REQUEST FOR ADDITIONAL INFORMATION 414-3102 REVISION 1

6/24/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 04.05.02 - Reactor Internal and Core Support Structure Materials
Application Section: 4.5.2

QUESTIONS for Component Integrity, Performance, and Testing Branch 1 (AP1000/EPR Projects) (CIB1)

04.05.02-6

Question 1
In response to RAI 269-2155 Question 4.5.2-2a, MHI provided a sketch of the neutron reflector and its components but did not provide the material specifications for the neutron reflector components.

Provide the material specifications for the neutron reflector components and modify Table 4.5-2 of the US-APWR DCD as appropriate (see Question 11).

04.05.02-7

Question 2
In response to RAI 269-2155 Question 4.5.2-2d, MHI stated that the maximum fluence at the corner of the neutron reflector will exceed the IASCC (irradiation assisted stress corrosion cracking) threshold of $5x10^{20}$ n/cm^2 by the end of design life. MHI also stated that the inner surface of the neutron reflector can be inspected.

Discuss your inspection plan (type of inspection, inspection area, frequency, acceptance criteria, etc.) for the neutron reflector to ensure that IASCC will not affect the integrity of the neutron reflector.

04.05.02-8

Question 3
In response to RAI 269-2155 Question 4.5.2-3b, MHI did not state if the lower core support plate was considered “Reactor vessel internals – primary material” as described in Table 4.5-2 of the US-APWR DCD. The reason for this question was to verify the material specification applicable to the lower core support plate.

Provide the material specification for the lower core support plate and modify Table 4.5-2 of the US-APWR DCD as appropriate (see Question 11).

04.05.02-9

Question 4
In response to RAI 269-2155 Question 4.5.2-3b, MHI did not state if the radial support keys are considered “Reactor vessel internals – primary material” as described in Table 4.5-2 of the US-APWR DCD. The reason for this question was to verify the material specification applicable to the radial support keys.

Provide the material specification for the radial support keys and modify Table 4.5-2 of the US-APWR DCD as appropriate (see Question 11).

04.05.02-10

Question 5
In RAI 269-2155 Question 4.5.2-3b, the staff requested that MHI describe how the radial support keys are attached to the lower support plate. The reason for this question was to determine if the radial support keys that are shown in Figures 3.9-4 and 3.9-6 of the US-APWR DCD are manufactured as an integral part of the lower core support plate or if they are attached to the lower core support plate by welding.

Discuss how the radial support keys are attached to the lower core support plate. If welding processes are used, discuss the welding process and welding materials used to make the attachment.

04.05.02-11

Question 6
In response to RAI 269-2155 Question 4.5.2-3b, MHI discussed radial supports that are reactor vessel parts as identified in Table 5.2.3-1 of the US-APWR DCD.

a) Confirm that the radial supports are Thermally Treated Alloy 690 in accordance with material specification SB-166 as specified in Table 5.2.3-1 of the US-APWR DCD.
b) Discuss the welding processes and welding materials used to connect the radial supports to the reactor vessel.
c) Discuss whether the radial supports are welded directly to the reactor vessel base material (SA-508 alloy steel) or are welded to the reactor vessel cladding. Confirm that these welds are qualified as structural welds.
d) Discuss whether stainless steel cladding is used for the entirety of the reactor vessel or whether nickel based cladding is used in the vicinity of the radial supports.
e) If both stainless steel and nickel based cladding is used in the reactor vessel, discuss the cladding sequence.

04.05.02-12

Question 7
Discuss in detail how the lower core support plate attaches to the reactor vessel. (Note: Figure 3.9-4 of the US-APWR DCD shows this attachment but not in detail and without identifying certain components such as the reactor vessel radial supports, radial support clevis inserts, and any welds. A detailed sketch of this attachment would be helpful to the staff's understanding but is not required.)

Include the following in your detailed discussion or sketch.

- Lower core support plate
- Radial support key
- Weld between lower core support plate and radial support key (if applicable)
- Radial support clevis insert
- Radial support clevis insert bolt and spring
- Reactor vessel radial support
- Reactor vessel
- Any weld or weld cladding between the reactor vessel radial support and the reactor vessel base material
- Any component critical to the attachment that was omitted from the list above (if applicable)

04.05.02-13

Question 8
In response to RAI 269-2155 Question 4.5.2-4a, MHI provided a list of core barrel welds that were not listed in Section 3.9.5.1.2 of the US-APWR DCD.

Confirm that these welds will be made using weld materials listed in Table 4.5-2 of the US-APWR DCD, or provide the material specification for these welds in Table 4.5-2 of the US-APWR DCD.

04.05.02-14

Question 9
In response to RAI 269-2155 Question 4.5.2-4b, MHI stated that the maximum fluence on the core barrel will exceed the threshold of $5x10^{20}$ n/cm^2 by the end of design life. MHI also stated that the core barrel can be inspected.

Discuss your inspection plan (type of inspection, inspection area, frequency, acceptance criteria, etc.) for the core barrel to ensure that IASCC will not affect the integrity of the core barrel.

04.05.02-15

Question 10
In response to RAI 269-2155 Question 4.5.2-5, MHI stated that the DCD will incorporate changes to "4.1.1.1 Controls on Welding".

Confirm that these changes will be made to Section 4.5.2.2 in lieu of Section 4.1.1.1 of the US-APWR DCD.

04.05.02-16

Question 11
The first Component listed in Table 4.5-2 is “Reactor vessel internals-primary material”.

a) Clarify what components are included under “Reactor vessel internals-primary material”.
b) Does this category include both internal structures and core support structures that are not specifically listed in Table 4.5-2?
c) Does this category include the neutron reflector components, lower core support plate and radial key inserts?