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## RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

### APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.: 310-8355

SRP Section: 14.03.08 – Radiation Protection – Inspections, Tests, Analyses, and Acceptance Criteria

Application Section: Tier 1, Section 2.7.4.4

Date of RAI Issue: 11/16/2015

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### **Question No. 14.03.08-12**

In the response to RAI 8054, Question 14.03.08-3, the applicant indicated that the Refueling Machine (RM) and Spent Fuel Handling Machine (SFHM) include an ITAAC (ITAAC item 8 of Table 2.7.4.4-2) to ensure that they contain mechanical stops to restrict the withdrawal of spent fuel assemblies. However, as specified in RAI 8054, Question 14.03.08-3, the ITAAC should ensure that the fuel height is limited so that the dose rate to an operator does not exceed 2.5 mrem/hour. The 2.5 mrem/hour is specified in ANSI/ANS-57.1-1992, which is referenced by the applicant for fuel handling. The current ITAAC Item 8 of Table 2.7.4.4-2, does not specify what an acceptable lift height or dose rate is, therefore, it is unclear from the ITAAC if the mechanical stops will limit the dose to operators to within 2.5 mrem/hour in accordance with the information in Tier 2 of the FSAR. Therefore, the ITAAC should be updated in a way that ensures that if the ITAAC is met, the dose to an operator will not exceed 2.5 mrem/hour from the maximum raised fuel assembly, control element, or both, with the water level in the pools at the lower limit of the normal operating water level. This will ensure that a facility referencing design certification will meet the 2.5 mrem/hour criteria specified in the design certification. Please update the ITAAC accordingly.

### **Response**

The RM, SFHM and CEACP hoists are provided with mechanical stops. The mechanical stops restrict withdrawal of the spent fuel assemblies or CEAs above the minimum safe water cover depth (9 ft). This ensures that an operator on the refueling platform will not be exposed to the radiation dose limit of 2.5 mrem/hr.

Tier 1, Section 2.7.4.4 will be revised to describe the basis for the mechanical stops along with the associated ITAAC.

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**Impact on DCD**

Tier 1, Section 2.7.4.4 and Table 2.7.4.4-2 Item 8 will be revised as shown in the attachment.

**Impact on PRA**

There is no impact on the PRA.

**Impact on Technical Specifications**

There is no impact on the Technical Specifications.

**Impact on Technical/Topical/Environmental Reports**

There is no impact on any Technical, Topical, or Environment Report.

**APR1400 DCD TIER 1**2.7.4.4 Light Load Handling System2.7.4.4.1 Design Description

The light load handling system (LLHS) handles, moves and stores fuel assemblies and control element assemblies (CEAs) during fuel transfer operation. The LLHS load measuring devices are designed to reduce the potential for damage to a fuel assembly. All of the LLHS equipment are classified as non-nuclear safety with the single exception of the double blind flange assembly for transfer tube penetration sleeve. The LLHS has indicator lights on the control console to verify visually the operation status for the operator. Additionally, movement of the refueling machine (RM) and the spent fuel handling machine (SFHM) bridge is audibly signaled.

The RM, CEA change platform (CEACP) and CEA elevator (CEAE) are located in the reactor containment building. The SFHM, new fuel elevator (NFE) and fuel handling hoist of overhead crane are located in the fuel handling area of the auxiliary building. The fuel transfer system (FTS) is located in both the reactor containment building and the auxiliary building.

1. The functional arrangement of the LLHS is as described in the Design Description of Subsection 2.7.4.4.1 and in Table 2.7.4.4-1.
2. The ASME Code equipment identified in Table 2.7.4.4-1 is designed and constructed in accordance with ASME Section III requirements.
3. The ASME Code equipment identified in Table 2.7.4.4-1 retains its pressure boundary integrity at its design pressure.
4. The seismic Category I equipment identified in Table 2.7.4.4-1 withstands seismic design basis loads without loss of safety function.
5. The seismic Category II equipment identified in Table 2.7.4.4-1 retains structural integrity and does not impair the ability of a seismic Category I equipment to perform its design basis safety function during or following a safe shutdown earthquake (SSE).

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6. The RM, SFHM and CEACP hoists are provided with load measuring devices and are interlocked to interrupt hoisting and lowering if load limits are reached.
7. The RM, SFHM and CEACP hoists are interlocked to limit upward hoist travel.
8. The RM, SFHM and CEACP hoists are provided with mechanical stops to limit upward hoist travel.
9. During a loss of electrical power to the RM or SFHM, the RM or SFHM does not drop the fuel assembly held by its hoist.
10. The new fuel elevator is interlocked to prevent from raising the elevator with a fuel assembly in the elevator cavity.

**2.7.4.4.2 Inspections, Tests, Analyses, and Acceptance Criteria**

Table 2.7.4.4-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the LLHS.

The RM, SFHM and CEACP hoists are provided with mechanical stops. The mechanical stops restrict withdrawal of the spent fuel assemblies or CEAs above the minimum safe water cover depth (9 ft). This ensures that an operator on the refueling platform is not exposed to the radiation dose limit of 2.5 mrem/hr when at the lower limit of the normal operating water level.

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Table 2.7.4.4-2 (2 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. The seismic Category II equipment identified in Table 2.7.4.4-1 retains structural integrity and does not impair the ability of a seismic Category I equipment to perform its design basis safety function during or following a safe shutdown earthquake (SSE).	5. Inspections and analyses of the as-built seismic Category II equipment will be performed.	5. A report exists and concludes that the as-built seismic Category II equipment identified Table 2.7.4.4-1 does not impair the ability of a seismic Category I equipment to perform its design basis safety function during or following an SSE.
6. The RM, SFHM and CEACP hoists are provided with load measuring devices and are interlocked to interrupt hoisting and lowering if load limits are reached.	6. Test of the RM, SFHM and CEACP hoists will be performed to evaluate equipment response to simulated loads.	6. Load measuring devices and interlocks of the RM, SFHM and CEACP hoists interrupt hoisting and lowering when simulated load limits are reached.
7. The RM, SFHM and CEACP hoists are interlocked to limit upward hoist travel.	7. Test of the RM, SFHM and CEACP hoists will be performed to confirm that the interlock function works to limit upward hoist travel.	7. The RM, SFHM and CEACP hoists are interlocked to limit upward hoist travel.
8. The RM, SFHM and CEACP hoists are provided with mechanical stops to limit upward hoist travel.	8. Test of the RM, SFHM and CEACP hoists will be performed to confirm that the mechanical stops function works to limit upward hoist travel.	8. The RM, SFHM and CEACP hoists are limited for upward hoist travel at the mechanical stops.
9. During a loss of electrical power to the RM or SFHM, the RM or SFHM does not drop the fuel assembly held by its hoist.	9. Test of the RM and SFHM will be performed by removing electrical power from the loaded equipment.	9. The grapple does not open upon the loss of electrical power.
10. The new fuel elevator is interlocked to prevent from raising the elevator with a fuel assembly in the elevator cavity.	10. Test of the new fuel elevator will be performed to confirm that the interlock function works to limit travel.	10. The new fuel elevator does not raise with a fuel assembly in the elevator cavity.

The RM, SFHM and CEACP hoists are provided with mechanical stops. The mechanical stops restrict withdrawal of the spent fuel assemblies or CEAs above the minimum safe water cover depth (9 ft). This ensures that an operator on the refueling platform is not exposed to the radiation dose limit of 2.5 mrem/hr when at the lower limit of the normal operating water level.

The RM, SFHM and CEACP hoists limit upward hoist travel of spent fuel assemblies, CEAs, or both to provide at least 9 ft. of water cover depth.