appropriate subsection which is 6.1.1.1. The applicant responded to the above RAI and stated that low alloy steels are not applied to ESF components and a description with regard to RG 1.50 application to low alloy steels will not be added in the DCD. The applicant also stated that preheating for carbon steel and low alloy steel is applied in accordance with the qualified welding procedure specification. The applicant provided a proposed revision of DCD Subsection 6.1.1.1 which states that preheating for carbon steel and low alloy steel is applied in accordance with gualified welding procedure specification. The staff expects that minimum preheating temperatures for carbon and low alloy steels will meet or exceed the recommendations listed in ASME Code Section III, Appendix D, Article D-1000. In addition, the staff notes that the statement in the applicant's response that low alloy steel components are not used in ESF systems appears to conflict with proposed revisions to Tables 6.1-1 and 6.1-2 which list Grade F22 (2.25%Cr,1% Mo) materials which are low alloy steels. With regard to RG 1.50, RAI 06.01.01-17 requested that the applicant move its statement that it follows RG 1.50 from DCD Subsection 6.1.1.2.2 "Controls for Austenitic Stainless Steels" to Subsection 6.1.1.1 "Materials Selection and Fabrication" since RG 1.50 does not apply to stainless steels. The staff requests that the applicant modify DCD Subsection 6.1.1.1 to state that the minimum preheat temperatures used for welding carbon and low alloy steels in ESF systems will meet or exceed the guidelines listed in ASME Code Section III. Appendix D. Article D-1000 or provide an alternative including a technical basis. In addition, the staff requests that the applicant move its statement that it follows RG 1.50 from DCD Subsection 6.1.1.2.2 "Controls for Austenitic Stainless Steels" to Subsection 6.1.1.1 "Materials Selection and Fabrication" since RG 1.50 does not apply to stainless steels. Also, address the inconsistency between the DCD and your statement, in response to RAO 06.01.01-17, that low alloy steels are not listed in any ESF components.

ANSWER:

DCD Subsection 6.1.1.1 will be modified to state that the minimum preheat temperatures used for welding carbon and low alloy steels in ESF systems will meet the guidelines listed in ASME Code Section III, Appendix D, Article D-1000.

The RAI response of RAI 06.01.01-17 is revised as follows;

The description with regard to RG 1.50 will be placed in DCD Subsection 6.1.1.1. DCD Subsection 6.1.1.1 will be modified to state that the minimum preheat temperatures used for welding carbon and low alloy steels in ESF systems will meet the guidelines listed in ASME Code Section III, Appendix D, Article D-1000.

Low alloy steels are not applied to ESF components. Therefore, a description with regard to RG 1.50 application to low alloy steels will not be added in the DCD.

Preheating for carbon steel and low alloy steel is applied in accordance with qualified welding procedure specification. So this description will be added in the DCD.

Impact on DCD

The impact on DCD of RAI response of 06.01.01-17 will be modified as follows:

The 8th paragraph of Subsection 6.1.1.1 will be revised as follows:

The control of welding, heat treatment, welder qualification, and contamination protection for ESF ferritic and austenitic stainless steel material fabrication are described in Chapter 5, Subsection 5.2.3. <u>The minimum preheat temperatures used for welding carbon and low alloy steels in ESF systems will meet the guidelines listed in ASME Code Section III, Appendix D, Article D-1000.</u>

The following sentence will be deleted from 2nd paragraph of Subsection 6.1.1.2.2.

The recommendations of RG 1.50, Control of Preheat Temperature for Welding of Low Alloy Steel, (Ref. 6.1-14) are applied during weld fabrication.

The following sentence will be added in the last paragraph of Subsection 6.1.1.1.

<u>The recommendations of RG 1.50, Control of Preheat Temperature for Welding of Low</u> Alloy Steel, (Ref. 6.1-14) are applied during weld fabrication.

Impact on COLA

There is no impact on the COLA.

Impact on PRA