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TOKYO, JAPAN

October 6, 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-11346

Subject: MHI's Response to US-APWR DCD RAI No.826-6014 Revision 3 (SRP 06.05.01)

References: 1) "Request for Additional Information No. 826-6014 Revision 3, SRP Section: 06.05.01 – ESF Atmosphere Cleanup Systems Application Section: Section 9.4.6" dated September 7, 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.826-6014 Revision 3".

Enclosed are responses to 2 RAIs 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. 826-6014, Revision 3

D081
NRO

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

UAP-HF-11346
Docket Number 52-021

Response to Request for Additional InformationNo.
826-6014, Revision 3

October, 2011

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

10/06/2011

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**826-6014 REVISION 3**
SRP SECTION:	**06.05.01 – ESF Atmosphere Cleanup Systems**
APPLICATION SECTION:	**DCD Section 9.4.6**
DATE OF RAI ISSUE:	**9/7/2011**

QUESTION NO.: 06.05.01-21

Follow-up RAI

This is a follow-up RAI to RAI No. 73-943, Question No. 06.05.01-1 RAI 6.5.1-18 and RAI No. 558-4227, Question No. 06.05.01-14.

From the review of Revision 3 of the DCD, the staff determined that subsection 9.4.6.5.3 had been amended consistent with the response to Question No. 06.05.01-14. In contrast, the requisite change to subsection 14.2.12.1.66 did not appear in Revision 3 of the DCD.

In particular, DCD Subsection 14.2.12.1.66, C.2 was not revised per the following.

"2. Simulate low airflow and high vibration signals and verify alarm annunciation." Based on this, the staff find's the applicant's response to RAI No. 558-4227, Question No. 06.05.01-14 as incomplete. The staff requests that the applicant revise subsection 14.2.12.1.66 consistent with their commitment of RAI No. 558-4227, Question No. 06.05.01-14.

ANSWER:

DCD Tier 2 Revision 3 Subsection 14.2.12.1.66, C.2 will be revised to reflect the committed to changes of RAI No. 558-4227, Question No. 06.05.01-14.

Impact on DCD

DCD Tier 2 Revision 3 Subsection 14.2.12.1.66, C.2 will be revised as follows (See Attachment-1):

2. Simulate **low airflow and** high vibration signals and verify alarm annunciation.

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.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

10/06/2011

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**826-6014 REVISION 3**
SRP SECTION:	**06.05.01 – ESF Atmosphere Cleanup Systems**
APPLICATION SECTION:	**DCD Section 9.4.6**
DATE OF RAI ISSUE:	**9/7/2011**

QUESTION NO.: 06.05.01-22

Follow-up RAI

This is a follow-up RAI question to RAI 73-943 Question No. 06.05.01-1 RAI 6.5.1-17 and RAI No. 558-4227, Question No. 06.05.01-15.

The applicant responded to Question No. 06.05.01-15 (ML101170172) with a commitment to implement changes that add line Item 3 to Tier 1 ITAAC Table 2.7.5.3-1 and add relevant fire damper information to Tier 1 subsection 2.7.5.3.1.1. The staff found both of these changes as acceptable since these changes are consistent with the SRP guidance on ITAAC and meet the requirements for ITAAC.

The staff notes that Revision 3 of the DCD significantly changed the format of Tier 1. As part of this format change, Revision 3 of the Tier 1 ITAAC eliminated Subsection 2.7.5.3.1.1, "Containment Purge System - Design Description" under "Key Design Features". The staff finds this approach acceptable if the ITAAC of Table 2.7.5.3-1 is sufficiently comprehensive and well defined. The staff verified that DCD Revision 3 Tier 1 Table 2.7.5.3-1 "Containment Ventilation System Inspections, Tests, Analyses, and Acceptance Criteria" contains line Item 3 pertaining to fire damper testing and analyses. Item 3 reads that dampers in the ductwork of the containment purge system that penetrates the fire barriers are "type tested" and analyzed to ensure that the dampers will operate to protect safe shutdown capability. The staff notes that the ITAAC as written fails to demonstrate that the "as-built" fire dampers will fully close under system design flow rates. The staff notes that "type testing" consists of factory sample population testing. The staff is concerned that too many things can go wrong in the entire population of dampers, after the fire dampers are factory assembled. In particular, during shipping, during construction site storage; during component work site job staging; and during the actual installation (i.e. wrong or poor quality installation) to rely on the current words in Rev 3 of the ITAAC which fails to verify/demonstrate that the "as-built" dampers will fully close when required to close to preserve the plant's safe shutdown capability.

The staff requests that the applicant revise the fire damper testing line Items contained in Tier 1 Table 2.7.5.1-3 "Main Control Room ITAAC", HVAC System Table 2.7.5.2-3 "Engineered Safety Features Ventilation System ITAAC" and Table 2.7.5.4-3 "Auxiliary Building Ventilation System ITAAC" and Table 2.7.5.3-1 "Containment Ventilation System ITAAC" to verify full closure of the dampers during full flow testing of the "as-built" fire dampers.

ANSWER:

US-APWR DCD Revision 3 Tier 1 conforms to SRP 9.5.1.1 guidance to provide ITAAC that verify the Fire Protection Program in accordance with SRP 14.3 guidance.

DCD Tier 1 conforms to SRP 14.3 guidance, providing the "top level information" and ITAAC necessary to adequately describe and verify key features of the Fire Protection Program. It also conforms to guidance of RIS 2008-05.

RG 1.189, October 2009, Revision 2, Section 4.2.1.3, Fire Dampers, states in the third paragraph, "Fire damper surveillance testing should model airflow to ensure that the dampers will close fully when called to do so. This can be addressed by (1) type testing ..." DCD Tier 1 provides "type test" ITAAC based on this guidance.

