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April 17, 2009

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-09178

Subject: MHI's Response to US-APWR DCD RAI No. 253-2063 REVISION 0, RAI No. 254-2075 REVISION 0, RAI No. 291-2301 REVISION 0

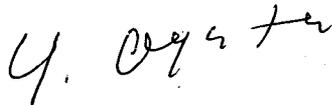
- Reference:**
- 1) "Request for Additional Information No. 253-2063 Revision 0, SRP Section: 05.02.01.02 – Applicable Code Cases" dated March 3, 2009.
 - 2) "Request for Additional Information No. 254-2075 Revision 0, SRP Section: 05.02.04 – Reactor Coolant Pressure Boundary Inservice Inspection and Testing" dated March 3, 2009.
 - 3) "Request for Additional Information No. 291-2301 Revision 0, SRP Section: 05.02.01.02 – Compliance with Applicable Code Cases" dated March 26, 2009.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") documents entitled "Response to Request for Additional Information No. 253-2063 Revision 0, RAI No. 254-2075 Revision 0, RAI No. 291-2301 Revision 0."

Enclosed are the responses to the RAI contained within Reference 1, 2 and 3.

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,



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

Enclosures:

1. Response to Request for Additional Information No. 253-2063 Revision 0
2. Response to Request for Additional Information No. 254-2075 Revision 0
3. Response to Request for Additional Information No. 291-2301 Revision 0

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MHI

CC: J. A. Ciocco
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Contact Information

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Enclosure 1

UAP-HF-09178
Docket Number 52-021

Response to Request for Additional Information
No. 253-2063 Revision 0

April 2009

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

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

RAI NO.: NO.253-2063 REVISION 0
SRP SECTION: "5.2.1.2 – Applicable Code Cases"
APPLICATION SECTION: 5.2.1.2
DATE OF RAI ISSUE: 3/03/2009

QUESTION NO. : 05.02.01.02-1

USAPWR DCD Tier 2, Section 5.2.1.2, "Compliance with Applicable Code Cases," states that applicable ASME Code Cases for reactor coolant pressure boundary (RCPB) Class 1 components are listed in Table 5.2.1-2, "ASME Code Cases." USAPWR DCD Tier 2, Section 5.2.1.2 states that any Code Case conditionally approved in Regulatory Guide 1.84 for Class 1 components meets the conditions established in the regulatory guide. Table 5.2.1-2 lists ASME Code Case N-71-18, "Additional Material for Subsection NF, Class 1, 2, 3 and MC Supports Fabricated by Welding, Section III Division 1," for use in the design of supports for specific nuclear power plant components. The NRC staff requests that Mitsubishi specify in the USAPWR DCD the components that will be fabricated using Code Case N-71-18 and the materials specifications and grades that will be used.

ANSWER:

DCD Table 5.2.1-2 identifies the RCPB component supports that Code Case N-71-18 and N-249-14 may be applied to. These components will be fabricated from carbon steel material such as SA-36, consistent with the application and criteria of the code cases.

Impact on DCD

There is no impact on the DCD

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

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Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: NO.253-2063 REVISION 0
SRP SECTION: "5.2.1.2 – Applicable Code Cases"
APPLICATION SECTION: 5.2.1.2
DATE OF RAI ISSUE: 3/03/2009

