

  
**MITSUBISHI HEAVY INDUSTRIES, LTD.**  
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TOKYO, JAPAN

March 02, 2011

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-11055

**Subject: MHI's Response to US-APWR DCD RAI No. 688-5273 Revision 2 (SRP Section 07.07)**

**Reference:** 1) "Request for Additional Information No. 688-5273 Revision 2, SRP Section: 07.07 –Control Systems – Application Section: 07.07 – Control Systems" dated January 31, 2011.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Response to Request for Additional Information No. 688-5273 Revision 2."

Enclosed is the response to a question 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,



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

Enclosure:

1. Response to Request for Additional Information No. 672-4982 Revision 2

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

Contact Information

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DOB  
HRO

Docket No. 52-021  
MHI Ref: UAP-HF-11055

Enclosure 1

UAP-HF-11055  
Docket No. 52-021

Response to Request for Additional Information No. 688-5273  
Revision 2

March 2011

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**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

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03/02/2011

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

**RAI NO.:** NO.688-5273 REVISION 2  
**SRP SECTION:** 07.07 – CONTROL SYSTEMS  
**APPLICATION SECTION:** 07.07 – CONTROL SYSTEMS  
**DATE OF RAI ISSUE:** 01/31/2011

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**QUESTION NO. : 07-07-30**

On Table 7.1-2, "Regulatory Requirements Applicability Matrix," of Tier 2 of the USAPWR DCD, 10 CFR 50.55a(a)(1) is not addressed under PCMS or DAS. 10 CFR 50.55a(a)(1) states that "*Structures, systems, and components must be designed, fabricated, erected, constructed, tested, and inspected to quality standards commensurate with the importance of the safety function to be performed*". In the SRP Chapters for 7.7 (Control Systems) and 7.8 (Diverse Instrumentation and Control Systems), 10 CFR 50.55a(a)(1) is part of the acceptance criteria.

The staff requests MHI to include 10 CFR 50.55a(a)(1) in Table 7.1-2 of the DCD, to fully address how US-APWR complies with the requirement.

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**ANSWER:**

MHI agrees with the staff's request.

DCD Table 7.1-2 will be revised to indicate that 10 CFR 50.55a(a)(1) applies to the PCMS and the DAS.

As described in MHI response to Question 07.07-32, MHI will clarify the augmented quality assurance requirements for the PCMS and the DAS by the end of March.

**Impact on DCD**

Item a. of Table 7.1-2 will be revised as shown in the following table markup.

**Impact on COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.

**Table 7.1-2 Regulatory Requirements Applicability Matrix**  
 (per NUREG-0800 Standard Review Plan (SRP) Sec. 7.1 Rev. 5)  
 (Sheet 1 of 8)

Applicable Criteria		Title	I&C System							Related Section in US-APWR DCD
			RPS	ESFAS	SLS	Safety HSI	Safety DCS	PCMS	DAS	
		<b>1. 10 CFR 50 and 52</b>								
a.	50.55a(a)(1)	Quality Standards for Systems Important to Safety	X	X	X	X	X	X	X	7.2 to 7.6, 7.9
b.	50.55a(h)(2)	Protection Systems (IEEE Std 603-1991 or IEEE Std 279-1971)	X	X	X	X	X			7.2 to 7.6, 7.9
c.	50.55a(h)(3)	Safety Systems (IEEE Std 603-1991)	X	X	X	X	X			7.2 to 7.6, 7.9
d.	50.34(f)(2)(v) [I.D.3]	Bypass and Inoperable Status Indication	X	X	X	X	X	X		7.2, 7.3, 7.5, 7.6
e.	50.34(f)(2)(xi) [II.D.3]	Direct Indication of Relief and Safety Valve Position			X		X	X		7.5
f.	50.34(f)(2)(xii) [II.E.1.2]	Auxiliary Feedwater System Automatic Initiation and Flow Indication	X	X	X	X	X			7.3, 7.5
g.	50.34(f)(2)(xvii) [II.F.1]	Accident Monitoring Instrumentation	X		X	X	X	X		7.5
h.	50.34(f)(2)(xviii) [II.F.2]	Instrumentation for the Detection of Inadequate Core Cooling	X			X	X			7.5
i.	50.34(f)(2)(xiv) [II.E.4.2]	Containment Isolation Systems	X	X	X	X	X			7.3
j.	50.34(f)(2)(xix) [II.F.3]	Instruments for Monitoring Plant Conditions Following Core Damage	X			X	X			7.5
k.	50.34(f)(2)(xx) [II.G.1]	Power for Pressurizer Level Indication and Controls for Pressurizer Relief and Block Valves	X		X	X	X			7.4, 7.5
l.	50.34(f)(2)(xxii) [II.K.2.9]	Failure Mode and Effect Analysis of Integrated Control System								N/A to US-APWR
m.	50.34(f)(2)(xxiii) [II.K.2.10]	Anticipatory Trip on Loss of Main Feedwater or Turbine Trip								N/A to US-APWR
n.	50.34(f)(2)(xxiv) [II.K.3.23]	Central Reactor Vessel Water Level Recording								N/A to US-APWR

