MITSUBISHI HEAVY INDUSTRIES, LTD.
16-5, KONAN 2-CHOME, MINATO-KU
TOKYO, JAPAN

May 27, 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-11156

Subject: MHI's Responses to US-APWR DCD RAI No. 748-5593 Revision 2 (SRP 06.02.05)

Reference: 1) "Request for Additional Information No. 748-5593 Revision 2, SRP Section: 06.02.05 – Combustible Gas Control in Containment, Application Section: 6.2.5," dated April 28, 2011.

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

Enclosed is the response to one 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,

Atsushi Kumaki for

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

Enclosures:

1. Responses to Request for Additional Information No. 748-5593 Revision 2

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

Contact Information
C. Keith Paulson, Senior Technical Manager
Mitsubishi Nuclear Energy Systems, Inc.
300 Oxford Drive, Suite 301
Monroeville, PA 15146
E-mail: ck_paulson@mnes-us.com
Telephone: (412) 373-6466

DO81
NRO

Docket No. 52-021
MHI Ref: UAP-HF-11156

Enclosure 1

UAP-HF-11156
Docket Number 52-021

Responses to Request for Additional Information
No. 748-5593 Revision 2

May 2011

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

5/27/2011

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No.52-021

RAI NO.: **NO. 748-5593 REVISION 2**

SRP SECTION: **06.02.05 – Combustible Gas Control in Containment**

APPLICATION SECTION: **6.2.5**

DATE OF RAI ISSUE: **4/28/2011**

QUESTION NO. : 06.02.05-42

Provide a more specific commitment to verify that the procured equipment identified as critical equipment in the Severe Accident Survivability Assessment is capable of withstanding the environmental conditions.

Provide further justification for the final list of equipment whose design specifications must consider the pressure, temperature and radiation conditions of a severe accident in their design specification and in particular, the pressure and temperature resulting from a hydrogen burn of an amount equal to that produced by a fuel clad-coolant reaction involving100% of the fuel cladding surrounding the active fuel region.

The staff requested in RAI #635-4954 Question 06.02.05-39, that you clarify your statement made in RAI 551-4356 Question 06.02.05-37 response that the necessity of assessment of as-built key equipment is not necessary. The staff also requested you provide further justification for the final list of equipment whose design specifications must consider the pressure, temperature and radiation conditions of a severe accident in their design specification.

The staff has reviewed the response to RAI #635-4954 Question 06.02.05-39, and the following information is needed:

1) In regard to your response to RAI #635-4954 Question 06.02.05-39 Item #1: Please explain the sentences: "The COL applicant may not need to address SA survivability in procurement specifications used to purchase site-specific equipment. The plant designer is responsible to ensure that the capabilities of the systems and equipment procured for the US-APWR address the environmental conditions evaluated in the DCD"

   a) Identify the specific process that will trigger type tests on the identified severe accident equipment such as igniters, pressure instrumentation. If it is the responsibility of the COL applicant to justify the use of prototypical studies to be representative of the procured equipment or to perform type tests for equipment that does not, please indicate the COL action item that specifies this action. If it is the plant designer that is responsible for such action, please provide more specific design basis equipment information that would justify

the use of prototypical studies to represent procured equipment. Please note that 10 CFR 52.47 specifies that the DC application must contain a level of design information sufficient to enable the commission to judge the applicant's proposed means of assuring that construction conforms to the design and to reach a final conclusion on all safety question associated with the design before the certification is granted. This may require information normally contained in procurement specifications be completed and available for audit if the information is necessary for the commission to make its safety determination.

2) Similarly for Question 06.02.05-39 Item 3b, the staff considers the action to update the PRA/SA to take into consideration site specific conditions and the action to validate the use of prototypical studies to justify use of procured equipment two separate actions. The staff is not confident that COL item 19.3(4) provides assurance that the COL applicant will justify that referenced prototypical studies are applicable to the procured equipment. Clarify the DCD to include a separate COL action for the COL applicant to validate the prototypical studies to the procured equipment or alternatively, provide more specific design basis information in the DCD that indicates that the procured equipment will have similar or better performance as that equipment described in the prototypical studies, such that there would be no need to validate prototypical studies to procured equipment.