QUESTION NO. : 05.02.01.02-2

USAPWR DCD Tier 2, Section 5.2.1.2 states that ASME Code Cases for Class 2 and 3 piping are covered in Section 3.12, "Piping Design Review." USAPWR DCD Tier 2, Subsection 3.12.2.2, "American Society of Mechanical Engineers Code Cases," states that ASME Code Cases N-122-2, N-318-5, N-391-2, N-392-3, and N-319-3 are applicable for the design of the piping system and the piping supports for the USAPWR. These code cases are listed as acceptable in RG 1.84. USAPWR DCD Tier 2, Section 5.2.1.2 states that other ASME Codes Cases may be used in the USAPWR Design Certification if they are either conditionally or unconditionally approved in RG 1.84. As stated in the NRC safety evaluation report (NUREG-1793) for the AP1000 Design Certification, the only acceptable ASME Code Cases that may be used for the design of ASME Code Class 1, 2, and 3 piping systems in the certified design plant are those either conditionally or unconditionally approved in RG 1.84, and that are in effect at the time of the Design Certification, or determined to be conditionally acceptable in the NRC safety evaluation report on the Design Certification application. A COL applicant may submit, with its COL application, future ASME Code Cases that are endorsed in RG 1.84 at the time of the application, provided that they do not alter the staff's safety findings on the certified design. In addition, the COL applicant should specify those ASME Code Cases to be used at the plant referencing the certified design, which are in effect at the time of the COL application that are applicable to RG 1.147, "Inservice Inspection Code Case Acceptability - ASME Section XI, Division 1," and RG 1.192, "Operation and Maintenance Code Case Acceptability - ASME OM Code." The NRC staff requests that Mitsubishi clarify the need for the COL applicant to identify ASME Code Cases to be used at the plant referencing the USAPWR design certification in the COL application.

ANSWER:

The third paragraph of DCD Subsection 5.2.1.2 states that the COL applicant addresses the addition of ASME Code Cases that are approved in RGs 1.84, 1.147 and RG 1.192.

MHI will add sentences about the need for the COL applicant to identify ASME Code Cases to be used at the plant referencing the USAPWR design certification in the COL application.

Impact on DCD

The DCD will be changed to add sentences that "A COL applicant may submit, with its COL application, future ASME Code Cases that are endorsed in RG 1.84 at the time of the application, provided that they do not alter the NRC staff's safety findings on the certified design. In addition, the COL applicant should specify those ASME Code Cases to be used at the plant referencing the certified design, which are in effect at the time of the COL application that are applicable to RG 1.147 and RG 1.192."

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

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RAI NO.: NO.253-2063 REVISION 0
SRP SECTION: "5.2.1.2 – Applicable Code Cases"
APPLICATION SECTION: 5.2.1.2
DATE OF RAI ISSUE: 3/03/2009

QUESTION NO. : 05.02.04-3

USAPWR DCD Tier 2, Section 5.2.1.2 states that the COL applicant addresses ASME Code Cases that are approved in RG 1.147 and RG 1.192. USAPWR DCD Tier 2, Section 5.2.6, "Combined License Information," lists COL information items COL 5.2(1), (2), and (3) that specify that the COL applicant addresses ASME Code Cases approved in RGs 1.84, 1.147, and 1.192, respectively. The NRC staff requests that Mitsubishi specify in the USAPWR DCD the ASME *Boiler and Pressure Vessel Code*, Section III and Section XI Code Cases, and ASME *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) Code Cases currently planned to be applied as part of the USAPWR design.

ANSWER:

Code Cases N-307-3 and N-613-1 for RV, SG, and Pressurizer, and N-729-1 for RV upper head are currently planned to be used. These Code Cases are ASME Section XI Code Cases. Code Case OMN-13 of ASME OM Code is currently planned to be applied to the inservice testing of snubbers as stated in the DCD Subsection 3.9.3.4.2.6. These Code Cases will be added to Table 5.2.1-2.

ASME Section III Code Cases that may be used as part of the US-APWR RCPB Class 1 component design are already listed in the DCD Table 5.2.1-2. Other ASME Section III Code Cases that may be used are N-318-5 and N-392-3 for Class 2, 3 piping (as stated in the DCD Subsection 3.12.2.2), and N-4-11 for Core Support Structures as stated in the DCD Subsection 4.5.2.1. But as stated in the regulatory guide 1.206, the guidance for Subsection 5.2.1.2 is to provide a list of ASME Code Cases that will be applied to components within the RCPB. So these Code Cases are not be listed in the Table 5.2.1-2 because it is not for RCPB components but for CSS.

Impact on DCD

The DCD will be changed to incorporate the following:

- Table 5.2.1-2 will be revised reflecting the Code Cases N-307-3, N-613-1, N-729-1, and OMN-13.

