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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-11183

Subject: MHI's Response to US-APWR DCD RAI No. 729-5667 Revision 2 (SRP 06.02.04)

Reference: 1) "Request for Additional Information No. 729-5667 Revision 2, SRP Section: 06.02.04 – Containment Isolation System – Application Section: 6.2.4" dated April 13, 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. 729-5667 Revision 2".

Enclosed are the responses to Question 06.02.04-55 that is 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,

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

Enclosure:

1. Response to Request for Additional Information No. 729-5667 Revision 2

D081
NRO

CC: J. A. Ciocco
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Docket No. 52-021
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Enclosure 1

UAP-HF-11183
Docket No. 52-021

Response to Request for Additional Information No. 729-5667
Revision 2

June 2011

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

6/16/2011

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 729-5667 REVISION 2**
SRP SECTION:	**06.02.04 – CONTAINMENT ISOLATION SYSTEM**
APPLICATION SECTION:	**6.2.4**
DATE OF RAI ISSUE:	**4/13/2011**

QUESTION NO.: 06.02.04-55

Question 06.02.04-55

1. The response to RAI 271-1899 Question 06.02.04-38 indicated the word "not" would be removed from the following sentence in Note 7 of Tier 2 Table 6.2.4-3: "The valve does ~~not~~ provide a barrier outside containment to prevent loss of sump water should a leak develop in a recirculation loop" The staff did not note this change in Revision 2 of the DCD or any tracking report. Please clarify the sentence in the DCD as per your previous response.

2. The US-APWR, is a pressurized water reactor with a refueling water storage pit located inside containment. The staff understands that it is the intent of MHI to justify compliance with GDC 56 using the Other Defined Basis for a single valve and a closed system both located outside containment. This guidance for justification of this basis is provided in ANSI N271-1976 paragraph 3.6.4. The staff has noted that justification statements in note 7 are similar to that used in ANSI N271-1976, Appendix A Note 56-1. This note provides justification for an acceptable alternative to GDC 56 requirements for typical lines which connect to a suppression pool in Boiling Water Reactor (BWR) plants. This note provides justification for the valve arrangement based, in part, on the following design features:

a. The single valve is remote manual or automatic
b. The valve is attached to lines which are an extension to containment
c. The valve is enclosed in a room adjacent to containment which as provisions for environmental control of any fluid leakage
d. The lines in the suppression pool are always submerged so no containment atmosphere can impinge upon the valve.
e. The systems which the lines from the suppression pool connect to outside containment are closed systems meeting the appropriate requirements of closed systems in ANSI N271-1976, including 3.6.4 and 3.6.7.
f. The valves provide a barrier outside containment to prevent loss of suppression pool water should a leak develop in the lines from the suppression pool.
g. Should leakage develop, fluid will be contained by the controlled leakage pump room.
h. The configuration of the connection of the lines to the suppression pool assures that the connections are always submerged and prevents the escape of containment atmosphere.

The staff has reviewed justification for the lines by comparing the justification in note 7 to ANSI N271-1976, Appendix A Note 56-1 and the guidance in ANSI N271-1976 paragraph 3.6.4 for this arrangement. In addition to item 1 above, the following information is needed

2. a. Please clarify the note that the connecting systems are considered closed systems as these are defined by ANSI N271-1976 An explicit statement that the connecting systems are closed systems outside containment and these systems are designed to meet the guidance for closed systems in ANSI N271-1976, including paragraphs 3.6.4 and 3.6.7 would suffice, or provide alternative wording to the note.

2.b. Please clarify the note #7 to state that the lines from the RWSP that contain a single containment isolation valve outside containment are always submerged (during normal operation and postulated accidents) and therefore no containment atmosphere can impinge on the valve.

2. c. SRP 6.2.4 Rev. 3, Acceptance Criterion 5 also states that the design of the valve or the piping compartment should provide the capability to terminate leakage from the valve shaft or bonnet seals. ANSI N271-1976 paragraph 3.6.4 states that the single valve and piping between the containment and the valve shall be enclosed in a protective leak tight or controlled leakage housing to prevent leakage to the atmosphere. Note# 7 does not include a discussion on how leakage will be terminated or contained should a leak develop in the piping, valve body, valve bonnet or shaft seals or piping. Based on review of appendix A and B of this standard, the staff notes that this could be satisfied by either A)

Locating the piping and valve in a compartment (a small space capable of terminating the leakage), such as the pump room adjacent to the containment as discussed in Appendix A note 56-1 or, B) Locating the piping and valve in a compartment that is leak tight at containment design pressure, as discussed in Appendix B note 56-1. Therefore please clarify how the US-APWR design complies with this aspect of SRP 6.2.4 Rev. 3 SRP Acceptance Criteria 5 in note 7, indicate such confinement in DCD Tier 2 Figure 6.2.4-1 sheets 11 and 18 to show the barrier that terminates leakage from the valve shaft or bonnet seals.

