

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.: 181-8011

SRP Section: 9.1.4 - LIGHT LOAD HANDLING SYSTEM AND REFUELING CAVITY DESIGN

Application Section: 09.01.04 – LIGHT LOAD HANDLING SYSTEM(RELATED TO REFUELING)

Date of RAI Issue: 08/31/2015

Question No. 09.01.04-2

NUREG-0800, SRP 9.1.4 specifies that acceptance for meeting the relevant aspects of GDC 61 and 62 are based, in part, on the guidelines of the American National Standards Institute/ American Nuclear Society (ANSI/ANS) 57.1.

DCD Tier 2, Section 9.1.4.5 commits to the use of electrical or mechanical interlocks to prevent criticality accidents, damage to fuel, and excessive personnel exposure, in accordance with ANSI/ANS 57.1 for the main fuel handling components.

DCD Tier 2, Section 9.1.4.2.1.6 provides a description of the spent fuel handling machine (SFHM) and states that, “[t]he SFHM has an auxiliary hoist that is provided to handle the light loads or fuel assembly using the appropriate handling tool. The auxiliary hoist also has a load-weighing system that includes a load cell and load indication to prevent the auxiliary hoist from being subjected to excessive force.”

Since the SFHM auxiliary hoist has the capability of handling fuel assemblies, it is unclear whether ANS/ANSI 57.1 interlocks or other features are applied to the auxiliary hoist.

The applicant is requested to describe any interlocks or control features provided with the auxiliary hoist on the SFHM.

Response

The auxiliary hoist is to be mounted on a superstructure, which is installed on the bridge of the spent fuel handling machine, and is designed for use with the fuel handling tool. The spent fuel handling tool is used in conjunction with the auxiliary hoist of the spent fuel handling machine for movement of fuel assemblies.

Interlocks or control features provided with the auxiliary hoist on the SFHM are as follows :

- (1) The auxiliary hoist raises or lowers the fuel handling tool at the spent fuel storage rack locations, the new fuel elevator, the damaged fuel container locations, the tool storage locations, spent fuel inspection device location, and the cask loading pit.
- (2) A control pendant is used to control the auxiliary trolley, auxiliary hoist and bridge motion. An interlock for overload, underload and travel protection is included. Additionally, the auxiliary hoist has an interlock with the spent fuel handling machine, the spent fuel handling machine is operated only when the auxiliary hoist is parked in its storage location.
- (3) The auxiliary hoist has limit switches for auxiliary trolley travel limit positions and hard stops.
- (4) The auxiliary hoist has a load weighing system including a load cell and load indication.
- (5) The auxiliary hoist is designed to be a variable speed system.

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 Technical Specifications.

Impact on Technical/Topical/Environmental Reports

There is no impact on any Technical/Topical/Environmental Reports.

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Question No. 09.01.04-3

NUREG-0800, SRP 14.3.7 states that the staff reviews the proposed ITAAC that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a plant that incorporates the design certification is built and will operate in accordance with the design certification, the Atomic Energy Act, and the NRC's regulations.

Item 7 in DCD Tier 1, Table 2.7.4.4-2 provides ITAAC for refueling machine (RM), spent fuel handling machine (SFHM) and control element assemblies change platform (CEACP) use of interlocks. The ITAAC acceptance criteria indicate that “[t]he RM, SFHM and CEACP hoists are interlocked to limit upward hoist travel.”

The staff finds these are unmeasurable acceptance criteria and additional criteria should be considered. In accordance with ANSI/ANS 57.1, Section 6.3.4.1.5, fuel handling equipment shall be designed so that the operator will not be exposed to >2.5 mrem/h from an irradiated fuel unit, control component, or both, elevated to the up position interlock with the pool at normal operating water level.

The applicant is requested to further define the ITAAC acceptance criteria to represent more measurable criteria for ITAAC related to the interlocks.

Response

Item 7 in Tier 1, Table 2.7.4.4-2 describes the electrical interlocks of the RM, SFHM and CEACP. The electrical interlocks of the RM, SFHM and CEACP provide reasonable assurance of the reliability of system components, to simplify the performance of sequential operations, and to limit travel and loads so that design conditions are not exceeded. In no

case are the electrical interlocks utilized to prevent inadvertent criticality or for reducing the exposure to the operator during the movement of fuel or control components.

Mechanical stops (Refer to ITACC item 8 of Table 2.7.4.4-2) are provided to prevent the fuel from being lifted above the minimum safe water depth and make sure that the operator is not exposed to more than 0.025 mSv/h at the spent fuel pool and refueling pool surface during the movement of fuel or control components.

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 Technical Specifications.

Impact on Technical/Topical/Environmental Reports

There is no impact on any Technical/Topical/Environmental Reports.