KHNPDCDRAIsPEm Resource

From:	Ciocco, Jeff
Sent:	Monday, February 01, 2016 9:20 AM
To:	apr1400rai@khnp.co.kr; KHNPDCDRAIsPEm Resource; Harry (Hyun Seung) Chang; Andy Jiyong Oh; James Ross
Cc:	Budzynski, John; Karas, Rebecca; Ward, William; Lee, Samuel
Subject:	APR1400 Design Certification Application RAI 384-8100 (05.04.07 - Residual Heat Removal (RHR) System)
Attachments:	APR1400 DC RAI 384 SRSB 8100.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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Options
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REQUEST FOR ADDITIONAL INFORMATION 384-8100

Issue Date: 02/01/2016
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: DCD Section 5.4.7

QUESTIONS

05.04.07-3

NSSS (nuclear steam supply system) Natural Circulation Cooling Analysis

NRC Standard Review Plan (SRP) Branch Technical Position (BTP) 5-4, “Design Requirements for Residual Heat Removal Systems,” Section B, "Branch Technical Position," Subsection 5, “Test Requirements,” states, in part, that:

“The preoperational and initial startup test program shall be in conformance with Regulatory Guide 1.68. The programs for PWRs shall include tests with supporting analysis to (1) confirm that adequate mixing of borated water added before or during cooldown can be achieved under natural circulation conditions and permit estimation of the times required to achieve such mixing, and (2) confirm that cooldown under natural circulation conditions can be achieved within the limits specified in the emergency operating procedures.”

RG 1.68, “Initial Test Programs for Water-Cooled Nuclear Power Plants” provides guidance on the initial test program that includes the following requirements:

- General Design Criterion (GDC) 1, “Quality standards and records” of Appendix A, “General Design Criteria for Nuclear Power Plants” to 10 CFR Part 50 states, in part, that structures, systems, and components important to safety shall be tested to quality standards commensurate with the importance of the safety functions to be performed.

- Criterion XI, “Test Control,” of Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants,” to 10 CFR Part 50 states, in part, that a test program shall be established to assure that all testing required to demonstrate that SSCs will perform satisfactorily in service is identified and performed in accordance with written test procedures, which incorporate the requirements and acceptance limits contained in applicable design requirements.

DCD Subsection 5.4.7.3.1.3, “Conclusions,” states, in part that:

“The NSSS natural circulation cooling analysis results demonstrate that a cooldown and depressurization to the shutdown cooling system (SCS) entry conditions are achievable within the BTP 5-4 requirements. It is concluded that the NSSS can be cooled and depressurized to the SCS entry conditions with the restrictive assumptions of BTP 5-4.”

However, in DCD Section 14.2.12.4.22, Section 5.0, Acceptance Criteria, the DC applicant states:

5.1 The natural circulation power-to-flow ratio is less than 1.0.

The NRC staff could not identify any information in DCD Section 5.4.7 related to the natural circulation power-to-flow ratio of less than 1.0 being an adequate test acceptance criterion in DCD Section 14.2.12.4.22. In addition, the staff performed a search of applicable DCD Chapters 4, 5, 15, and 16 including technical reports without identifying any information of natural circulation, boron and thermal stratification, and appropriate margin to SAFDLs related to power to flow ratio.

REQUEST FOR ADDITIONAL INFORMATION 384-8100

Please provide additional information in DCD Sections 5.4.7 and 14.2.12.4.22 to address and justify meeting NRC SRP BTP 5-4, Section B, Branch Technical Position, Subsection 5, “Test Requirements.”

Please provide the documents related to the natural circulation analysis and test including a discussion of the relationship of the above conditions with respect to the reactor power conditions at the initiation of the test.


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