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February 27, 2012

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-12022

Subject: Revised Response to US-APWR DCD RAI No.161-1812 Revision 0 (SRP 16)

References: 1) "REQUEST FOR ADDITIONAL INFORMATION NO. 161-1812 REVISION 0, SRP Section: 16 - Technical Specifications Application Section: 16, QUESTIONS for Technical Specification Branch (CTSB)" dated January 21, 2009
2) Letter MHI Ref: UAP-HF-09101 from Y. Ogata (MHI) to U.S. NRC "MHI's Second Response to US-APWR DCD No.161-1812 Revision 0" dated March 19, 2009

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") the document entitled "Revised Response to Request for Additional Information No.161-1812 Revision 0 Question 16-117".

Enclosed is the revised response to RAI contained within Reference 1.

Please contact Mr. Joseph Tapia, General Manager of Licensing Department, Mitsubishi Nuclear Energy Systems, Inc. if the NRC has questions concerning any aspect of the submittals. His contact information is below.

Sincerely,

Y. Ogata

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

Enclosure:

1. Revised Response to Request for Additional Information No.161-1812 Revision 0

D081
NRD

CC: J. A. Ciocco
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Enclosure 1

UAP-HF-12022
Docket Number 52-021

Revised Response to Request for Additional Information
No.161-1812 Revision 0

February, 2012

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

2/27/2012

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No.52-021

RAI NO.: NO.161-1812 REVISION 0
SRP SECTION: 16 – Technical Specifications
APPLICATION SECTION: TS SECTIONS 1.0, 3.0, 4.0, AND 5.0
DATE OF RAI ISSUE: 1/21/2009

QUESTION NO. : 16-117

Describe the process used and the results of applying the Criterion 4 of 10 CFR 50.36 (d)(2)(ii) to identify the structures, systems, components, and parameters for which LCOs were include in US-APWR TS.

The application of Criterion 4 of 10 CFR 50.36 (d)(2)(ii) is not discussed in the FSAR. The US-APWR FSAR states that the identification of the structures, systems, components, and parameters for which LCOs have been included in the US-APWR TS was based on screening criteria of 10 CFR 50.36 (d)(2)(ii). The criterion 4 of 10 CFR 50.36 (d)(2)(ii) is as follows: "structures, systems, and components which operating experience or probabilistic safety assessment has shown to be important to public health and safety." A few instances in the Bases section identify criterion 4 as the basis for the inclusion of the LCO. However, no additional analysis or discussion is provided regarding the application of this criterion. Additional discussion is needed regarding the process used and the results of the evaluations conducted to ensure that all structures, systems, and components which operating experience or probabilistic risk assessment has shown to be important to public health and safety have been included in the LCOs. The response to this information request should include the PRA evaluations used, criteria used to define structures, systems, and components important to public health and safety, and the list of structures, systems, and components identified by the PRA for inclusion in the TS LCO.

ANSWER:

An exhaustive review of risk important systems, structures and components (SSCs) identified by the PRA has been performed in accordance with Criterion 4 of 10 CFR 50.36 (c)(2)(ii). No additional SSCs to be included in the Technical Specification Limiting Conditions for Operation (TS LCO) have been identified from the PRA perspective, and it has been confirmed that the US-

APWR TS LCOs cover all risk important SSCs that need be controlled by Technical Specifications.
The process used to apply Criterion 4 is described below.

1) Risk important SSCs were chosen based on risk importance criteria in accordance with NEI 00-04, i.e., having a Fussell Vesely (FV) importance equal or larger than 0.005 and/or risk achievement worth (RAW) equal or larger than 2. These criteria were applied to results of Level 1 and Level 2 PRA for both internal and external events.

2) For each risk important SSC, the following criteria were used to screen out the SSCs that are considered unnecessary to be controlled by a TS LCO.

- SSCs credited in the PRA as an additional system to a frontline system

  The operability of SSCs credited as back-up to front-line systems becomes risk important when the operability of the associated frontline system degrades. For such SSCs, the operability or availability will be controlled by administrative controls, such as an operating procedure that requires verification of operability when the associated frontline system degrades. Hence this type of SSC is not included in a TS LCO.

- SSCs whose operability cannot be confirmed during plant operation

  Operability of SSCs, such as the stop function of a check valve in a normally operating line, cannot be confirmed during normal operation. In some cases the verification of such SSCs may increase the risk of causing a transient. These types of SSCs are excluded from TS LCOs.

- SSCs whose operability is ensured during plant operation

  An example of this type of SSCs is one whose unavailability would result in an LCO violation of another system. Operability of such SSCs is consequentially controlled by the LCO of the other system. Thus, an additional LCO for such SSCs is not necessary because the operability is already controlled. Another example of this type is an SSC that causes an initiating event when a risk significant failure occurs. Systems used for plant operation are included in this type.

3) An evaluation was performed of risk-significant SSCs not screened out in item 2) above to determine whether the NRC safety goals can be met without crediting the availability of the SSC. If the safety goals are not met, then the same evaluation is performed assuming that the SSC is available through implementation of an administrative control, such as an operating procedure. If the safety goals are met with the administrative control then no LCO is needed. If the safety goals cannot be met even with a non-Technical Specification administrative control, then an LCO is to be established to ensure the availability of the SSC (Note 1).

