

KHNPDCDRAIsPEm Resource

From: Ciocco, Jeff
Sent: Thursday, May 26, 2016 1:20 PM
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Cc: Budzynski, John; Karas, Rebecca; Umana, Jessica; Williams, Donna
Subject: APR1400 Design Certification Application RAI 492-8614 (05.04.07 - Residual Heat Removal (RHR) System)
Attachments: APR1400 DC RAI 492 SRSB 8614.pdf

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,

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Subject: APR1400 Design Certification Application RAI 492-8614 (05.04.07 - Residual Heat Removal (RHR) System)
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REQUEST FOR ADDITIONAL INFORMATION 492-8614

Issue Date: 05/26/2016
Application Title: APR1400 Design Certification Review – 52-046
Operating Company: Korea Hydro & Nuclear Power Co. Ltd.
Docket No. 52-046
Review Section: 05.04.07 - Residual Heat Removal (RHR) System
Application Section: Tier2 5.4.7 & Tier1 2.4.4

QUESTIONS

05.04.07-4

Gas Accumulation/Gas Entrainment

10 CFR 52.47(b)(1), which requires that a DC application contain the proposed ITAACs 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 DC is built and will operate in accordance with the DC, the provisions of the Atomic Energy Act (AEA), and the U.S. Nuclear Regulatory Commission's (NRC's) regulations.

Prevention of potential gas accumulation in safety related systems, including emergency core cooling systems, are described in GL-2008-, "Managing Gas Accumulation In Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems". This includes, but is not limited to the Shutdown Cooling System (SCS), including potential gas entrainment during mid-loop operations from vortexing, the containment spray system (CSS), and the safety injection system (SIS).

NRC Regulatory Issue Summary 2013-09, endorses and recommends NEI 09-10, Revision 1a-A, "Guidelines for Effective Prevention and Management of System Gas Accumulation" as an acceptable approach to managing gas accumulation (ML13136A129). The staff finds that the ITAACs submitted in response to RAI 42-7945 Question 19-2 do not adequately address the provisions in these documents. The staff is requesting KHNP to address GL-2008-01 and NEI 09-10, Revision 1a-A as they relate to SCS, SIS and CSS or provide and justify an alternate approach to managing gas accumulation.

REQUEST FOR ADDITIONAL INFORMATION 492-8614

ITAAC Gas Accumulation

The ITAAC below is representative of the standard ITAAC for gas accumulation.

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
<p>The decay heat removal function of the SCS, the emergency core cooling function of the SIS, and the containment heat removal function of the CSS will not be impaired by gas entrainment.</p>	<p>a. An analysis of the potential for gas entrainment will be performed to identify specific gas intrusion mechanisms that affect each local and system high point of the as-built configuration of the SCS, SIS, and CSS. The analysis will document the need for periodic monitoring and the monitoring interval based on design limits.</p> <p>b. An inspection will be performed to verify high point vents are installed in the as-built SCS, SIS, and CSS based on the analysis.</p>	<p>A report exist and concludes that the decay heat removal function of the SCS, the emergency core cooling function of the SIS, and the containment heat removal function of the CSS will not be impaired by gas entrainment. The report identifies specific gas intrusion mechanisms that affect each local and system high point. The report will document the need for periodic monitoring and the monitoring interval based on design limits.</p> <p>b. High point vents are installed in the SCS, SIS, and CSS based on the analysis.</p>

ITAAC Entrainment During Mid-Loop Operations

Section 5.4.7 discusses decay heat removal during mid-loop operation. An analysis will be performed to verify that the decay heat removal function of the SCS will not be impaired by gas entrainment during mid-loop operation while the system is operating at its maximum allowable flow rate and the reactor coolant hot leg level is at the lowest level allowable for decay heat removal.

The ITAAC below is representative of the standard ITAAC for gas entrainment during mid-loop operations.

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
<p>The decay heat removal function of the SCS will not be impaired by gas entrainment during mid-loop operation while the system is operating at its maximum allowable flow rate and the reactor coolant hot leg level is at the lowest level allowable for decay heat removal.</p>	<p>An analysis of the potential for gas entrainment during mid-loop operation will be performed of the as-built configuration of the SCS.</p>	<p>A report exist and concludes that the decay heat removal function of the SCS will not be impaired by gas entrainment during mid-loop operation while the system is operating at its maximum allowable flow rate and the reactor coolant hot leg level is at the lowest level allowable for decay heat removal.</p>



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