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

This completes MHI's responses to the NRC's questions.

Docket No. 52-021
MHI Ref: UAP-HF-09178

Enclosure 2

UAP-HF-09178
Docket Number 52-021

Response to Request for Additional Information
No. 254-2075 Revision 0

April 2009

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US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: NO.254-2075 REVISION 0
SRP SECTION: "5.2.4 – Reactor Coolant Pressure Boundary Inservice
Inspection and Testing"
APPLICATION SECTION: 5.2.4
DATE OF RAI ISSUE: 3/03/2009

QUESTION NO. : 05.02.04-1

DCD Tier 2, Section 5.2.4.1.1 describes accessibility for inspection and states that the physical arrangement of ASME Code Class 1 components is designed to allow personnel and equipment access "to the extent practical" to perform the required inservice examinations specified by the Code and mandatory appendices. The DCD also states that space is also provided per ASME Code, Section XI, paragraph IWA-1500(e) for necessary operations "to the extent practical" associated with repair/replacement activities. It states that piping arrangement allows for adequate separation of piping welds so that space is available to perform ISI. It further states that welds in piping that pass through wall are located such that there is sufficient clearance and access into the wall penetration to perform weld examination. The DCD also states that design features include sufficient clearances for personnel and equipment, maximized examination surface distances, and favorable materials, weld joint simplicity, elimination of geometric interferences, and proper weld surface preparation.

The staff notes that the phrase "to the extent practical" is inconsistent with a design that enables the performance of PSI/ISI examinations by eliminating interferences due to design, geometry, or materials of construction. The regulations in 10 CFR 50.55a(g)(3)(i) and (3)(ii) require that for a boiling- or pressurized-water nuclear power reactor whose design certification is issued on or after July 1, 1974, components (including supports) classified as Class 1, 2, and 3 must be designed and be provided with access to enable the performance of inservice examination and must meet the preservice examination requirements set forth in the editions and addenda of Section XI of the ASME Code incorporated by reference. In this regard, the term "to the extent practical" is unlikely to apply to a design certification application since design, geometry, and materials of construction can be revised as necessary to meet Code ISI examination requirements. If any specific conditions exist in the US-APWR in which you believe Code ISI examinations are impractical, those conditions should be clearly described and justification should be provided describing why it is impractical to meet Code requirements for reasons of design, geometry, or materials of construction at this time.

ANSWER:

ASME Code Class 1 components are designed to provide access for the examinations required by ASME Section XI and mandatory appendices.

As stated in the DCD Subsection 5.2.4.1.1, US-APWR design activities include consideration of accessibility for inspection of Class 1 components. The ASME Class 1 components and welds requiring ISI have design features that provide accessibility for inspection, including clearance for personnel, weld joint simplicity, elimination of geometrical interferences, and proper weld surface preparation. The design of items such as nozzle to vessel welds allow for volumetric inservice inspection consistent with Code Case N-613-1. The answers to questions 05.02.04-3 through 05.02.04-8 of this RAI response provide additional detailed information regarding the subject of component accessibility for ISI consistent with ASME Section XI.

US-APWR ASME components are designed to provide accessibility for ISI. Therefore, the phrase "to the extent practical" will be removed from the DCD Subsection 5.2.4.1.1.

Impact on DCD

The DCD will be changed to delete the sentences "to the extent practical" from Subsection 5.2.4.1.1.

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

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RAI NO.: NO.254-2075 REVISION 0
SRP SECTION: "5.2.4 – Reactor Coolant Pressure Boundary Inservice Inspection and Testing"
APPLICATION SECTION: 5.2.4
DATE OF RAI ISSUE: 3/03/2009

QUESTION NO. : 05.02.04-2

The SRP acceptance criteria state that the methods, procedures, and requirements regarding qualification of nondestructive examination personnel are in accordance with the ASME Code, Section XI, Article IWA-2300, "Qualification of Nondestructive Examination Personnel." DCD Tier 2, Section 5.2.4.1.2 does not address this acceptance criteria. Please provide additional information with respect to qualification of nondestructive examination personnel in order for the staff to obtain a reasonable assurance finding for this aspect of the operational program.

