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TOKYO, JAPAN

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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-09489

Subject: **MHI's Responses to US-APWR DCD DRAFT OPEN ITEMS 16.4.7, 16.4.8, 16.4.9, 16.4.10 and 16.4.14**

Reference:
1) "DRAFT OPEN ITEMS 16.4.7, SRP Section: 16.4.7 –REACTOR COOLANT SYSTEM" dated 09/16/2009.
2) "DRAFT OPEN ITEMS 16.4.8, SRP Section: 16.4.8 –EMERGENCY CORE COOLING SYSTEMS" dated 09/16/2009.
3) "DRAFT OPEN ITEMS 16.4.9, SRP Section: 16.4.9 –CONTAINMENT SYSTEMS" dated 09/16/2009.
4) "DRAFT OPEN ITEMS 16.4.10, SRP Section: 16.4.10 –PLANT SYSTEMS" dated 09/16/2009.
5) "DRAFT OPEN ITEMS 16.4.14, SRP Section: 16.4.14 –ADMINISTRATIVE CONTROLS" dated 09/16/2009.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") documents as listed in Enclosures.

Enclosed are the responses to DRAFT OPEN ITEMS within Reference 1 through 5.

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

Sincerely,

Y. Ogata

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

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NRO

Enclosures:

1. Response to DRAFT OPEN ITEMS 16.4.7 No.16-146-1804/79
2. Responses to DRAFT OPEN ITEMS 16.4.8 No.16-135-1818/51 and No. 16-135-1818/53
3. Response to DRAFT OPEN ITEMS 16.4.9 No.16-2.4-50
4. Response to DRAFT OPEN ITEMS 16.4.10 No.16-9.2.1-26
5. Response to DRAFT OPEN ITEMS 16.4.14 No.16-133-1827/136

CC: J. A. Ciocco
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Enclosure 1

UAP-HF-09489, Rev.0

Response to DRAFT OPEN ITEMS 16.4.7 No.16-146-1804/79

October 2009

RESPONSES TO DRAFT OPEN ITEMS 16.4.7

10/14/2009

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

OPEN ITEM NO.: 16.4.7

SRP SECTION: 16.4.7 – REACTOR COOLANT SYSTEM

APPLICATION SECTION: 16.4.7

DATE OF OPEN ITEM ISSUE: 09/16/2009

OPEN ITEM NO. : [16-146-1804/79] This question is related to RAI 16-146-1804/79.

The APWR GTS 3.4.12 contains operability requirements for the LTOP system. The APWR GTS 3.4.12 models similar requirements in the Westinghouse STS. As part of its review, the staff noted differences between the APWR GTS and the Westinghouse STS regarding the use of the RHR suction reliefs valves as means to prevent overpressure condition in the RCS pressure boundary at low RCS temperature (below 350 degree F). It is not clear in the bases discussion if the single failure criterion is being considered when TS requirements were formulated in this regard. In RAI 16-79, the applicant was asked to provide further clarifications on this staff's concern. In its response letter dated February 4, 2009, the applicant stated:

> "The RHR Suction relief valves are considered passive components since these valves are a spring-loaded type. Therefore, there is no need to consider single active component failure."

The staff disagreed with the above stated position since the valve is changing its state from closed to open position when the lift setpoint is reached. A technical justification should be provided for not applying single failure criteria to the spring-loaded relief valve design. This is an open item (OI 16-146-1804/79).

ANSWER:

MHI believes the RHR suction relief valves are considered passive components because this valve has high reliability. The reasons are the followings:

- The RHR suction relief valve is a spring-loaded type, which structure is very simple.
- This valve is a spring-loaded type, which is self-actuated type and does not need any power such as electric or air and any signal. Therefore, failure of electric, air or control system does not affect the function of this valve.
- This valve is Equipment Class 2, which is designed and fabricated as ASME Section III Safety Class 2. This means this valve is based on Quality Group B. Therefore, a reliability of this valve is sufficiently high.

- The function of this valve will be confirmed by ITAAC. The capacity and set pressure are the items of ITAAC. Therefore, the function of this valve will be confirmed before initial fuel load. (Please see ITAAC 8e of Table 2.4.5-5)

- During the operation, the reliability of this valve will be maintained by T-Spec. SR 3.4.12.6 requires the periodic testing for set pressure in accordance with IST.

