REVISED 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.:	**235-8275**
SRP Section:	**12.03-12.04 - Radiation Protection Design Features**
Application Section:	**SRP 12.3-12.4**
Date of RAI Issue:	**10/07/2015**

Question No. 12.03-28

10 CFR 50, GDC 61, requires that the fuel storage and handling, radioactive waste, and other systems which may contain radioactivity shall be designed to assure adequate safety under normal and postulated accident conditions. These systems shall be designed (1) with a capability to permit appropriate periodic inspection and testing of components important to safety, (2) with suitable shielding for radiation protection, (3) with appropriate containment, confinement, and filtering systems, (4) with a residual heat removal capability having reliability and testability that reflects the importance to safety of decay heat and other residual heat removal, and (5) to prevent significant reduction in fuel storage coolant inventory under accident conditions.

ANSI/ANS-57.1-1992, which is referenced by the applicant, indicates that fuel handling equipment shall be designed so that the operator will not be exposed to greater than 2.5 mrem/hour from an irradiated fuel unit, control component, or both, elevated to the up position interlock with the pool at normal operating water level.

While the applicant references ANSI/ANS-57.1-1992, and provides spent fuel dose information in FSAR Figures 12.2-1 and 12.2-2 the applicant provides no information indicating what the maximum lift height of a fuel assembly in the refueling pool and spent fuel pool would be in order to maintain the 2.5 mrem/hour criteria for an operator on the refueling platform, considering the maximum fuel assembly being transferred at the earliest time allowed by technical specifications. Please specify this lift height in the FSAR and ensure that there is appropriate height in the spent fuel pool and refueling pool to allow for the movement of fuel (for example, ensure that sufficient shielding can be provided over the raised fuel assembly while allowing clearance between the fuel and storage racks seated in the bottom of the spent fuel pool).

Response – (Rev. 1)

Mechanical stops in both the refueling machine and the spent fuel handling machine restrict withdrawal of the spent fuel assemblies as described in DCD Tier 2 section 9.1.4.3.

This results in the maintenance of a minimum water cover of 2.74 m (9 ft) over the active core region of the fuel assembly as shown in Figures 1, 2 and 3 when the lifted spent fuel assembly is at the mechanical stop. The resulting radiation level from the spent fuel is 2.5 mrem/hr or less in the work area when the shielding of the fuel handling equipment is taken into account. The SFP shielding has been designed for the maximum anticipated enrichment and burnup of the fuel assemblies.

