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.:	**474-8588**
SRP Section:	**09.01.04-LIGHT LOAD HANDLING SYSTEM (RELATED TO REFUELING)**
Application Section:	**9.1.4- LIGHT LOAD HANDLING SYSTEM (RELATED TO REFUELING)**
Date of RAI Issue:	**05/02/2016**

Question No. 09.01.04-5

In RAI 161-7992 question 9.1.4-1 Item b, the staff requested the applicant to provide a refueling cavity drain-down evaluation, as described in SRP 9.1.4.III.3.D.ii. The applicant's response indicates the worst drain-down scenario as the one in which the spent fuel assembly is temporarily stored, in a vertical position, in the fuel carrier upender.

The staff evaluated the applicant's response and determined that additional information is needed. Taking into consideration the refueling operations, the staff would have expected the worst case to occur with fuel already located in the double-capacity upender and another fuel assembly in transit, elevated at the maximum lift elevation.

The staff requests the applicant to justify the basis for the initial assumptions described, or to re-evaluate the drain-down scenario with more limiting initial conditions.

Response

We agree that the worst case is with the fuel already located in the double-capacity upender and another fuel assembly in transit, elevated at the maximum lift elevation. With this condition, we re-evaluated the drain down scenario in the response to RAI 474-8588, Question 09.01.04-6.

Impact on DCD

There is no impact on the DCD.

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.

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Question No. 09.01.04-6

In RAI 161-7992 question 9.1.4-1 Item b, the staff requested the applicant to provide a refueling cavity drain-down evaluation, as described in SRP 9.1.4.III.3.D.ii. In its response the applicant discusses the refueling pool seal design and system misalignment.

The staff evaluated the applicant's response and determined that it does not address the drainage caused by failures of non-Seismic Category I SSCs that connect to the refueling pool.

The staff requests the applicant to identify all non-Seismic Category I SSCs that connect to the refueling pool (including their associated elevations), and to evaluate the drain-down scenario caused by failure of these non-Seismic Category I SSCs.

Response

1. The non-Seismic Category I SSCs that connected to the refueling pool and the evaluation for the drain-down scenario are as follows :

   a. Fuel Transfer Tube (Seismic Category Ⅱ : EL. 121'-0" - Refer to Figure 1) :

      The fuel transfer tube is designed to connect the containment building refueling pool and the fuel handling area transfer canal in the auxiliary building and to remain structurally intact and leak tight under seismic conditions. The welds are non-destructively inspected to confirm that there are no weld deficiencies when the fuel transfer tube is initially installed. Additionally, no matter what the leakage may occur during a postulated failure of the fuel transfer tube, the leakage water will be contained by the transfer tube penetration sleeve. Therefore, the leakage due to the postulated accident has no direct effect on the refueling pool water level.

b. The piping connected from the spent fuel pool cooling and cleanup system to the refueling pool (Seismic Category Ⅱ : EL. 153'-0", 114'-6", and 106'-6 3/8" – Refer to DCD Tier 2, Figure 9.1.3-1)