ANSWER:

MHI will add the following sentence before the second sentence in DCD Subsection 5.2.4.1.2.

"Personnel performing nondestructive examinations will be qualified and certified using a written practice in accordance with ASME Code Section XI, Article IWA-2300, "Qualification of Nondestructive Examination Personnel."

Impact on DCD

The DCD will be changed to incorporate the above sentence.

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

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RAI NO.: NO.254-2075 REVISION 0

SRP SECTION: "5.2.4 – Reactor Coolant Pressure Boundary Inservice Inspection and Testing"

APPLICATION SECTION: 5.2.4

DATE OF RAI ISSUE: 3/03/2009

QUESTION NO. : 05.02.04-3

The SRP states that exemptions from Code examinations should be permitted if the criteria in the ASME Code, Section XI, Subsubarticle IWB-1220, "Components Exempt from Examination," are met. DCD Tier 2 Section 5.2.4.1.6 states that Section XI Code exemptions are permitted by Subarticle IWB-1220. Please provide additional information in order for the staff to determine if the criteria in Subsubarticle IWB-1220 are met in the U.S. APWR design. Your discussion should specifically discuss those conditions in the US-APWR plant where inaccessibility of welds due to concrete encasement, buried underground, or encapsulation exist. Also, if no additional exemptions to the criteria are necessary for the U.S. APWR design, please state as such in the DCD.

ANSWER:

As stated in the DCD Subsection 5.2.4.1.1, piping arrangement allows for adequate separation of piping welds so that space is available to perform ISI, and removable insulation, removable shielding, and removable hangers are provided on those piping systems requiring volumetric and surface examination. As a result US-APWR Class 1 piping design minimizes inaccessibility of welds due to concrete encasement, buried underground, or encapsulation and the exemption criteria of ASME Section XI IWB-1220 will be met.

Piping of NPS 1 and smaller, for example instrumentation line attached to each vessel, and reactor vessel head connections and associated piping, NPS 2 and smaller, are exempted from inspection.

No additional exemptions to the IWB-1220 criteria are necessary and this will be stated in the DCD.

Impact on DCD

The DCD Subsection 5.2.4.1.6 will be changed to add a sentence that no additional exemptions to the ASME Section XI IWB-1220 criteria are necessary based on the current design. .

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

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RAI NO.: NO.254-2075 REVISION 0
SRP SECTION: "5.2.4 – Reactor Coolant Pressure Boundary Inservice
Inspection and Testing"
APPLICATION SECTION: 5.2.4
DATE OF RAI ISSUE: 3/03/2009

QUESTION NO. : 05.02.04-4

The SRP states that the reviewer will determine if the applicant/licensee has demonstrated that any ASME Code requirement is impractical due to design, geometry, or materials of construction. The U.S. APWR DCD, Section 5.2.4.1.7 states that the COL applicant discusses any requests for relief from ASME Code requirements that are impractical as a result of limitations of component design, geometry, or materials of construction. In such cases, specific information is provided which identifies the applicable Code requirements, justification for the relief request, and the inspection method to be used as an alternative. The staff could not determine if the U.S. APWR design incorporates relief requests from impractical examinations as a result of component design, geometry, or materials of construction. The staff notes that the DCD applicant should discuss this aspect, because there should be no relief requests for PSI and first interval ISI examinations due to the requirements under 10 CFR 50.55a(g)(3). Please revise the DCD to state no Code ISI requirements are impractical for the US-APWR design when using the ISI code of record in order for the staff to obtain a reasonable assurance finding.

ANSWER:

No relief request is expected for PSI and first interval ISI examinations for US-APWR Class 1 components and the DCD will be changed as such. 10 CFR 50.55a provide an allowance to request alternatives to or relief from Code requirements. Approved Code Cases that are listed in RG 1.147 may be used because Section XI requirements can be modified by invoking approved Section XI Code Cases.

