

# REQUEST FOR ADDITIONAL INFORMATION 292-2232 REVISION 1

3/26/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

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

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

09.01.05-1

## **RAI 9.1.5-01**

SRP 9.1.5 indicates OHLHS "Overhead Heavy Load Handling Systems" consists of all components and equipment for moving all heavy loads at the plant site. The DCD "Design Control Document" only provides information on two single-failure proof cranes; spent fuel cask handling and polar cranes. DCD section 9.1.5.2 states that "other OHLHS equipment may include, but are not limited to, monorail type hoists, bridge cranes, and jib cranes." While reviewing the DCD the staff noticed that the essential service water pump pit cranes, listed in item 30 of Table 3.2-2 of the DCD, may be located near equipment important-to-safety, (the essential service water system is safety-related). However, the OHLHS was not discussed in DCD Section 9.1.5, and no information on the design of these cranes was included in the DCD.

Provide a complete list of all cranes of the OHLHS along with design details (i.e. single failure-proof, loads, location, seismic category, etc...) for OHLHS cranes located in areas throughout the plant where load drops could result in damage to SSC important-to-safety. Clearly identify whether or not the cranes are single-failure-proof in accordance with NUREG-0554. Include a list/description of all cranes/hoists in areas where there is nuclear fuel or SSC important-to-safety (i.e. a crane that could handle a critical load). In addition, clearly indicate in the DCD that the conditions of SRP section 9.1.5.III.4 are met for each crane that could handle a critical load. Provide a markup of the affected DCD section in your response.

09.01.05-2

## **RAI 9.1.5-02**

DCD, Chapter 1, table 1.9.3-1, "Conformance with Generic Issues" (page 1.9-364) lists CMAA 70 or 74 as applicable to cranes handling critical loads and makes repeated reference to ASME NOG-1 Type 1 cranes. However in the design description of the OHLHS in DCD section 9.1.5 there is no discussion on whether the OHLHS design conforms with the criteria specified in CMAA 70, 2000, "Specification for Top Running Bridge and Gantry Type Multiple Girder Electric Overhead Traveling Cranes", and chapter 2-1 of ANSI/ASME B30.2-2005, "Overhead and Gantry Cranes - Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist", as recommended in SRP Section 9.1.5.III.3.F. Furthermore, ASME NOG-1 standard defines cranes classified into

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three types (I, II or III) depending upon crane location and usage of the crane at a nuclear facility. The DCD does not clearly identify the OHLHS cranes as NOG-1 Type I, II or III.

In addition, the DCD does not identify classification type for "Suspension Crane" on the spent fuel handling crane. In accordance with ASME NOG-1, section 6320(c), auxiliary hoists on a Type I crane shall meet the performance requirements of hoist for type II cranes. Confirm that the auxiliary cranes meet this requirement.

Confirm that OHLHS cranes will be designed to the criteria specified in CMAA-70-2000, "Specification for Top Running Bridge and Gantry Type Multiple Girder Electric Overhead Traveling Cranes" and Chapter 2-1 of ASME B30.2-2005, "Overhead and Gantry Cranes - Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist" as recommended in SRP Section 9.1.5.III.3.F. In addition, provide the ASME NOG-1 Type I, II, or III classification for all OHLHS cranes. Include this information in the DCD, identify which revision of the DCD it will be in, and provide a markup in your response.

09.01.05-3

### **RAI 9.1.5-03**

Section 2.5 of NUREG-0554 specifies that single failure proof cranes are to be designed to retain control of and hold the load during an SSE. DCD Section 9.1.5.2 indicates the OHLHS is designed to seismic category II and thus meet the guidelines of Regulatory Position C.2. of RG 1.29. Although DCD states that the OHLHS are seismic category II, the DCD does not address the OHLHS designs compliance with Section 2.5 of NUREG-0554. Discuss capability of all OHLHS cranes (including non-single failure-proof) to continue to hold their maximum load during an SSE. Include this information in the DCD, identify which revision of the DCD it will be in, and provide a markup in your response.