07.07-3

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**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

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03/02/2011

**US-APWR Design Certification  
Mitsubishi Heavy Industries  
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**RAI NO.:** NO.688-5273 REVISION 2  
**SRP SECTION:** 07.07 – CONTROL SYSTEMS  
**APPLICATION SECTION:** 07.07 – CONTROL SYSTEMS  
**DATE OF RAI ISSUE:** 01/31/2011

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**QUESTION NO. : 07-07-31**

In the response to RAI 240-2045, question 07.07-11, MHI stated that “...conformance with RG 1.180, which is only for safety systems, is not required for the PCMS.” But RG 1.180 (page 1.180-5, 2nd paragraph) also states that “While non-safety-related systems are not part of the regulatory guidance being developed, control of EMI/RFI from these systems is necessary to ensure that safety-related I&C systems can continue to perform properly in the nuclear power plant environment. When feasible, the emissions from non-safety-related systems should be held to the same levels as safety-related systems.”

The staff requests MHI to demonstrate how the US-APWR design is in conformance with RG 1.180 in relation to the PCMS and how the emissions from nonsafety-related systems do not affect the safety systems.

Reference: MHI's Responses to US-APWR DCD RAI No.230-2028, No.227-2020, No.238-2030, No.228-2021, and No.231-2037, Revision 0; MHI Ref: UAP-HF-09196; DATED APRIL 28, 2009; ML091250290.

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**ANSWER:**

PCMS is designed to meet the requirements in Regulatory Position C.3, EMI/RFI Emissions Testing, of RG 1.180, so that the emissions from the PCMS are held to the equivalent levels as safety-related systems in order to ensure that the safety-related systems can perform their safety functions. In addition, the PCMS is located in a different room from the safety-related systems, so it has a small impact on the safety related systems.

For the susceptibility of the PCMS, MHI will clarify EMI/RFI susceptibility requirements of the PCMS in the discussions with the NRC staff of augmented environmental qualification requirements by the end of March, 2011, as described in MHI response to Question 07.07-32.

**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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**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

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03/02/2011

**US-APWR Design Certification  
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**QUESTION NO. : 07-07-32**

In subsection 7.7.2.6, "Use of Digital Systems," of the US-APWR DCD, it states that *"The PCMS and PSMS utilize the same basic software. In addition, the PCMS application software is developed using a structured process similar to that applied to development of the PSMS application software."* Similarly, in subsection 5.1.8 of MUAP-07004 (Revision 5), "Safety I&C System Description and Design Process," it states that *"The MELTAC platform that is applied to the PCMS is essentially the same as the MELTAC platform applied to the PSMS."*

In the Abstract of MUAP-07005 (Revision 6), "Safety System Digital Platform – MELTAC -," it states that *"the MELTAC Platform has been developed using a rigorous safety related design process that ensures suitable hardware and software quality and reliability for critical applications such as the Reactor Protection System or Engineered Safety Features Actuation System."* SRP Section 7.7, "Control Systems;" under the section "Review Procedures," states that *"To minimize the potential for control system failures that could challenge safety systems, control system software should be developed using a structured process similar to that applied to safety system software. Elements of the review process may be tailored to account for the lower safety significance of control system software. Refer to SRP Appendix 7.0-A and SRP Appendix 7.1-D for guidance on digital system review."* Please clarify what exactly are the differences between the MELTAC platform for the PCMS compared to that of the PSMS?

Also, identify which functions in the PCMS are important to safety, if any? If so, what are the additional requirements, and the process, beyond the non-safety (software and hardware) PCMS which will be applied? Ensure that the function discussed in MUAP-07004 (Revision 5), "Safety I&C System Description and Design Process," Appendix A, section A.6.3 is included in your response.

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**ANSWER:**

MHI will clarify the augmented quality assurance and environmental qualification requirements for the PCMS and the DAS by the end of March, 2011 based on discussions with the NRC staff. The differences of quality assurance and environmental qualification between the PSMS and the PCMS, based on these discussions, will be clarified and documented by the end of March, 2011.

**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.

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