Impact on DCD

The DCD Subsection 5.2.4.1.7 will be changed to incorporate the following:

- Based on the proposed design no relief requests are necessary for PSI and first interval ISI examinations for US-APWR Class 1 components.
- Approved Code Cases that are listed in RG 1.147 may be used.

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

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US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: NO.254-2075 REVISION 0
SRP SECTION: "5.2.4 – Reactor Coolant Pressure Boundary Inservice Inspection and Testing"
APPLICATION SECTION: 5.2.4
DATE OF RAI ISSUE: 3/03/2009

QUESTION NO. : 05.02.04-5

The U.S. APWR DCD, Section 5.2.4.1.8 states that code cases referenced by the COL applicant that may have been invoked in connection with the ISI program are in compliance with Regulatory Guide 1.147. Please revise the DCD to state what code cases if any, are incorporated into the U.S. APWR design. In addition, First Revised Order EA-03-009 and ASME Code Case N-729-1, are provided as requirements for the system boundary subject to inspection of the reactor vessel head. Due to control rod drive mechanism (CRDM) J-groove weld cracking, the staff believes it is important that the most recent inspection requirements be applied during operation. The NRC position applicable to inspection requirements for the reactor vessel is presented in the final amended rule to 10 CFR 50.55a(g)(6)(ii)(D) related to reactor vessel head inspections (73 FR 52749) issued on September 10, 2008. Please revise the DCD to ensure it is consistent with augmented requirements for the inservice inspection program for the reactor vessel head by implementing ASME Code Case N-729-1 as amended in the final rule amendment to 10 CFR 50.55a.

ANSWER:

The US-APWR DCD Section 5.2.4.1.8 will be revised to include the implementation of ASME Code Case N-729-1, with the conditions specified in 10 CFR 50.55a(g)(6)(ii)(D) of the most recent revision of 10 CFR 50.55a (73 FR52748, Sept. 10, 2008). The US-APWR DCD Section 5.2.4.1.8 will also be revised to include the implementation of ASME Code Case N-613-1 and N-307-3.

Impact on DCD

DCD Subsection 5.2.4.1.8 will be revised as follows:

Code cases referenced by the COL application that may have been invoked in connection with the ISI program are in compliance with Regulatory Guide 1.147 (Ref. 5.2-18). Additional ISI requirements relating to the reactor vessel closure head that are required

by 10 CFR 50.55a, code case N-729-1 "Alternative Examination Requirements for PWR Reactor Vessel Upper Heads With Nozzles Having Pressure-Retaining Partial-Penetration Welds Section XI, Division 1" will be implemented with the conditions specified in 10 CFR 50.55a, Code Case N-613-1 "Ultrasonic Examination of Full Penetration Nozzles in Vessels, Examination Category B-D, Item No's. B3.10 and B3.90; Reactor Nozzle-To-Vessel Welds, Figs. IWB-2500-7(a), (b), and (c) Section XI, Division 1" and Code Case N-307-3 "Ultrasonic Examination of Class 1 Bolting, Table-2500-1, Examination Category B-G-1 Section XI, Division 1" will also be implemented.

The first paragraph of DCD Subsection 5.2.4.2 will be revised as follows:

The preservice examination program is based on the requirements of Article NB-5280 of Section III, Division I of the ASME Code. The PSI program complies with the edition and addenda of ASME Code section XI incorporated by reference in 10 CFR 50.55a (b). In addition, ASME code cases listed in NRC RG 1.147 that are incorporated by reference in paragraph (b) of 10 CFR 50.55a, and other code cases such as N-729-1 that are to be implemented with the conditions of 10 CFR 50.55a, N-613-1, and N-307-3 are incorporated, as needed, in the program for use. The preparation of the inspection and testing program is the responsibility of the COL applicant.