09.01.05-4

### **RAI 9.1.5-04**

DCD Section 9.1.5.3 "Safety Evaluation" outlines the evaluation process for the OHLHS "Overhead Heavy Load Handling Systems" as to its ability to prevent damaging or uncovering fuel, compromising sub-criticality, or impeding essential safe-shutdown functions. The DCD described the travel of the spent fuel cask handling machine as being limited "to the areas shown in Figure 9.1.5-4." Since figure 9.1.5-4 provides the traveling route of a heavy load inside containment, the table number appears to be in error. Explain and resolve the apparent discrepancy and make the appropriate revision to the DCD.

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09.01.05-5

### **RAI 9.1.5-05**

The applicant stated in Section 9.1.5.1, "On occasion, the OHLHS may be used to handle non-critical loads of greater weight than the maximum critical load. For those occasions, the maximum non-critical load is the design rated load. The design rated load does not have the safety factor limits of a single-failure-proof crane required by NUREG-0554. The design rated load utilizes standard commercial practice safety factor limits."

Provide examples of non-critical loads and explain the methodology that will be used to determine that the loads are non-critical.

09.01.05-6

### **RAI 9.1.5-06**

DCD section 9.1.5.3 "Safety Evaluation" indicates that slings for use with the single failure proof cranes (i.e. fuel cask handling and polar crane) are designed to ANSI/ASME B30.9. SRP section 9.1.5.III.4.C.ii(2) indicates that for single-failure cranes the slings are to be constructed of a metallic material and also designed for twice the load or have dual/redundant configuration.

While reviewing the DCD, the staff was not able to locate how this sling criterion is met. Provide details on how the US-APWR will address this criterion for slings used on single failure proof OHLHS cranes.

09.01.05-7

### **RAI 9.1.5-07**

DCD contains inconsistencies in code revision of ASME NOG-1 applied to the OHLHS throughout the DCD. The DCD references in question are:

- Table 1.9.3-1 page 1.9-361 "Conformance with Generic Issues" uses reference to NOG-1 2002,
- Section 9.1.5 references NOG-1 2004.
- Section 3.7, "reference 3.7-22" specifies use of 1995 revision of NOG-1.

Justify why the application does not specify the most current revision to ASME NOG-1 standard throughout the application.

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09.01.05-8

### **RAI 9.1.5-08**

The DCD section 9.1.7 "References" seems to indicate an incorrect title and is missing revision date for NUREG-0554, "Single-Failure-Proof Cranes for Nuclear Power Plant" (reference 9.1.7-19). Revise DCD to correct reference.

09.01.05-9

### **RAI 9.1.5-09**

DCD table 9.1.5-1, "Specification of the Spent Fuel Cask Handling Crane" and Table 9.1.5-2, "Specification of the Polar Crane" provide reference to a Figure 9.1.5-5 for "Hook Coverage" dimension (Item 9).

Staff is unable to locate figure 9.1.5-5 in the DCD. Provide figure 9.1.5-5 in DCD or revise reference to the correct figure.

09.01.05-10

### **RAI 9.1.5-10**

DCD, Tier 1, Section 2.7.6.5.1 (subpart "Numeric Performance Values") provides 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."

Staff has the following concerns with this Tier 1 statement above:

- Staff is unable to locate the safety analysis referenced in the statement. Also, details of this analysis do not seem to be provided in Tier 1 or Tier 2 of DCD. Provide location of safety analysis and details.
- DCD, Tier 2, section 9.1.5.1 appears to indicate use of a single-failure proof crane precludes the need for a load drop evaluation to meet highly reliable handling system requirement of SRP 9.1.5.III.4 and NUREG-0612. However, Tier 1 statement above seems to use load path and mechanical stops to meet SRP and NUREG-0612 requirements to preclude need for a safety analysis. Resolve Tier 1 and Tier 2 inconsistency.
- As stated in Tier 1 statement above, spent fuel cask drop accident is not required since crane is prohibited from traveling over spent fuel. Prohibiting travel over spent fuel adequately addresses cask drop accident over the spent fuel, but fails to address a potential load drop accident that could cause damage to equipment essential to achieve or maintain safe shutdown. Justify why a safety analysis is not needed for drop accident over equipment essential to achieve or maintain safe shutdown.

