

# REQUEST FOR ADDITIONAL INFORMATION 471-3699 REVISION 1

10/6/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 06.02.05 - Combustible Gas Control in Containment  
Application Section: 6.2.5

QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects) (SPCV)

06.02.05-35

**RAI 6.2.5-35:**

Provide more specific design information on the components of the CHS. Table 6.2.5-1 of the DCD provides very general CHS design parameters, and Section 19.2.3.3.7 of the DCD discusses equipment survivability, but more design details are needed.

The staff requested, in RAI 6.2.5-7 that in order to evaluate if the design meets the requirements of 10 CFR Part 50, § 50.44(c)(3), regarding equipment survivability, the applicant should:

- 1) Indicate what specific design basis information for the components of the CHS reflect the results of the referenced Subsection 19.2.3.3.7 evaluation, and DCD reference 19.2-58.
- 2) Provide a design description of the hydrogen igniter to be supplied for the US-APWR, and its associated power supplies, transformers and cabling etc, to include performance criteria sufficient to support that such igniter, when installed, will have similar performance as those described in DCD reference 19.2-58.

The applicant provided the following response:

Please refer to the technical report "US-APWR Probabilistic Risk Assessment" (MUAP-07030) Chapter 15 Separate Effect Analysis. Section 15.7 of this report describes the discussion on the equipment survivability, in which the containment gas temperatures during the postulated severe accident conditions are presented. Hydrogen igniters including the associated power supplies, transformers and cabling, etc. are designed to satisfy the functionality within the evaluated temperature conditions.

The staff has reviewed this response and the referenced technical report and has identified that the following needs to be addressed by the applicant:

- 1) Per 10 CFR 52.47(a)(12), all applicants for a reactor operating license shall include the analyses and the descriptions of the equipment and systems required by 10 CFR 50.44 as part of their application. Therefore, the information contained in Subsection 15.7.3. (Equipment Survivability Assessment) of MUAP-07030, including all figures referenced therein shall be supplied, as part of Section 6.2.5 of the DCD application,

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since this analysis information is used to evaluate the adequacy of the Combustible Gas Control System Design., Alternatively a reference to the above section can be provided in DCD section 6.2.5.2

2) The discussion in Section 15.7 of MUAP-07030 is very general and high level. The needed design description/performance criteria for a successful selection and procurement of an acceptable igniter system is not provided. As stated in the reply, the hydrogen igniters including the associated power supplies, transformers and cabling, etc. should be designed to satisfy the functionality within the evaluated temperature conditions. Therefore the DCD should explicitly state what the temperature limits, etc. are under which the system must function. Provide these temperature limits as discreet information in DCD Section 6.2.5.

3) As described in DCD Subsection 19.2.3.3.7 Table 19.2-1 provides a listing of the US-APWR design features for mitigating severe accidents and the phenomenon mitigated. Equipment survivability is one of the phenomena listed for the hydrogen igniter. The staff understands that the detailed design for the hydrogen igniter is not completed, and an equipment vendor has not yet been selected. Assurance that procured equipment will survive the environmental conditions associated with a severe accident and continue to function is provided by verification that important equipment design information is identified in licensing documents.

Table 19.2-1 contains a note #4 which states that specific components, systems, time frames and environmental conditions will be selected and examined in regard to equipment survivability during the COL stage. How will this be accomplished? There is no DCD COL information item associated with this note. Please explain how the survivability study results are reviewed and are reflected in the licensing documents for severe accident equipment. Please explain why such key design commitments are not captured in ITAAC.

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### **RAI 6.2.5-36:**

Provide an analysis that demonstrates that the US-APWR containment can withstand severe accident loads, as described in RG 1.7 and RG 1.136.

The staff requested, in RAIs 6.2.5-19 and 34 and RAI 3.8-01 that the applicant clarify the analysis used to demonstrate that the US-APWR containment can withstand severe accident loads.

In a letter dated June 5, 2009 MHI responded to RAI 6.2.5-34 with a proposed revision to DCD Subsection 19.2.4.1. Although somewhat reassuring, the comparison of the factored load to the ultimate pressure capacity is not the acceptance criteria recommended by RG 1.136.

In addition, on p. 6.2.5-44 of MHI's response to 6.2.5-34, MHI assumes that the Pg1 and Pg2 loads do not occur at the same time. Therefore, they state that the pressure before uncontrolled burn is  $D+Pg1=50.1$  psia, and  $D+Pg2=130.4$  psia after the uncontrolled burn. MHI then compared the larger of these, 130 psia, to the ultimate capacity of the PCCV (216 psia), and concluded that sufficient margin exists. However, according to the equation in RG 1.136 (p.8) concerning the hydrogen burn, the two loads, Pg1 and

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Pg2, are additive. In other words, the equation in RG 1.136 and the total pressure would be as follows:

$$D+Pg1+Pg2=3.4+46.7+127=177.1 \text{ psia.}$$

$$\text{Not } D + Pg1=50.1 \text{ psia}$$

$$\text{or } D+ Pg2=130.4 \text{ psia,}$$

as given in MHI's response.

Please provide an analysis that computes the factored load in accordance with RG 1.136. In addition analyze the resultant factored load ( $D+Pg1+Pg2$ ) to determine if it results in meeting allowable limits from stresses and strains, in accordance with ASME Article CC-3720. (i.e. a discussion on how this pressure on the liner does not result in calculated strain for the liner exceeding Table CC-3720-1)