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

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RAI NO.: NO.254-2075 REVISION 0
SRP SECTION: "5.2.4 – Reactor Coolant Pressure Boundary Inservice Inspection and Testing"
APPLICATION SECTION: 5.2.4
DATE OF RAI ISSUE: 3/03/2009

QUESTION NO. : 05.02.04-6

The SRP (NUREG-0800) states that the ISI program is reviewed to verify that the high-energy system piping between containment isolation valves receives an augmented ISI that meets four criteria. The US-APWR DCD does not address this aspect of augmented ISI. If no high-energy piping (including Class 1 piping) penetrates the containment, and no augmented ISI is required to protect against postulated piping failures of high-energy piping (including Class 1 piping) between containment isolation valves, please revise the DCD to reflect this and discuss how postulated pipe breaks at the containment boundary are considered including a discussion of single-failure of one containment isolation valve to close. Otherwise, please provide a description of the augmented ISI that is used for high-energy system piping between containment isolation valves.

ANSWER:

The eighth paragraph of Subsection 5.2.4.1.1 of the DCD states, "The high energy system piping between containment isolation valves should receive an augmented ISI as described at Subsection 6.6.8". Subsection 6.6.8 already states, "An augmented ISI program is required for high-energy fluid system piping between containment isolation valves The ISI program contains information addressing areas subject to inspection, method of inspection, and extent and frequency of inspection. The program covers the high-energy fluid systems described in Chapter 3, Subsection 3.6.1 and 3.6.2." Subsection 3.6.1 addresses plant design for protection against postulated piping failure in fluid systems inside and outside containment, and Subsection 3.6.2 addresses determination of rupture locations and dynamic effects associated with the postulated rupture of piping. Design criteria including the requirements for inspection of all piping in the PCCV penetration are addressed in Subsection 3.6.2.1.1.1 of the DCD. Therefore no DCD change is required.

Impact on DCD

There is no impact on the DCD

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

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Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: NO.254-2075 REVISION 0

SRP SECTION: "5.2.4 – Reactor Coolant Pressure Boundary Inservice Inspection and Testing"

APPLICATION SECTION: 5.2.4

DATE OF RAI ISSUE: 3/03/2009

QUESTION NO. : 05.02.04-7

The US-APWR DCD, Section 5.2.4, does not discuss any aspect of a boric-acid, leak-detection program to address the concerns of NRC Generic Letter 88-05. NUREG-0800 states that for PWR plants the applicant must establish an inspection program to detect and correct potential reactor-coolant-pressure boundary corrosion caused by boric acid leaks as described in NRC Generic Letter 88-05. Please revise the DCD to describe how specific design features of the US-APWR plant enable effective boric-acid, leak-detection inspections in sufficient detail for the staff to make a reasonable assurance determination and provide what actions are necessary by COL applicants to address any other aspect of the operational program (e.g., inspection frequency).

ANSWER:

Locations such as valve packing and pump seals are possible sources of reactor coolant leakage, and ferritic components such as vessels and threaded fasteners will show increased general corrosion rates when exposed to reactor coolant leakage. Industry operating experience has shown that a boric acid corrosion control program utilizing inservice visual and/or other nondestructive inspections is needed. Boric acid corrosion control procedures require inspection of the reactor coolant pressure boundary for leakage that can cause boric acid corrosion of the reactor coolant pressure boundary materials. The procedures are directed at identifying reactor coolant leakage locations and paths of leaking coolant and determining the principal locations where leaks can cause degradation of the primary pressure boundary by boric acid corrosion. The boric acid corrosion control procedure consists of visual inspection of component surfaces to determine the principal location of leakage, discovery of leakage paths, removal of boric acid residue, and corrective actions as described in Generic Letter 88-05.

The boric-acid, leak-detection program will provide guidance for inspecting the integrity of bolting and threaded fasteners. For the reactor vessel closure head, this program includes surface examination requirements of code case N-729-1, with the conditions of 10 CFR 50.55a.

Impact on DCD

Fifth paragraph of the DCD Subsection 5.2.4.1 will be changed as follows:

The ISI and IST program detail the areas subject to examination and the method, extent, and frequency of examinations, including a program to detect and correct potential RCPB corrosion caused by boric acid leaks, as described in NRC Generic Letter 88-05. (Ref. 5.2-37) For the reactor vessel closure head, this program includes surface examination requirements of code case N-729-1, with the conditions of 10 CFR 50.55a. Additionally, component supports and snubber testing requirements are included in the inspection program.