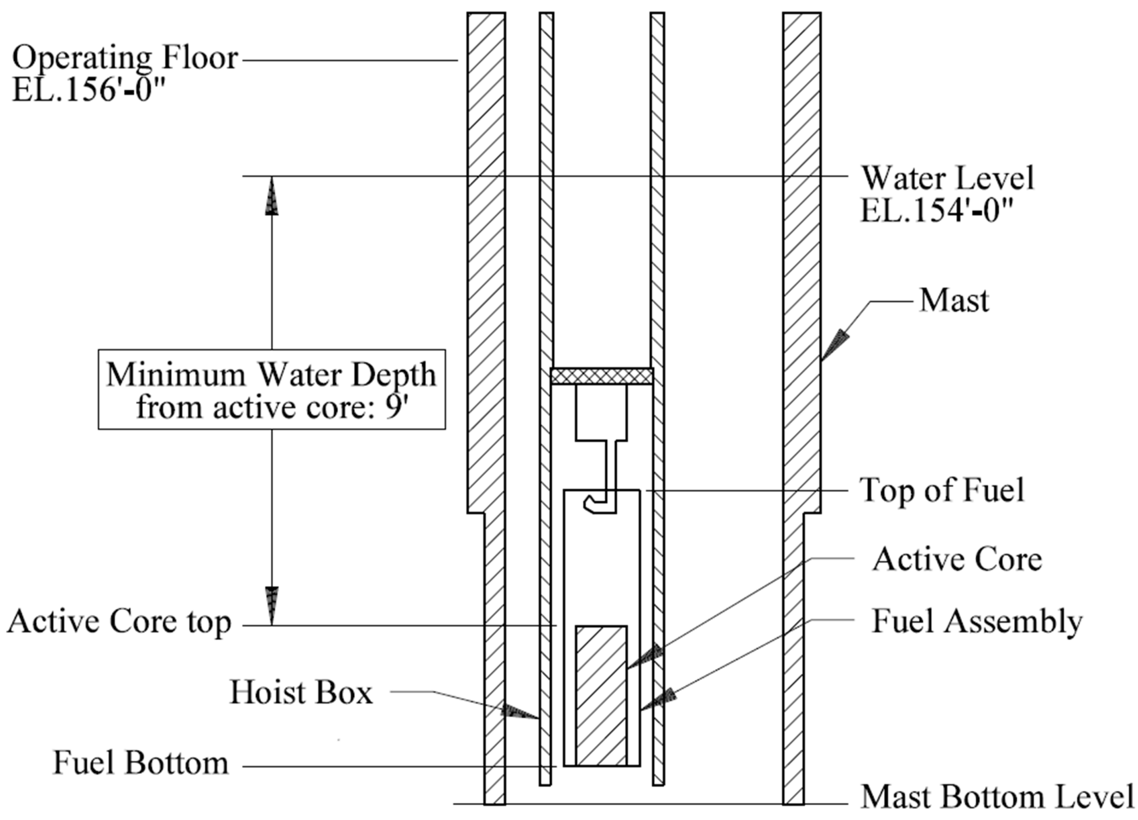

Figure 1 Minimum Water Depth of the RM (at the Up-stop)