3) In regard to your response to RAI #635-4954 Question 06.02.05-39 Item # 2e: In your response to RAI 627-4926 Questions 19-449 and 19-454, you indicate that there is potential for hydrogen concentrations to exceed 10% by volume in the RWSP and there is a potential for detonation, and containment failure for some scenarios. You describe an accident management strategy where an operator would fill the RWSP with firewater to eliminate the potential. Please clarify why this action would not necessitate the inclusion of the RWSP water level instrument as necessary equipment to achieve safe shutdown and maintaining containment structural integrity as specified by 10 CFR Part 50, § 50.44(c)(3) and 10 CFR Part 50, § 50.34(f)(2)(ix)(c), alternatively, include design requirements for this instrument to survive the severe accident environment.

4) In RAI 627-4926 Question 19-454 you describe manual operator action to inject firewater in to the containment to fill the RWSP in order to eliminate the potential for hydrogen accumulation in this subcompartment. Is hydrogen concentration monitoring in the RWSP now required to provide indication to operators that this action is required? If not, clarify how plant operators will be prompted to perform this action such that the threat of hydrogen detonation in this space is eliminated for all credible scenarios. Indicate or revise the COL item that is used to ensure that this described operator action be included in plant operating procedures.

ANSWER:

Regarding the list of equipment whose design specifications must consider the conditions of a severe accident in their design specification, MHI has proposed changing the DCD description in the answer to RAI #707-5556 Question 19-499, to include the basis for how to determine the list of equipment necessary to be evaluated to satisfy the 10 CFR 50.44(c)(3) requirement.

1) As answered to RAI #707-5556 Question 19-499, the basis for determination of the list of equipment subject to the equipment survivability study will be described in the next revision of the DCD. This methodology to identify the list of equipment subject to the survivability study is completely applicable to the both the standard plant design and the site-specific design, and no unique components are identified for the site-specific design. Hence, a COL applicant does not need to address any new equipment survivability requirements and the design specific requirements described in the DCD are fully applicable to the site-specific design. Type tests or

analyses necessary to assure the functionality of the severe accident mitigation components will be performed in the DCD design certification phase as a responsibility of MHI.

Regarding the procurement specification, DCD Rev. 3 includes the following description in Section 19.2.3.3.7:

> *"These specific environmental conditions obtained from the equipment survivability study are addressed for the type test or analyses of these systems and components. It will be confirmed through the type test or analyses that the systems and components in the US-APWR design are able to maintain safe shutdown and containment structural integrity with high confidence and to keep their functions under the postulated severe accident environmental conditions created by hydrogen burning. These system design specifications will be appropriately carried forward in procurement documents."*

MHI believes this description provides sufficient assurance that the components provided to mitigate severe accidents (SAs) have an appropriate capability and the design specification will be transferred to the procurement specification.

2) The scope of COL Item 19.3(4) is to address site-specific external hazards in the site-specific PRA/SA. Regarding the severe accident environmental conditions inside the containment, there is no difference between the standard plant design and the site-specific design, and no unique conditions are involved for the site-specific design. The COL applicants are therefore not required to perform site-specific severe accident analyses because the standard design analysis results are fully applicable to site-specific supplied equipment. Type tests or analyses necessary to assure the functionality of the severe accident mitigation components will be performed in the DCD design certification phase as a responsibility of MHI. Hence, COL Item 19.3(4) is considered "not applicable" because the COL applicants have no requirement to specify SA equipment survivability requirements (i.e., there are no site-specific severe accident components), and no addition COL action item is warranted.

3) and 4) The NRC staff has issued an additional question as follow-up for these questions in RAI #751-5709. Hence, responses to questions 3) and 4) are transferred to the follow-up RAI #751-5709 and answered there.

Impact on DCD

There is no impact on the DCD

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