The following risk significant SSCs have been identified as requiring administrative controls to credit availability in order to meet the NRC safety goals:

- Alternate AC (AAC) gas turbine generators (GTGs) – during at power operations to provide back up to the Class 1E GTGs

- Demineralized water storage tank – during at power operations, the demineralized water storage tank can be aligned so as to provide makeup to the emergency feedwater system directly or serve as a backup (replenishment) water source to the emergency feedwater pits

- Safety injection pump and associated water source – during cold shutdown and refueling conditions to provide a reactor coolant system makeup water source

Requirements to implement these administrative controls will be documented in DCD Table 19.1-119 as key insights. These new table entries will identify COL Item 13.5(5) to ensure that the controls will be implemented by the COL applicants.

Note 1: See response to RAI 628-4866 (UAP-HF-10277, October 14th 2010) for discussion related to an LCO for the low-pressure letdown line isolation valve.

Impact on DCD

See attached Table 19.1-119 markup.(See Attachment-1)

Impact on R-COLA

R-COLA Part 2 FSAR Table 19.1-119R will be revised, consistent with DCD Table 19.1-119.

Impact on S-COLA

S-COLA Part 2 FSAR Table 19.1-119R will be revised, consistent with DCD Table 19.1-119.

Impact on PRA

There is no impact on the PRA.

Impact on Technical / Topical Reports

There is no impact on the Technical / Topical Reports.

Table 19.1-119 Key Insights and Assumptions (Sheet 19 of 48)

Key Insights and Assumptions	Dispositions	
18. Main equipments and instrumentations used for severe accident mitigation are designed to perform their function in the environmental conditions such as containment overpressure and temperature rise following hydrogen combustion.	19.2.3.3.7	
19. Instrumentations for detecting core damage with high reliability are provided.	5.3.3.1	
20. Risk significant SSCs are identified for the RAP.	17.4	
21. Instrumentation piping are installed at upside of the RV. No penetrations through the RV are located below the top of the reactor core. This minimizes the potential for a loss of coolant accident by leakage from the reactor vessel, allowing the reactor core to be uncovered.	5.3.3.1	
22. Check valves in accumulator, high head injection system, and other systems are in diverse configuration because: - The accumulator does not have any pumps to drive upon a failed closed check valve but other systems have pumps so the forces acting on the valves to open them (even if the valves are similar) are different - The duty cycles in the systems are different. They are cycled at different times when the systems are tested. - Maintenance practices including testing may also be different. Common cause failure between the check valves in accumulator and HHIS is therefore not model in the PRA.	19.1.4.1 Table 19.1-38	
23. Surveillance test interval and refueling outages are consistent with Technical Specifications.	Chapter 16	
24. The availability and reliability of all trains of safety related systems will be controlled by the maintenance and configuration risk management programs. Availability goals will be set for each train of all safety related systems and their availability will be tracked and compared to these goals.	COL 17.6(1)	
25. Administrative controls to ensure the availability of AAC as a back up function to the Class 1E GTGs will be implemented.	COL 13.5(5)	DCD_16-117
26. Administrative controls to ensure the availability of demineralized water storage tank as a back up function to the EFW pits will be implemented.	COL 13.5(5)	DCD_16-117

Table 19.1-119 Key Insights and Assumptions (Sheet 34 of 48)

Key Insights and Assumptions	Dispositions	
19. Surge line flooding may occur if decay heat removal function is lost during plant operating states where the pressurizer manway is the only vapor release pass from the RCS. Water held up in the pressurizer can erroneous readings of water level indicators measured with reference to the pressurizer. This phenomenon can also prevent gravity injection from the SFP. Measures to prevent accident evolution caused by surge line flooding are important. Adoption of both measures listed below can reduce risk from surge line flooding event. - Installation of an temporary RCP water level sensor that measure the MCP water level with reference to pressure at the reactor vessel head vent line and cross over leg when the RCS is vented at a high elevation. - Operational procedures to perform continuous RCS injections when loss of RHR occurs under conditions where the pressurizer manway is the only vapor release pass from the RCS. The temporary water level will satisfy the following specifications. - Water level can be read outside the containment vessel (CV) in order to be effective during events which involve harsh environment in the CV - Tygon tubing monometer will not be used - Instrumentation piping diameter will be sufficient enough to prevent delay in response	5.4.7.2.3.6 19.2.5 COL 19.3(6) COL 13.5(7)	
20. Two types of instruments are provided in US-APWR design to measure the temperature representative of the core exit whenever the reactor vessel head is located on top of the reactor vessel. The first one is core exit thermocouples located inside the RV. The second is resistance temperature detectors in the reactor coolant hot leg. These two independent instruments will be available whenever the RCS is in a mid-loop condition and the reactor vessel head is located on top of the reactor vessel.	5.4.7.2.3.6	
21. Administrative controls to ensure the availability of a train of the SIS and associated water source (i.e.RWSP) as a RCS make up function during cold shutdown and during refueling with water level <23 ft above the top of reactor vessel flange.	COL 13.5(5)	DCD_16-117 DCD_19-494