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

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DATE OF RAI ISSUE: 3/03/2009

QUESTION NO. : 05.02.04-8

The staff notes that a significant number of dissimilar-metal welds and austenitic welds in the current U.S. PWR fleet have experienced cracking due to primary-water, stress-corrosion cracking (PWSCC). The staff considers this issue a significant safety issue and has committed a considerable amount of resources and oversight to resolve this issue in the operating fleet. The USAPWR DCD does not describe what design considerations have been taken into account to address this issue. Based on the above, the staff requires additional information in order to obtain a reasonable assurance finding of the acceptability of the US-APWR design to address the concerns of PWSCC. Please discuss the design details for preservice and inservice inspection of Class 1 austenitic and dissimilar-metal welds with respect to their ability to enable inspection and monitoring for PWSCC degradation. Specifically, address two-sided accessibility. If two-sided access cannot be obtained to perform the same type of nondestructive examination method during inservice examination as performed during preservice examination, discuss how NRC regulations under 10 CFR 50.55a(b)(2)(xv), 10 CFR 50.55a(b)(2)(xvi) and the ASME Code requirements will be met. Note that the staff assumes that any relief from the Code requirements for these susceptible welds on the basis of design, geometry, or materials of construction should not be necessary, since these factors can be rectified during the design stage before the plant is constructed. If radiography is to be used to supplement one-sided examinations, discuss how operational and radiological concerns associated with the method will be taken into consideration such that 100% examination of the required weld volume remains practical by the COL holder (or licensee). Finally, please state in the DCD that any changes to the design of US-APWR components by the COL applicant should include a discussion of the provisions to preserve accessibility to perform ISI for Class 1, 2, and 3 components when meeting IWA-1500 and 10 CFR 50.55a(g)(3).

ANSWER:

Dissimilar metal welds exist in US-APWR reactor coolant system components that utilize nickel-based alloy 690 weld materials to provide high performance against PWSCC. Dissimilar-metal

welds in US-APWR Class 1 components of the reactor coolant system are designed for two-sided access volumetric inspection.

Austenitic stainless steel piping welds are also designed for two-sided access wherever possible. However, due to their geometry a limited number of circumferential weld locations such as branch piping connections, valve connections and elbow connections may have limited access for two sided ultrasonic examination. Cases where two sided ultrasonic examination is difficult or not possible will be evaluated on a case-by-case basis to establish effective inspection methods. RT, including digital RT, may be used in conjunction with UT as allowed by IWA-2231, smaller or specially configured UT transducers, if there is the applicable method, may be applied. For austenitic stainless steel welds where two sided access is difficult, the UT procedure will comply with ASME Section XI, 10 CFR 50.55a(b)(2)(xvi)(B) and 10 CFR 50.55a(b)(2)(xv)(A)(2). RT will be a strictly limited to use only to supplement UT to improve coverage of the required examination volume. Personnel access limitations and/or protective shield barriers in the work area will be used when RT is being conducted.

The DCD will be changed to state that any changes to the design of US-APWR components by the COL applicant should include a discussion of the provisions to preserve accessibility to perform ISI for Class 1 components when meeting IWA-1500 and 10 CFR 50.55a(g)(3).

Impact on DCD

A sentence will be added to the last paragraph of Subsection 5.2.4.1.1 of the DCD stating:

Any changes to the design of US-APWR components by the COL applicant should include a discussion of the provisions to preserve accessibility to perform ISI for Class 1 components consistent with the requirements of IWA-1500 and 10 CFR 50.55a(g)(3).

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

This completes MHI's responses to the NRC's questions.