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- DCD, Tier 1, Section 2.7.6.5.1 (subpart “Numeric Performance Values”) provides justification for not requiring a load drop analysis for the spent fuel cask handling crane. Staff is unable to locate similar justifications for the polar and other cranes that will handle critical load. Provide similar details for all OHLHS cranes.

Staff requests applicant to address concerns listed above.

09.01.05-11

### **RAI 9.1.5-11**

DCD Tier 2, section 9.1.5.1 clearly defines Polar and spent fuel cask cranes as single-failure-proof cranes, by stating, "The OHLHS is designed with single-failure proof cranes in accordance with NUREG-0554, Single-Failure-Proof Cranes for Nuclear Power Plants, (Ref 9.1.7-19) using ASME NOG-1, Rules for Construction of Overload and Gantry Cranes (Top Running Bridge, Multiple Girder) (Ref 9.1.7-20, to handle the maximum critical load based on the area in which it is operating."

The US-APWR DCD, Tier 1, Section 2.7.6.5 does not list "single-failure-proof" as certified design information with an ITAAC for either the polar crane or the spent fuel cask handling crane. The staff believes that "single-failure-proof" design criteria for the above listed cranes should be listed in Tier 1. Special lifting devices should also be verified to be in accordance with ANSI N14.6 as an ITAAC.

One design criteria, among several design criteria for Tier 1 information, is that it should include features and functions which could have a significant effect on the safety of a nuclear plant or are important in preventing or mitigating accidents. A drop of the reactor vessel head assembly and the upper and lower reactor internals, a spent fuel cask, Rector Coolant Pump Motors and other similar sized equipment could affect plant safety. Therefore, design features that reduce the risk and/or analyses that provide assurance of safety after a dropped load are important-to-safety. The staff considers "single-failure-proof" design criteria for the OHLHS handling cranes as Tier 1 safety-significant design criteria.

Provide justification for not including "Single-Failure-proof" design criteria and an ITAAC in Tier 1 of DCD, which are safety-significant for OHLHS cranes. In addition, provide justification for not including verification of NASI N14.6 special lifting device as an ITAAC.

09.01.05-12

### **RAI 9.1.5-12**

COL items 9.1(3) through 9.1(8) in chapter 9.1.6 were deleted in Revision 1 of DCD. DCD revision 1 provides reason for deletion in description of change list (located in "Rev1\_Change\_List" page 18 of 75) which states, "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

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identified as COL item in Subsection 13.5, the item described in Section 9.1 was deleted to avoid duplicate description in the DCD.”

Staff also noticed DCD Tier 2, Chapter 1 table 1.9.3-1, “Conformance with Generic Issues (page 1.9-365, sheet 19 of 30)” provides discussion of the minimum amount of details needed for heavy load handling procedures.

SRP 9.1.5 and NUREG-0612 provides guidance for applicants to develop a heavy load handling program for design, operation, testing, maintenance and inspection of heavy load handling systems.

A COL action item should be added to DCD to provide direction for COL applicant to develop such a heavy load handling program.

09.01.05-13

### **RAI 9.1.5-13**

DCD Tier 2, Chapter 1, Table 1.9.3-1, “Conformance with Generic Issues” (page 1.9-365) states, “However, all specific loads and load paths cannot be defined prior to the operations. For these cases, it is anticipated that safe load path considerations will be based on comparison with analyzed cases, previously defined safe movement areas, and previously defined restricted areas and reviewed by the COL Applicant’s plant review board.”

Staff is unable to locate any COL item in DCD to provide closure of this item. Provide justification as to why this COL item was omitted and whether an additional COL item should be added.