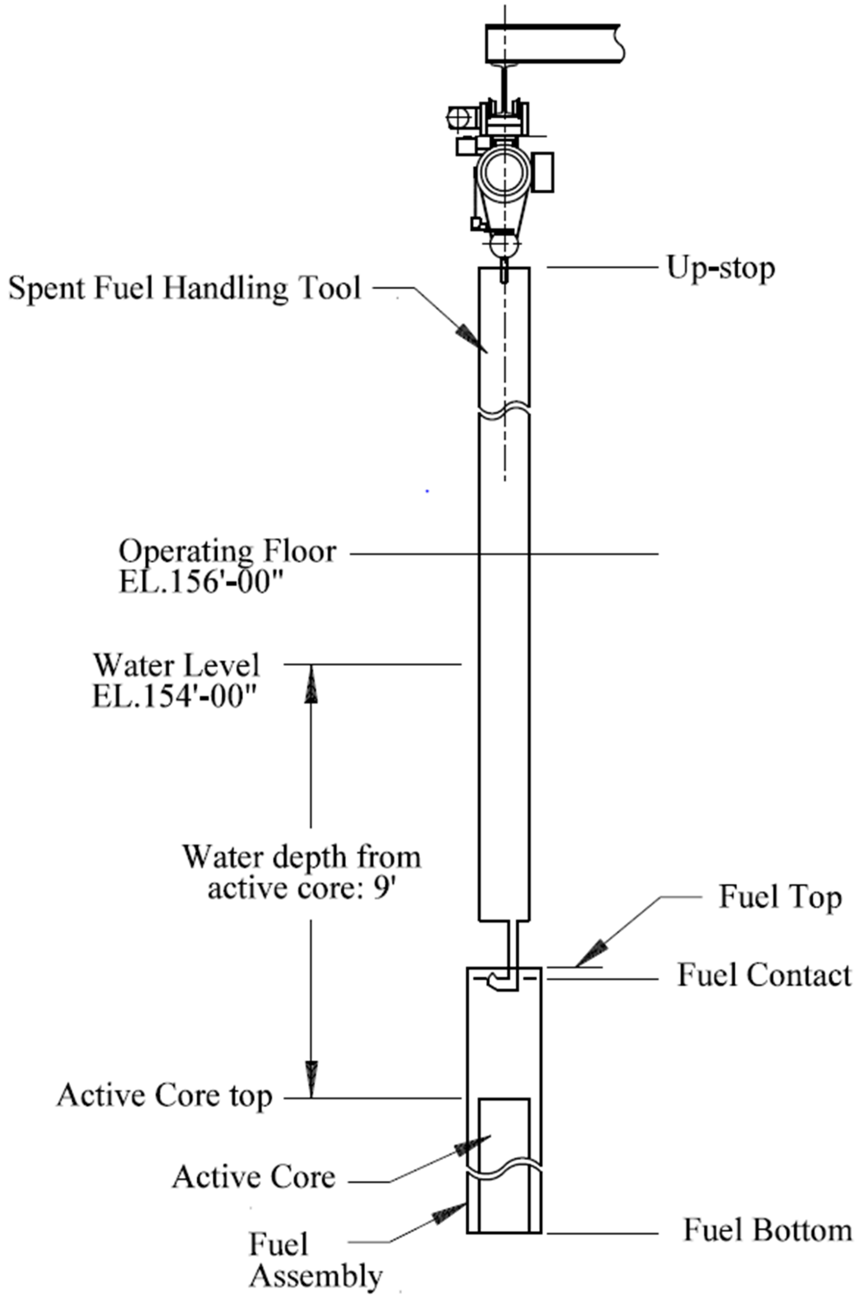

Figure 2 Minimum Water Depth of the SFHM Aux. Hoist (at the Up-stop)

