REQUEST FOR ADDITIONAL INFORMATION 563-4386 REVISION 0

3/29/2010

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 09.01.05 - Overhead Heavy Load Handling Systems
Application Section: SRP 9.1.5

QUESTIONS for Balance of Plant Branch 1 (AP1000/EPR Projects) (SBPA)

09.01.05-14

COL Information Items 9.1(3) through 9.1(8) in Section 9.1.6 were deleted in Revision 1 of DCD. DCD Revision 1 provided a reason for deletion in the description of change list (located in "Rev1_Change_List" page 18 of 75) which stated, "Editorial: This COL item is programmatic, and as a part of plant procedures and administrative procedures those has been defined in Subsection 13.5. Since these procedures has already been identified as COL item in Subsection 13.5, the item described in Section 9.1 was deleted to avoid duplicate description in the DCD."

SRP Section 9.1.5 and NUREG-0612 provides guidance for applicants to describe a heavy load handling program for design, operation, testing, maintenance and inspection of heavy load handling systems. In addition, US-APWR DCD Chapter 1, page 1.9-364, Table 1.9.3-1, "Conformance with Generic Issues (sheet 19 of 30)" provides a discussion of the minimum amount of details needed for heavy load handling procedures. The applicant was asked to determine whether a COL information item should be developed to ensure that the COL applicant will provide such a heavy load handling program. [RAI 292-2232, question 9.1.5-12]

In its response, the applicant agreed to the addition of a COL information item. The applicant proposed language containing specific guidance directing a COL applicant to establish a heavy load handling program, including associated procedural and administrative controls, for addition to DCD Tier 2 Section 9.1.6 as COL 9.1(6).

The staff agrees with the addition of COL 9.1(6), since this will provide a more detailed definition of the content that the COL applicants will include in development of their heavy load handling program. However, Section C.I.9.1.5 of Regulatory Guide (RG) 1.206 contains specific guidance for the COL applicant to include in the heavy load handling program and the proposed US-APWR COL items do not seem to specify all the items specified in RG 1.206 for inclusion into the handling program. In addition, the response to RAI 9.1.5-01 specifically declared the essential service water pump pit cranes associated with the ultimate heat sink related structures (UHSRS) as outside the scope of the DCD. Thus, the staff finds the RG 1.206 item instructing the COL applicant to list all the heavy load handling equipment outside the scope of the certified design especially important to fully address this scope.

Therefore, the applicant is requested to revise and/or replace COL 9.1(6) to clearly specify all of the load handling items found in RG 1.206 C.I.9.1.5.

Reference: MHI's Responses to US-APWR DCD RAI No. 292-2232; MHI Ref: UAP-HF-09260; dated May 25, 2009, ML091490219.

09.01.05-15

The applicant described in DCD Tier 2 Section 9.1.5.1 that the Overhead Heavy Load Handling Systems (OHLHS) may be used to handle non-critical loads of greater weight than the maximum critical load. In RAI 9.1.5-05, the staff asked the applicant to provide examples of non-critical loads and the methodology used to determine what constitutes a non-critical load.

In its response, the applicant provided an example of the use of the OHLHS for handling non-critical loads of greater weight than the maximum critical load as the, "special lifting of heavy loads during construction or plant shutdown".

The RAI 9.1.5-05 response further indicated the following:

> "One example is the special lifting of heavy loads during construction or plant shutdown conditions. Prior to the lifting of non-critical loads after initial fuel loading, it would be demonstrated that the potential load drops due to inadvertent operations or equipment malfunctions, separately or in combination, would not jeopardize safe shutdown functions, cause a significant release of radioactivity, a criticality accident, or inability to cool fuel within the reactor vessel or spent fuel pool."

Although the RAI response is acceptable, the staff requests the applicant to include the details of the response to RAI 9.1.5-05 regarding the use and demonstration of safe handling prior to non-critical lifts in the DCD accordingly.

Reference: MHI's Responses to US-APWR DCD RAI No. 292-2232; MHI Ref: UAP-HF-09260; dated May 25, 2009, ML091490219.