DCD Tier 1 Table 2.7.5.1-3 "Main Control Room HVAC System ITAAC", Table 2.7.5.2-3 "Engineered Safety Features Ventilation System ITAAC" and Table 2.7.5.4-3 "Auxiliary Building Ventilation System ITAAC" and Table 2.7.5.3-1 "Containment Ventilation System ITAAC" provides ITAAC #5.d, ITAAC #5.c, ITAAC #4.c, and ITAAC #3, respectively, to verify that the subject fire dampers "close under the design air flow conditions or the conditions which bound the design air flow conditions." The ITA used for these ITAAC include "type tests," as specified by RG 1.189.

DCD Tier 2 Section 14.2.12.1.90, Fire Protection System Preoperational Test, subsection D, Acceptance Criterion, paragraph 1, states, "The fire protection system operates as described in Subsection 9.5.1 and Appendix 9A." However, the subsection A, Objective, and C, Test Method, are not clearly in agreement with the subsection D, Acceptance Criterion, inasmuch as they tend to focus on water and gaseous systems. MHI will revise DCD Tier 2 Section 14.2.12.1.90 to clarify that it also applies to fire dampers.

DCD Tier 2 Section 9.5.1.2.7, Building Ventilation, states in the second paragraph that, "... Ventilation system fire dampers close automatically against full airflow, if required, ..."

DCD Tier 2 Table 9.5.1-2 US-APWR Fire Protection Program Conformance with NFPA 804 (Sheet 28 of 62), regarding Paragraph 8.4.8.6, states that US-APWR design conforms with the NFPA 804 requirement that "Fire dampers shall be designed and installed so that the air velocity in the ducts assists in closing fire dampers and does not preclude proper damper closure." US-APWR fire dampers, thus, will not be required to close against airflow and no test verification of this ability is required.

Providing a new ITAAC to verify "full closure of the dampers during full flow testing of the "as-built" fire dampers," represents a level of detail that is inconsistent with SRP 14.3 guidance to select "top level information" that includes principal performance characteristics and safety functions of the SSC to be verified by ITAAC and creates a situation inconsistent with guidance of RIS 2008-05 regarding ITAAC closure. Tier 1 ITAAC conformance with RG 1.189 guidance to provide "type tests" in addition to Tier 2 described pre-operational testing to verify that "The fire protection system operates as described by Subsection 9.5.1 and Appendix A," and US-APWR design conforms to NFPA 804, Paragraph 8.4.8.6, provide reasonable assurance that fire dampers will perform their design basis functions.

Thus, the requested ITAAC to "verify full closure of the dampers during full flow testing of the "as-built" fire dampers" is inconsistent with regulatory guidance, is not needed to reasonably assure fire damper operation, and therefore is not provided.

Impact on DCD

US-APWR DCD Revision 3 Tier 2 Section 14.2.12.1.90 will be changed as described in the Answer and shown in the attached markups .(See Attachment-1)

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.

2. All high alarms annunciate to MCR properly.

3. The CRDM cooling system performs in accordance with design specifications during hot functional testing.

14.2.12.1.66 Reactor Cavity Cooling System Preoperational Test

A. Objective

1. To demonstrate operation of the reactor cavity cooling system.

B. Prerequisites

1. Required construction testing is completed.

2. Component testing and instrument calibration is completed.

3. Test instrumentation is available and calibrated.

4. Required support systems are available.

C. Test Method

1. Simulate start and interlock signals for each cooling fan and verify operation and annunciation.

2. Simulate low airflow and high vibration signals and verify alarm annunciation. | DCD_06.05.01-21

3. Verify design airflow.

4. During hot functional testing, monitor temperature between the reactor vessel support base plates and the concrete, and temperature of the primary shield wall.

D. Acceptance Criteria

1. Reactor cavity air cooling fans operate on the proper signals (see Subsection 9.4.6).

2. All high alarms annunciate to MCR properly.

3. During hot functional testing, the temperature between the reactor vessel support base plates and the concrete is maintained at or below 200° F.

4. During hot functional testing, the temperature of the primary shield wall is maintained at or below 150° F.

14.2.12.1.67 Containment High Volume Purge System Preoperational Test

A. Objective

2. The automatic functions required to add chemicals perform as described in Subsection 10.4.10.

3. The mixing pump meets its design requirements.

4. Indications and alarms operate as described in Subsection 10.4.10.

14.2.12.1.90 Fire Protection System Preoperational Test

A. Objective

1. To demonstrate operation of the fire protection system, (fire dampers, water system and gaseous systems) in the turbine building, access control building, auxiliary building, C/V, reactor building, and power source buildings. DCD_06.05.01-22

B. Prerequisites

1. Required construction testing is completed.

2. Component testing and instrument calibration is completed.

3. Test instrumentation is available and calibrated.

4. Required support systems are available.

C. Test Method

1. ~~Demonstrate~~Verify operation of the fire detection system and gaseous fire suppression systems. DCD_06.05.01-22

2. Demonstrate the head and flow characteristics of the fire protection water supply system pumps and the operation of all auxiliaries.

3. Verify control logic of the fire protection water supply system pumps and auxiliaries.

4. Demonstrate flow paths of the fire protection water supply system.

5. Demonstrate operation of the fire alarm system.

6. Verify installation of fire extinguishers.

7. Verify operation of ~~the gaseous fire protection systems~~fire dampers during full flow conditions. DCD_06.05.01-22

D. Acceptance Criterion

1. The fire protection system operates as described in Subsection 9.5.1 and Appendix 9A.