Impact on DCD

There is no impact on DCD.

Impact on COLA

There is no impact on COLA.

Impact on PRA

There is no impact on PRA.

This completes MHI's response to the NRC's open item.

Enclosure 2

UAP-HF-09489, Rev.0

Responses to DRAFT OPEN ITEMS 16.4.8 No.16-135-1818/51 and No. 16-135-1818/53

October 2009

RESPONSES TO DRAFT OPEN ITEMS 16.4.8

10/14/2009

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

OPEN ITEM NO.: **16.4.8**

SRP Section: **16.04.08 – EMERGENCY CORE COOLING SYSTEMS**

APPLICATION SECTION: **16.04.08**

DATE OF OPEN ITEM ISSUE: **09/16/2009**

OPEN ITEM NO. : [16-135-1818/51] This question is related to RAI 16-135-1818/51.

Pump Accumulator Makeup valves that require power lockout in SR 3.5.2.1. The DCD Chapter 6 also identifies the four SI Pump Full Flow Test Line stop valves as being normally closed with control power locked out. In its response letter February 4, 2009, the applicant stated:

"SR 3.5.2.1 addresses Safety Injection Pump Accumulator Makeup Valves (SIS-AOV-201 B and C). These valves are provided in the cross line between B and C safety injection trains, thereby misalignment of these valves could lead to simultaneous unavailability of two trains. Each of the Safety Injection Pump Full-flow Test line Stop Valves (SIS-MOV-024A, B, C and D) is provided in the associated independent train, and misalignment of these valves could not cause simultaneous unavailability of two or more trains ... the second sentence of BASES for SR 3.5.2.1, "Misalignment of these valves could render its associated SIS train inoperable" will be corrected to "Misalignment of these valves could render two SIS trains inoperable."

The staff's review of the discussion on SR 3.5.2.1 in the STS found that operating experiences documented in the NRC Information Notice (IN) 87-01 are cited as the basis for this surveillance requirement. The staff believed MHI has mis-interpreted the safety implication of findings identified in IN 87-01. If misalignment of a valve could render any SIS train inoperable (an unanalyzed configuration), that valve should be listed in SR 3.5.2.1. This is an open item (OI 16-135-1818/51).

ANSWER:

MHI concurs with the recommendation that "If misalignment of a valve could render any SIS train inoperable (an unanalyzed configuration), that valve should be listed in SR 3.5.2.1".

Impact on DCD

SR 3.5.2.1 will be revised as following;.

SURVEILLANCE			FREQUENCY
SR 3.5.2.1	Verify the following valves are in the listed position (with power to the valve operator removed).		[12 hours OR In accordance with the Surveillance Frequency Control Program]
Number	Function	Position	
SIS-AOV -201B and C	Accumulator Makeup	CLOSED	
SIS-MOV -024A, B, C and D	**Safety Injection Pump Full-Flow Test Line Stop**	**CLOSED**	

Impact on COLA

There is impact on the COLA to incorporate the DCD change.

Impact on PRA

There is no impact on PRA.

RESPONSES TO DRAFT OPEN ITEMS 16.4.8

10/14/2009

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

OPEN ITEM NO.: 16.4.8

SRP Section: 16.04.08 – EMERGENCY CORE COOLING SYSTEMS

APPLICATION SECTION: 16.04.08

DATE OF OPEN ITEM ISSUE: 09/16/2009

OPEN ITEM NO. : [16-135-1818/53] This question is related to RAI 16-135-1818/53.

The APWR GTS, Section 3.5.2, contains operability requirements for the ECCS when the plant is in Mode 3 or above. Aside from the accumulators, the APWR ECCS design consists of only one SI subsystem in contrast to the three SI subsystems in Westinghouse PWR plants. The APWR ECCS operability requirements were formulated following the guidance from the Westinghouse STS with respect to equipment redundancy, potential loss of applicable safety function(s), and the relative importance role of each system component in the plant accident/safety analyses. During its review, however, the staff noted that the applicant did not include a surveillance requirement to verify the operability of ECCS valves which are manually activated during a design basis accident event. In RAI 16-53, the applicant was asked to justify this SR omission. In its response letter dated February 4, 2009, MHI stated that remote manual-operated valves are considered to have higher reliability than automatic valves. MHI also stated that, based on NUREG-1431, periodic actuation verification is not required for remote manual-operated valves. The staff finds this response unacceptable in that MHI does not provide any evaluation or justification for the statement that remote manual-operated valves are considered to have higher reliability than automatic valve. MHI should provide some basis for the assertion including addressing resolution of issues identified in GL 89-10 and GL 96-05. This is an open item (OI 16-135-1818/53).