2.d. Please provide additional information to justify the following sentences in the note "These lines and valves are designed to preclude a breach of pipe integrity. Therefore guard pipe are not provided in these lines (Reference SRP 6.2.4 Rev. 3 SRP Acceptance Criteria 5)"

The staff is unclear what this means. Do you mean that the design of the lines and valves complies with SRP 6.2.4 Rev. 3 SRP Acceptance Criteria 5? If so, please indicate where the following information for this finding is located in the DCD or revise the DCD and the Note as required to provide the following information:

The SRP acceptance criterion prescribes the use of guard pipes for the piping. However, it also states that it would be acceptable that, in lieu of housing, the piping and valve could be designed conservatively to preclude a breach of piping integrity. This is provided through compliance with SRP 3.6.2 requirements. Therefore provide a discussion specific to the piping from the RWSP to the CIV and for the CIV, how these components meet SRP 3.6.2 requirements, and are of a conservative design in your RAI response. Note that the staff considers the discussion on the compliance with SRP 6.2.4 acceptance criterion 5 related to GDC 4 and is a separate issue than the question described in item 2.c. above (existence of leak tight or controlled leakage housing around piping and valve), which is related to provisions to terminate leakage such that redundant barriers exist to prevent loss of RWSP inventory, and uncontrolled leakage to the auxiliary building.

ANSWER:

1. This is a typographical error, so the word "not" will be deleted in the next tracking report.

2.a. Note 7 will be revised as requested to add "The systems which the RWSP lines connect to outside containment are closed systems meeting the appropriate requirements of closed systems in the standard (N271-1976), including 3.6.4 and 3.6.7."

2.b. Note 7 will be revised as requested to add "The lines from the RWSP are always submerged (during normal operation and postulated accidents) such that no containment atmosphere can impinge upon the valves."

2.c. The piping and valve will be located in the same rooms as the SI pumps and CS/RHR pumps and heat exchanges (i.e., the safeguard component area as shown in DCD Figure 6.5-2 through 6.5-9) which are designed to prevent flooding. Note 7 will be revised to add "Should a leak develop outside containment, the fluid will be contained by the controlled leakage safeguard component area."

2.d. The discussion how the piping from the RWSP to the CIV and for the CIV meet SRP 3.6.2 requirements is described in DCD Subsection 3.6.2. Therefore, Note 7 will be revised to add reference to DCD Subsection 3.6.2.

Impact on DCD

DCD Table 6.2.4-3 will be revised as follows:

Note 7 - The lines from refueling water storage pit (RWSP) to the suctions of the safety injection (SI) pumps and containment spray /residual heat removal (CS/RHR) pumps are each provided with a single remote manual gate valve. **The lines from the RWSP are always submerged (during normal operation and postulated accidents) such that no containment atmosphere can impinge upon the valves. The systems which the RWSP lines connect to outside containment are closed systems meeting the appropriate requirements of closed systems in the standard (N271-1976), including 3.6.4 and 3.6.7.** The valve does ~~not~~ provide a barrier outside containment to prevent loss of sump water should a leak develop in a recirculation loop. (The valve is to be closed remotely from the control room to accomplish this. Leak detection is provided for each line, so that the operator can determine which valve is to be closed.) **Should a leak develop outside containment, the fluid will be contained by the controlled leakage safeguard component area.** These lines and valves are designed to preclude a breach of piping integrity**, which is described in DCD Subsection 3.6.2**. Therefore, guard pipe are not provided in these lines. (Reference: SRP 6.2.4 Rev.3 SRP Acceptance Criteria 5) This arrangement is intended to provide guidance in satisfying Criterion 56 on the other defined basis in that system reliability is enhanced by a single valve and a single barrier is still maintained after accommodating a single active failure. Inservice testing and inspection of these isolation valves and the associated piping system outside the containment is performed periodically under the inservice inspection requirements of ASME XI as described in subsection 3.9.6 and section 6.6. During normal operation, the systems are water filled, and degradation of valves or piping is readily detected.

DCD Figure 6.2.4-1 Sheet 11 and 18 will be revised to add a note as follows;

Note: Valve and piping are located in the Safeguard Component Area to control and terminate leakage.

Impact on R-COLA

There is no impact on the R-COLA.

Impact on S-COLA

There is no impact on the S-COLA.

Impact on PRA

There is no impact on the PRA.