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TOKYO, JAPAN

August 26, 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-09432

Subject: MHI's Responses to US-APWR DCD RAI 434-3266 Revision 1

Reference: 1) "REQUEST FOR ADDITIONAL INFORMATION 434-3266 REVISION 1, SRP Section: 10.04.01 – Main Condensers, Application Section: 10.4.1, dated July 30, 2009.

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 434-3266 Revision 1."

Enclosed are the responses to a RAI 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,

Y. Ogata

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

Enclosure:

1. Responses to Request for Additional Information 434-3266 Revision 1

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

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Enclosure 1

UAP-HF-09432
Docket No. 52-021

Responses to Request for Additional Information No. 434-3266
Revision 1

August 2009

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

8/26/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: **NO. 434-3266 REVISION 1**

SRP SECTION: **10.04.01 MAIN CONDENSERS**

APPLICATION SECTION: **10.4.1**

DATE OF RAI ISSUE: **7/30/2009**

QUESTION NO.: 10.04.01-2

US-APWR Supplemental RAI 10.4.1-1:

a)

In order to conform to General Design Criteria (GDC) 60 requirements, as it relates to failure of the main condenser (MC) system and potential explosion due to hydrogen buildup, in US-APWR RAI 10.4.1-2 dated March 2, 2009, the staff requested the applicant to provide additional information, with full justification. In its response, dated March 30, 2009, the applicant stated that under normal operating conditions, a Ph controller and oxygen scavenger are injected into the steam generator (SG) secondary side water, as described in DCD Section 10.4.10, "Secondary Side Chemical Injection System." The applicant further stated that air, nitrogen, and ammonia are the main constituents in the non-condensable gases in the MC shells, and therefore hydrogen buildup is not expected in the MC. This is described in DCD Subsection 10.4.2.2.1, "General Description," of Section 10.4.2, "Main Condenser Evacuation System (MCES)." The applicant justified that, due to this mixture, the potential for hydrogen buildup within the condenser shell does not exist. Furthermore, the non-condensable gases are removed from the MC system by one of the two mechanical vacuum pumps, which is described in DCD Subsection 10.4.2.2.3, "System Operation," of the MCES. If one pump fails, it gives an alarm in the main control room, and the standby pump is started. This further decreases any potential for hydrogen buildup within the condenser shells. The staff finds the applicant responses acceptable, since it conforms to the GDC 60 criteria, as related to controlling excessive radioactive releases to the environment and also to control the buildup of hydrogen and explosive mixtures in the MC shells. Therefore, the NRC staff's concerns raised in US-APWR RAI 10.4.1-2 are resolved. However, the explanation of how these concerns are addressed in its response is not described in the DCD FSAR Section 10.4.1. Therefore, the staff requests the applicant to revise the FSAR Section 10.4.1 to reflect its responses to the above RAI 10.4.1-2.

b)

In order to meet the guidance of Item III.3.A (Review Procedures) of the SRP Section 10.4.3, as it relates to flood protection of the SSCs, In US-APWR RAI 10.4.1-3, the staff requested the applicant to provide additional information for the MC system, in the DCD Section 10.4.1. In its response, dated March 30, 2009, the applicant stated that in the yard area, the flood volume is directed away from the plant structures by virtue of the site grading and yard drainage system. In addition, water tight doors are installed in the doorways at the ground level, between turbine building and reactor building. This is described in FSAR Section 3.4.1.3, "Flood Protection from Internal Sources." Therefore, the applicant stated that the turbine building flooding does not affect the safety-related equipment in the reactor building. Also, in Section 3.4.1.3, the DCD states that

there is no equipment to be protected from flooding in the turbine building. The staff reviewed FSAR Section 3.4.1.3 and verified that the explanations provided by the applicant are true and justified, and therefore finds the applicant response acceptable. However, in its response, the applicant indicated no revisions to the DCD providing the details identified in this response. Therefore, the staff requests the applicant to revise the DCD to reflect these responses in the FSAR Section 10.4.1.

ANSWER:

a)

In order to reflect the US-APWR RAI response 10.4.1-2 dated March 30, 2009, MHI provides revision in Subsection 10.4.1.3 as follows:

"*Concerning secondary side chemical injection under normal operating conditions, pH controller and oxygen scavenger are injected as described in Subsection 10.4.10. Regarding source of hydrogen, thermal decomposition of hydrazine described in Subsection 10.4.10.2.2.2 can be considered. But "Air, nitrogen, and ammonia are mainly included in these noncondensable gasses." as described in the third paragraph of Subsection 10.4.2.2.1. Therefore, the potential for hydrogen buildup within the condenser shells does not exist. Furthermore, since "During normal plant operation, noncondensable gases are removed from the main condenser by the operation of one or two vacuum pumps. If one pump trips, the condition is alarmed in the main control room, and the standby pump is started." as described in the second paragraph of Subsection10.4.2.2.3, the potential for hydrogen buildup within the condenser shells does not exist due to pump failure. Therefore, no hydrogen buildup in the main condenser is anticipated*"

b)

In order to reflect the US-APWR RAI response 10.4.1-3 dated March 30, 2009, MHI provides revision in Subsection 10.4.1.3 as follows:

"*The failure of the main condenser and any resultant flooding will not preclude operation of any essential system since no safety-related equipment is located in the turbine building. The water cannot reach safety-related equipment located in Category I plant structure, since in the yard area, the flood volume is directed away from the plant structures by virtue of the site grading and yard drainage system, in addition, the water tight doors are installed in the doorways at ground level between T/B and R/B as described in Subsection 3.4.1.3.*"

Impact on DCD

The second paragraph in Subsection 10.4.1.3 will be revised as follows:

10.4.1.3 Safety Evaluation

During normal operation and shutdown, the main condenser has no significant inventory of radioactive contaminants. Radioactive contaminants may enter through a steam generator tube leak. A discussion of the radiological aspects of primary-to-secondary leakage, including anticipated operating concentrations of radioactive contaminants, is included in Chapter 11. Concerning secondary side chemical injection under normal operating conditions, pH controller and oxygen scavenger are injected as described in Subsection 10.4.10. Regarding source of hydrogen, thermal decomposition of hydrazine described in Subsection 10.4.10.2.2.2 can be considered. But "Air, nitrogen, and ammonia are mainly included in these noncondensable gasses." as described in the third paragraph of Subsection 10.4.2.2.1. Therefore, the potential for hydrogen buildup within the condenser shells does not exist. Furthermore, since "During normal

plant operation, noncondensable gases are removed from the main condenser by the operation of one or two vacuum pumps. If one pump trips, the condition is alarmed in the main control room, and the standby pump is started." as described in the second paragraph of Subsection10.4.2.2.3, the potential for hydrogen buildup within the condenser shells does not exist due to pump failure. Therefore, no hydrogen buildup in the main condenser is anticipated. The failure of the main condenser and any resultant flooding will not preclude operation of any essential system since no safety-related equipment is located in the turbine building and the water cannot reach safety-related equipment located in Category I plant structure, since in the yard area, the flood volume is directed away from the plant structures by virtue of the site grading and yard drainage system, in addition, the water tight doors are installed in the doorways at ground level between T/B and R/B as described in Subsection 3.4.1.3.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.