ANSWER:

MHI will include a surveillance requirement in the Technical Specifications to verify the operability of ECCS valves which are manually activated during a design basis accident event.

Impact on DCD

TS SR 3.5.2.4, 3.5.2.5 and 3.5.2.6 will be revised as following;

	SURVEILLANCE	FREQUENCY
SR 3.5.2.4	**Verify each ECCS valve manually activated during a design basis accident event in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position.**	**In accordance with the Inservice Testing Program**
SR 3.5.2.4**5**	Verify each SI pump starts automatically on an actual or simulated actuation signal.	[24 months OR In accordance with the Surveillance Frequency Control Program]
SR 3.5.2.~~5~~**6**	Verify by visual inspection, each SIS train ECC/CS STRAINER is not restricted by debris and shows no evidence of structural distress or abnormal corrosion.	[24 months OR In accordance with the Surveillance Frequency Control Program]

BASES SR 3.5.2.4, 3.5.2.5 and 3.5.2.6 will be revised as following;

SR 3.5.2.4

This Surveillance demonstrates that each ECCS valve manually activated during a design basis accident event actuates to the required position. This Surveillance is not required for valves that are locked, sealed, or otherwise secured in required position. SRs are specified in the Inservice Testing Program of the ASME Code. The ASME Code provides the activities and Frequencies necessary to satisfy the requirements.

SR 3.5.2.4**5**

This Surveillance demonstrates that each SI pump starts on receipt of an actual or simulated ECCS actuation signal. [The 24 month Frequency is based on the need to perform these

Surveillances under the conditions that apply during a plant outage and the potential for unplanned plant transients if the Surveillances were performed with the reactor at power. The 24 month Frequency is also acceptable based on consideration of the design reliability (and confirming operating experience) of the equipment. The actuation logic is tested as part of ESF Actuation System testing, and equipment performance is monitored as part of the Inservice Testing Program. OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.5.2.~~5~~**6**

Periodic inspections of the ECC/CS STRAINER ensure that it is unrestricted and stays in proper operating condition. [The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage, on the need to have access to the location, and because of the potential for an unplanned transient if the Surveillance were performed with the reactor at power. This Frequency has been found to be sufficient to detect abnormal degradation and is confirmed by operating experience. OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

Impact on COLA

There is impact on the COLA to incorporate the DCD change.

Impact on PRA

There is no impact on PRA.

Enclosure 3

UAP-HF-09489, Rev.0

Response to DRAFT OPEN ITEMS 16.4.9 No.16-2.4-50

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RESPONSES TO DRAFT OPEN ITEMS 16.4.9

10/16/2009

US-APWR Design Certification
Mitsubishi Heavy Industries
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OPEN ITEM NO.: **16.4.9**

SRP SECTION: **16.4.9 – CONTAINMENT SYSTEMS**

APPLICATION SECTION: **16.4.9**

DATE OF OPEN ITEM ISSUE: **09/16/2009**

OPEN ITEM NO. : [16-2.4-50] This question is related to RAI 16-2.4.50.

In RAI 6.2.4-50, the applicant was asked to clarify a design feature of the low volume containment purge valve which appears to be in conflict with requirements specified in SR 3.6.3.2. The response to this RAI has not been received from MHI. This is an open item (OI 6.2.4-50).

ANSWER:

The design feature of the low volume containment purge valve is described in the DCD Chapter 16, TS 3.6.3 BASES, SURVEILLANCE REQUIREMENT 3.6.3.2. The low volume containment purge valve is accordance with SR 3.6.3.2.