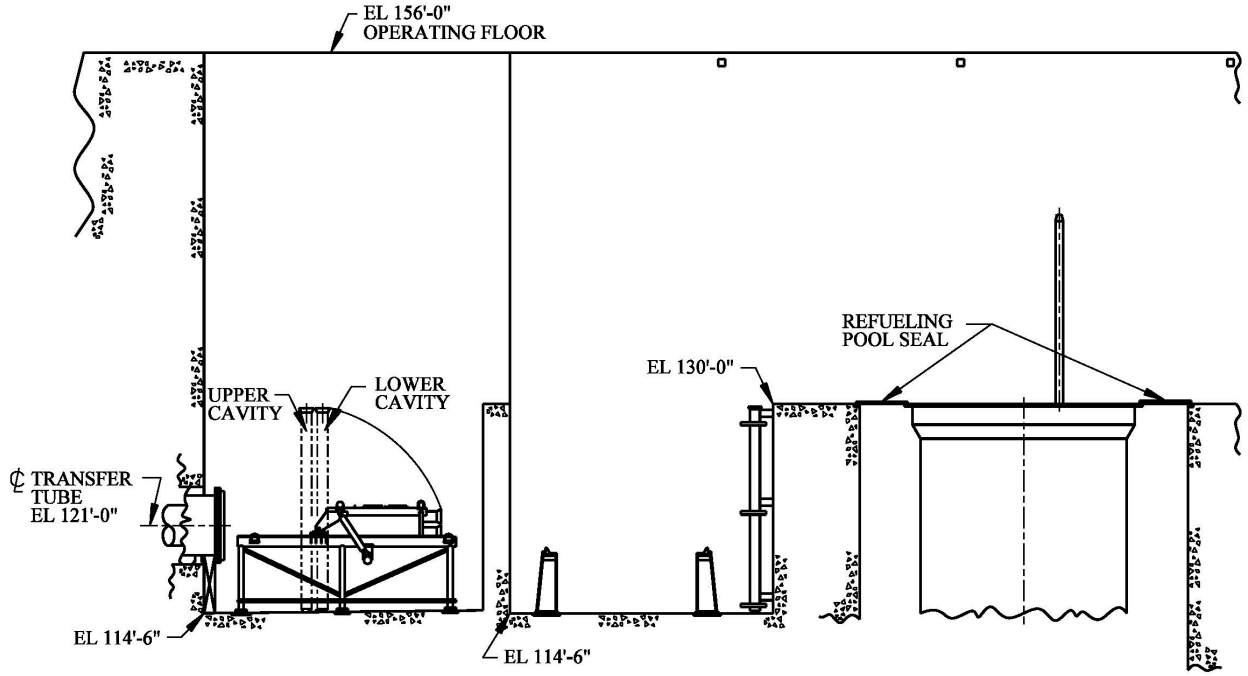
   Nine skimmers and a cleanup discharge nozzle are installed on the refueling pool side (EL. 153'-0") and three cleanup floor suction nozzles are installed on the bottom of refueling pool (114'-6", and 106'-6 3/8"). Since the piping from each connection is designed as Seismic Category II, which is designed to preclude a gross structural failure resulting from an SSE. The piping would not fail, but had the potential for leakage. When the piping is initially installed, its integrity is confirmed through a hydro test and welds are also inspected for non-destructive examination to verify that there are no weld deficiencies. Therefore, the probability of leakage through the piping is low. If the drainage occurs via leakage through the piping, the operator can readily identify the leakage by monitoring various water level instruments. Then, the operator can take the appropriate recovery actions to repair or isolate the piping and add makeup water to the refueling pool inventory at the same time. As a result, the refueling pool water level can be maintained to have sufficient inventory.

c. The refueling pool is connected to the SCS suction line, the SIS hot leg injection line and the SCS/SIS discharge line (DVI line) through reactor vessel. But all lines are designed in Seismic Category I.

2. The upper cavity of two cavities is only used in the transfer of fuel assembly between the containment building and the fuel handling area in the auxiliary building during refueling despite the design that the fuel carrier for the fuel transfer system consists of two cavities in APR 1400. (Refer to Figure 1)

3. If inventory loss occurs unexpectedly in the refueling pool under the condition where a spent fuel assembly is already located in the cavity fuel carrier and another fuel assembly in transit, elevated at the maximum lift elevation, the fuel assembly in the refueling pool could be immediately returned to its location in the reactor vessel or placed in another one of two fuel carrier cavity in the refueling canal. At this time, the top of the fuel assembly is completely covered by water because the refueling canal in the containment building is separated from the refueling pool by the concrete structure (Refer to Figure 1).

4. As mentioned in the response to Item a of RAI 161-7992, Question 09.01.04-1, if the water level in the refueling pool goes down, the makeup capability is sufficient to compensate for the drainage due to leakage from the non-Seismic Category I portion of the spent fuel pool cooling and cleanup system.



< Figure 1 Layout of Refueling Pool>

Impact on DCD

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