

KHNPDCDRAIsPEm Resource

From: Ciocco, Jeff
Sent: Thursday, August 20, 2015 9:50 AM
To: apr1400rai@khnp.co.kr; KHNPDCDRAIsPEm Resource; Harry (Hyun Seung) Chang; Andy Jiyong Oh; Christopher Tyree
Cc: Hernandez, Raul; Dias, Antonio; Umana, Jessica; Wunder, George; Lee, Samuel
Subject: APR1400 Design Certification Application RAI 161-7992 (09.01.04 - Light Load Handling System (Related to Refueling))
Attachments: APR1400 DC RAI 161 SPSB 7992.pdf; image001.jpg

KHNP,

The attachment contains the subject request for additional information (RAI). This RAI was sent to you in draft form. Your licensing review schedule assumes technically correct and complete responses within 30 days of receipt of RAIs. However, KHNP requests, and we grant 45 days to respond to this RAI. We may adjust the schedule accordingly.

Please submit your RAI response to the NRC Document Control Desk.

Thank you,

Jeff Ciocco
New Nuclear Reactor Licensing
301.415.6391
jeff.ciocco@nrc.gov



Hearing Identifier: KHNP_APR1400_DCD_RAI_Public
Email Number: 196

Mail Envelope Properties (cb8b46283e374312ae31961bb1f16138)

Subject: APR1400 Design Certification Application RAI 161-7992 (09.01.04 - Light Load Handling System (Related to Refueling))
Sent Date: 8/20/2015 9:49:41 AM
Received Date: 8/20/2015 9:49:42 AM
From: Ciocco, Jeff

Created By: Jeff.Ciocco@nrc.gov

Recipients:

"Hernandez, Raul" <Raul.Hernandez@nrc.gov>
Tracking Status: None
"Dias, Antonio" <Antonio.Dias@nrc.gov>
Tracking Status: None
"Umana, Jessica" <Jessica.Umana@nrc.gov>
Tracking Status: None
"Wunder, George" <George.Wunder@nrc.gov>
Tracking Status: None
"Lee, Samuel" <Samuel.Lee@nrc.gov>
Tracking Status: None
"apr1400rai@khnp.co.kr" <apr1400rai@khnp.co.kr>
Tracking Status: None
"KHNPDCDRAIsPEM Resource" <KHNPDCDRAIsPEM.Resource@nrc.gov>
Tracking Status: None
"Harry (Hyun Seung) Chang" <hyunseung.chang@gmail.com>
Tracking Status: None
"Andy Jiyong Oh" <jiyong.oh5@gmail.com>
Tracking Status: None
"Christopher Tyree" <Christopher.tyree@aeacom.com>
Tracking Status: None

Post Office: HQPWMSMRS08.nrc.gov

Files	Size	Date & Time
MESSAGE	629	8/20/2015 9:49:42 AM
APR1400 DC RAI 161 SPSB 7992.pdf		93596
image001.jpg	5040	

Options

Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

REQUEST FOR ADDITIONAL INFORMATION 161-7992

Issue Date: 08/20/2015

Application Title: APR1400 Design Certification Review – 52-046

Operating Company: Korea Hydro & Nuclear Power Co. Ltd.

Docket No. 52-046

Review Section: 09.01.04 - Light Load Handling System (Related to Refueling)

Application Section: Section 9.1.4

QUESTIONS

09.01.04-1

RAI 9.1.4 -1

GDC 61 requires that fuel storage and handling, radioactive waste, and other systems that may contain radioactive materials be designed for adequate safety under normal and postulated-accident conditions. Compliance with GDC 61 provides reasonable assurance that releases of radioactive materials and unacceptable personnel radiation exposures from damage to irradiated fuel will be avoided.

NUREG-0800, SRP Section 9.1.4 addresses handling of fuel and spent fuel which, if dropped, mishandled, or damaged, could cause releases of radioactive materials or unacceptable personnel radiation exposures. In addition, SRP Section 9.1.4 provides guidance to address the GDC 61 requirements.

In DCD Tier 2 Section 9.1.4.2.1.11, "Refueling Pool Seal," the applicant describes the refueling cavity seal as being designed to withstand the pressure resulting from a water head that is the full depth of the refueling cavity from the elevation of the operating floor, and for the impact of a fuel assembly drop from the maximum height. In Tier 2 Table 3.2-1, "Classification of Structures, Systems, and Components," the refueling pool seal is classified as non-nuclear safety (NNS), quality group D, seismic Category II.

- a. NUREG-0800, SRP 9.1.4.III.3.D.i states that the refueling cavity should be provided with a robust refueling cavity water seal that is built to appropriate engineering codes, or manufacturing association standards, will not catastrophically fail during a seismic event, and is not vulnerable to a single failure (passive or active) that results in a gross failure that significantly affects the refueling cavity water level.

The staff noted that the refueling cavity seal has been classified as Seismic category II component. DCD, Tier 2 Section 3.2.1, "Seismic Classification," defines seismic category II as "designed to preclude a gross structural failure resulting from an SSE that could degrade the ability of an adjacent safety-related SSC to function to an unacceptable level or result in incapacitating injuries to personnel in the main control room (MCR)." This definition does not preclude the seal from failing and draining the refueling cavity.

Therefore, the staff requests the applicant to upgrade the seismic design of the refueling cavity seal to seismic category I, or to provide a justification as to how the seal design prevents a failure that significantly affects the refueling cavity water level.

REQUEST FOR ADDITIONAL INFORMATION 161-7992

- b. NUREG-0800, SRP 9.1.4.III.3.D.ii states that the refueling cavity design should include an evaluation of all paths capable of inadvertently draining the refueling cavity, the potential for, and consequences of the refueling cavity to drain through these paths. The design of the cavity should be configured to assure sufficient water will be retained above fuel temporarily placed in the upender or other safe laydown location such that the worst-case draindown scenario will allow operators to add inventory before: (1) the loss of adequate shielding for personnel, (2) postulated boiling of the water, and (3) top of active fuel is reached.

The staff determined that the applicant has not provided an evaluation of all the paths capable of inadvertently draining the refueling cavity, the potential for, and consequences of the refueling cavity to drain through these paths.

Therefore, the staff requests the applicant to complete a refueling cavity drain down evaluation, as described in SRP 9.1.4.III.3.D.ii.

- c. NUREG-0800, SRP 9.1.4.III.3.D.iii states that the refueling cavity design should include provisions so that any leakage that occurs is readily identified and corrected. The applicant proposed a license condition (LC 9.1 (4)) that will require a COL applicant to provide plant procedures for preventing and mitigating inadvertent refueling cavity drain down events, maintenance procedures for the maintenance and inspection of refueling pool seal, and emergency response procedures for the proper measures during pool drain down events.

The staff determined that the applicant has not described the design provision for readily identifying leakage, as described in SRP 9.1.4.III.3.D.iii.

Therefore, the staff requests the applicant to describe the design provisions so that any leakage that occurs is readily identified.

- d. DCD Tier 2 Table 3.2-1 describes the refueling pool seal as NNS. The applicant provided the safety class definitions in DCD Tier 2 Section 3.2.3.

The staff finds that the refueling pool seal provides assurance of required cooling for the fuel temporarily stored in the cavity (upender); therefore, the refueling pool seal meets the definition of Safety Class 3 (SC-3).

Therefore, the staff requests the applicant to reclassify the refueling pool seal as a SC-3 or to provide justification for retaining the NNS classification.