The Low Volume Purge System operation is consistent to parts b and c described in the DCD Rev.1 Chapter 16 TS 3.6.3 BASES, BACKGROUND. However, the system is not consistent to part a. So, the description of part a will be deleted. (Refer to RAI 376-2849 Question No.06.02.04-50.)

The Low Volume Purge System is not used for containment cooling or heating. The outside air heating or cooling is to dehumidify and temper the supply air at approximate 65°F to the containment in order to minimize the condensation on the cooling coils in the containment fan cooler unit and the CRDM cooling unit, and on the supply air duct inside the containment, when this system is used to reduce the concentration of noble gases within containment or to equalize internal and external pressures of containment.

Impact on DCD

There is no impact on DCD.

Impact on COLA

There is no impact on COLA.

Impact on PRA

There is no impact on PRA.

Enclosure 4

UAP-HF-09489, Rev.0

Response to DRAFT OPEN ITEMS 16.4.10 No.16-9.2.1-26

October 2009

RESPONSES TO DRAFT OPEN ITEMS 16.4.10

10/14/2009

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

OPEN ITEM NO.: 16.4.10

SRP SECTION: 16.4.10 – PLANT SYSTEMS

APPLICATION SECTION: 16.4.10

DATE OF OPEN ITEM ISSUE: 09/16/2009

OPEN ITEM NO. : [16-9.2.1-26] This question is related to the applicant's response to RAI 16-9.2.1-26.

In RAI 9.2.1-26, the applicant was asked to address an inconsistency between GTS 3.7.8 and relevant information provided in DCD sections 8.3.1 and 9.2.1 regarding heat loads from the gas turbine generator (GTG) coolers. The response to this RAI has not been received from MHI. This is an open items (OI 9.2.1-26).

ANSWER:

RAI 9.2.1-26 has been duly addressed along with other RAI 326 questions; refer to MHI Reference No. UAP-HF- 09326 dated June 18, 2009 for the said responses. DCD markups will be reflected in the succeeding DCD revision as committed therein.

Impact on DCD

There is no impact on DCD.

Impact on COLA

There is no impact on COLA.

Impact on PRA

There is no impact on PRA.

This completes MHI's response to the NRC's open item.

Enclosure 5

UAP-HF-09489, Rev.0

Response to DRAFT OPEN ITEMS 16.4.14 No.16-133-1827/136

October 2009

RESPONSES TO DRAFT OPEN ITEMS 16.4.14

10/16/2009

US-APWR Design Certification
Mitsubishi Heavy Industries
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OPEN ITEM NO.: **16.4.14**

SRP SECTION: **16.4.14 – ADMINISTRATIVE CONTROLS**

APPLICATION SECTION: **16.4.14**

DATE OF OPEN ITEM ISSUE: **09/16/2009**

OPEN ITEM NO. : [16-133-1827/136] This question is related to RAI 16-133-1827/136.

In RAI 16-136, the applicant was asked to provide clarification on the listed face velocity of 2400 fps for the MCREFS in TS 5.5.11.c. In its response letter dated February 20, 2009, MHI corrected this value to 40 fps (2400 fpm) and proposed also to delete this information from the GTS. The staff reviewed the new information against guidance (in the form of Reviewer's Notes) provided in the Westinghouse STS which state "If the system has a face velocity greater than 110 percent of 0.203 m/s (40 ft/min), the face velocity should be specified." Based on this guidance, the staff finds the proposed deletion unacceptable. This is an open item (OI 16-133-1827/136).

ANSWER:

MHI amends to the response to RAI 161-1812 Question No. 16-136 as follows:

The face velocity of charcoal adsorber for the MCREFS is designed as 40 fps**m**. This face velocity is based on the charcoal adsorber residence time (0.25 seconds per 2 inches of adsorbent bed) recommended by RG 1.52.

Furthermore, the following sentence is stated in "REVIEWER'S NOTE" of Section 5.5.11, STS, NUREG-1431:

If the system has a face velocity greater than 110 percent of 0.203 m/s (40 ft/min), the face velocity should be specified.

So, the face velocity of charcoal adsorber is not required to be specified in TS of US-APWR. The DCD Chapter 16, 5.5.11 will be revised to reflect these correct informations.

Impact on DCD

There is no impact on DCD.

Impact on COLA

There is no impact on COLA.

Impact on PRA

There is no impact on PRA.