Docket No. 52-021
MHI Ref: UAP-HF-09178

Enclosure 3

UAP-HF-09178
Docket Number 52-021

Response to Request for Additional Information
No. 291-2301 Revision 0

April 2009

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

4/17/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: NO.291-2301 REVISION 0
SRP SECTION: "5.2.1.2 – Compliance with Applicable Code Cases"
APPLICATION SECTION: 5.2.1.2
DATE OF RAI ISSUE: 3/26/2009

QUESTION NO. : 05.02.01.02-4

US-APWR DCD Tier 2, Section 5.3.2.1, "Limit Curves" states that, "The methods outlined in ASME Code Section XI Appendix G, including defect sizes and safety factors, are applied in the analyses for protection against non-ductile failure. ASME Code Section XI Appendix G is applied rather than ASME Code Section III Appendix G, as it is referenced by 10 CFR 50 Appendix G (Ref. 5.3-6) and also incorporates several ASME code cases including N-588, N-640 and N-641." MHI is requested to list these code cases in Table 5.2.1-2. In addition, Mitsubishi is also requested to discuss how the use of these code cases is acceptable in US-APWR design.

ANSWER:

MHI does not believe it is necessary to list code cases N-588, N-640, and N-641 in Table 5.2.1-2, since, as described in the US-APWR DCD Tier 2 Section 5.3.2.1, these code cases have already been incorporated into the ASME Code Section XI Appendix G which is applied for the US-APWR.

The use of ASME Code Section XI Appendix G, which has incorporated these code cases, for the US-APWR design is acceptable since it is referenced by 10 CFR 50 Appendix G.

Impact on DCD

There is no impact on the DCD

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

4/17/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: NO.291-2301 REVISION 0
SRP SECTION: "5.2.1.2 – Compliance with Applicable Code Cases"
APPLICATION SECTION: 5.2.1.2
DATE OF RAI ISSUE: 3/26/2009

QUESTION NO. : 05.02.01.02-5

US-APWR DCD Tier 2, Section 5.2.1.2 states that, "The Combined License (COL) applicant addresses the addition of ASME Code Cases that are approved {by NRC} in Regulatory Guide 1.84 {Design, Fabrication, and Materials Code Case Acceptability, ASME Section III}." It also states that, "The {COL} applicant addresses ASME Code Cases that are approved in Regulatory Guide 1.147 "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," and 1.192 "Operation and Maintenance Code Case Acceptability, ASME OM Code." The COL items are provided in Section 5.2.6 and Table 1.8-2 "Compilation of All Combined License Applicant Items for Chapters 1-19" as COL 5.2(1), COL 5.2(2) and COL 5.2(3). Mitsubishi is requested to list all the ASME Section III, Section XI and OM Code Cases that were used or will be used (for instance, Code Cases N-284-2, N-759-2, N-729-1) for US-APWR component design certification. Explain how the COL applicant shall provide justification for using the code cases identified in the COL application other than those listed in Table 5.2.1-2.

ANSWER:

Code Cases N-307-3 and N-613-1 for RV, SG, and Pressurizer, and N-729-1 for RV upper head will be used as ASME Section XI Code Cases. Code Case OMN-13 of ASME OM Code is currently planned to be applied to the inservice testing of snubbers as stated in the DCD Subsection 3.9.3.4.2.6. These Code Cases will be added in the Table 5.2.1-2.

Code Case N-284-2 is not included in the table because this code case is for metal containment shells, not for RCPB components. N-759-2 is also not included in the table because this code case will not be applied to RCPB components in US-APWR. Other Code Cases not applicable to RCPB components are also not included in the Table 5.2.1-2 because, as stated in RG 1.206, the requirement for Subsection 5.2.1.2 is to provide a list of ASME Code Cases that will be applied to components within the RCPB. As stated in the DCD Subsection 5.2.6, the COL Applicant address the addition of Code Cases that are approved in RG 1.84, and the COL applicant address Code Cases invoked in connection with the inservice inspection program (or operation and maintenance) that are in compliance with RG 1.147 (or RG 1.192).

Impact on DCD

The DCD Table 5.2.1-2 will be changed to add N-307-3, N-613-1, N-729-1, and OMN-13.

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

This completes MHI's responses to the NRC's questions.