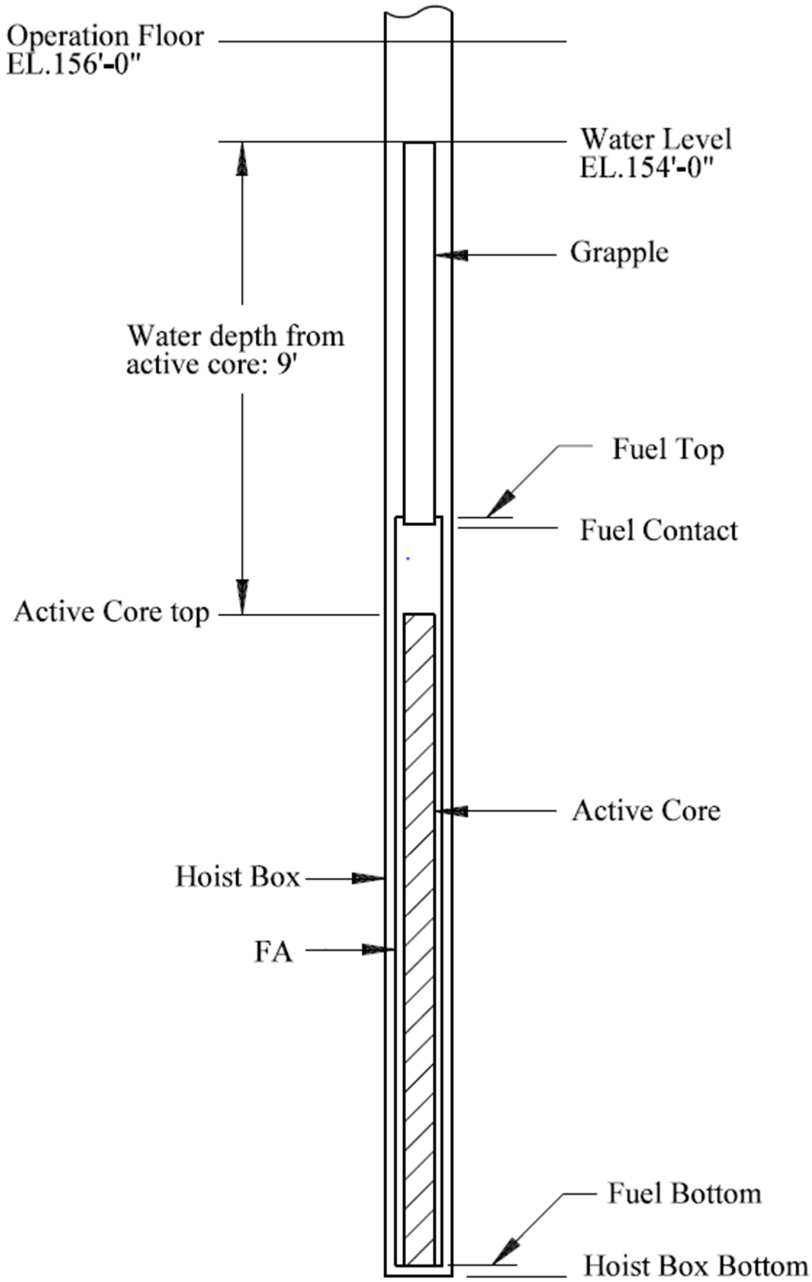

Figure 3 Minimum Water Depth of the SFHM Fixed Hoist box (at the Up-stop)

Impact on DCD

The section 9.1.4.3(d) of the DCD Tier 2 will be revised as indicated in 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 Environmental Report.

UGS using long handling tools and the CEA change platform. This operation may not be performed for each refueling.

If new CEAs are required, they may be introduced into the UGS at this time. The irradiated CEAs are moved to the CEA elevator, adjacent to the UGS storage area, where the upper CEA casting is removed from the CEA rods using special tooling. Each rod is picked up individually and placed into the transport container where the lower approximately 4.42 m (14 ft 6 in) section is cut off using the portable underwater hydraulic CEA cutter assembly. The upper approximately 1.68 m (5 ft 6 in) section of the CEA rod is then placed into the transport container, and the operation is repeated until all CEA rods have been cut. The transport container is then moved to the transfer carriage where it is transported to the spent fuel storage area for CEA rod disposal.

9.1.4.2.2.3.3 Reactor Assembly

The reactor assembly is executed by reversing the process in Subsection 9.1.4.2.2.3.1.

9.1.4.3 Safety Evaluation

The LLHS is evaluated to provide reasonable assurance that the LLHS operates under adequately safe conditions for any natural phenomena such as earthquakes and avoids criticality accidents and consequent release of radioactive materials from damage to the fuel by geometrical configuration and systems design during fuel handling. The LLHS is designed in accordance with ANSI/ANS 57.1-1992 (Reference 16) as follows:

a. To prevent mechanical damage to fuel assemblies and withstand natural phenomena

b. To prevent unacceptable radioactivity release, unacceptable radiation exposure, and criticality accidents

The LLHS equipment has the following design features:

a. The major systems of the LLHS are electrically interlocked with each other to assist the operator in properly conducting the fuel handling operation.

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b. Miscellaneous special design features that facilitate handling operations include the following:

   1) Manual operation of the refueling machine hoist and drives and CEA change platform traverse drives in the event of power failure

   2) Transfer system motor with a two-stage gearbox to permit applying an increased pull on the transfer carriage in the event it becomes stuck

   3) Viewing port in the refueling machine trolley deck to provide visual access to the reactor for the operator

   4) Protective shroud into which the fuel assembly is drawn by the refueling machine

   5) Removal of the transfer system components from the refueling cavity for servicing without draining the water from the refueling cavity

c. The fuel transfer tube is sufficiently large to provide natural circulation cooling of

This results in the maintenance of a minimum water cover of 2.74m (9 ft) over the active core region of the fuel assembly. The resulting radiation level from the spent fuel is 2.5 mrem/hr or less in the work area ~~when the shielding has been designed~~ for the maximum anticipated enrichment and burnup of the fuel assemblies.

tube.

d. Mechanical stops in both the refueling machine and the spent fuel handling machine restrict withdrawal of the spent fuel assemblies. The resulting radiation level at a minimum water depth from the spent fuel is designed to meet the radiation dose limits in the work area when the shielding of the fuel handling equipment is taken into account.

The LLHS meets positions C.1 and C.2 of NRC RG 1.29 (Reference 12) and positions C.1, C.5, C.6, and C.8 of NRC RG 1.13 (Reference 11), as they relate to the ability of the equipment to withstand the effects of earthquakes. With respect to radioactive release as a result of fuel damage, the machines conform to the guidelines of positions C.1 and C.5 of