09.01.05-16

US-APWR DCD, Revision 1, Section 2.7.6.5.1 of Tier 1 (subpart "Numeric Performance Values") provided the statement, "The safety analysis states that because the spent fuel cask handling crane is prohibited from traveling directly over the spent fuel, a spent fuel cask drop accident is an implausible event and is not required to be analyzed in the safety analysis." The staff asked applicant to provide additional details of this safety analysis in RAI 292-2232, 9.1.5-10.

In its response, the applicant clarified that there is no safety analysis as the cranes in question have a single-failure-proof main hook design. The applicant proposed removing the sentence regarding safety analysis from the Tier 1 Section 2.7.6.5.1 bullet titled "Numeric Performance Values" and replacing it with language to indicate, "The main hooks of the PCCV polar crane and the spent fuel cask handling crane are

designed as single-failure-proof cranes". Similar wording was also proposed as an additional bullet under the "Key Design Features" heading of DCD Tier 1 Section 2.7.6.5.1. The applicant submitted Revision 2 of the DCD, dated October 2009 that have incorporated the proposed RAI response.

The staff is unclear what is meant by the use of the term "hooks". It is not clear whether this reference to hook is referring to the "hoist" or only the hoists hook that has incorporated the single-failure proof feature.

In addition, the applicant added the following statement to Tier 1 Section 2.7.6.5.1: "Crane axle failure may result in limited slip of the lifted load, causing impact on the floor, which has been accounted for in the structural design". All information in Tier 1 needs to be provided in Tier 2 and the staff is unable locate a similar statement in Tier 2. The staff also can not locate any definition of "limited slip" and the applicant is asked to provide additional details on the potential cause and amount of slip allowed.

The applicant is requested to address the following and update the DCD accordingly:

- Clarify which portions of the cranes (i.e. hooks, hoist, etc..) are designed with single failure proof feature for consistency and update the term throughout the DCD accordingly.

- Revise Tier 2 to include the all information that is in Tier 1 in order to properly support Tier 1 statements.

- Provide definition of limited slip and provide the referenced structural design analysis used to justify the amount of slip allowed.

Reference: MHI's Responses to US-APWR DCD RAI No. 292-2232; MHI Ref: UAP-HF-09260; dated May 25, 2009, ML091490219.

09.01.05-17

In response to RAI 9.1.5-11, the applicant proposed to provide additional ITAAC to address OHLHS single-failure feature and special lifting device design.

The applicant also submitted Revision 2 of the DCD, dated October 2009. This revision contained the corrections detailed in the applicant's response to RAI 9.1.5-11. The staff reviewed the response to RAI 9.1.5-11 and DCD Revision 2 and found that the proposed ITAAC for declaration of single failure proof appeared too broad and the acceptance criteria related to the existence of a report is considered unacceptable.

For the single failure proof cranes, the ITAAC should be used to verify certain key attributes of the single failure proof crane using acceptance criteria from the licensing standard (i.e., NUREG-0554 or ASME NOG-1).

As a minimum the ITAAC should address a set of tests that include:

(1) NDE of critical welds in the crane structure (Paragraph 4251.4 of ASME NOG-1 or Article 2.6 of NUREG-0554) with acceptance criteria from AWS D1.1;

(2) Static and dynamic load testing (Paragraph 7422 of ASME NOG-1 or Articles 8.2 and 8.4 of NUREG-0554) with acceptance criteria related to bridge design deflection under load, ability to manually lower load, ability of holding brakes to individually stop and hold rated load, and proper operation of limiting and safety devices; and
(3) No-load test of two-blocking protection (either independent tests of redundant upper limit switches or test of energy absorbing device) (Paragraph 7421 of ASME NOG-1 or Article 8.3 of NUREG-0554).

In addition to ITAAC for the crane, there should be ITAAC for critical special lifting devices, which could be limited to the acceptance test in ANSI/ANS 14.6 (150% load test for 10 minutes followed by NDE of critical welds per Article 5.5).

The applicant is requested to resubmit the proposed ITAAC with a more defined acceptance criteria and details and update Tier 1 of the DCD accordingly.

Reference: MHI's Responses to US-APWR DCD RAI No. 292-2232; MHI Ref: UAP-HF-09260; dated May 25, 2009, ML091490219.