

KHNPDCDRAIsPEm Resource

From: Ciocco, Jeff
Sent: Thursday, July 16, 2015 6:44 AM
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Cc: Li, Chang; Dias, Antonio; Ward, William; Lee, Samuel
Subject: APR1400 Design Certification Application RAI 80-8040 (05.02.05 - Reactor Coolant Pressure Boundary Leakage Detection)
Attachments: APR1400 DC RAI 80 SPSB 8040.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, 60 days to respond to the RAI question. We may adjust the schedule accordingly.

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

Thank you,

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REQUEST FOR ADDITIONAL INFORMATION 80-8040

Issue Date: 07/16/2015

Application Title: APR1400 Design Certification Review – 52-046

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

Docket No. 52-046

Review Section: 05.02.05 - Reactor Coolant Pressure Boundary Leakage Detection

Application Section: 5.2.5

QUESTIONS

05.02.05-1

Leakage Detection Capability:

10 CFR 52.47(a)(2) requires that a standard design certification applicant provide a description and analysis of the structures, systems, and components (SSCs) of the facility, with emphasis upon performance requirements, the bases, with technical justification therefor, upon which these requirements have been established, and the evaluations required to show that safety functions will be accomplished. RG 1.45, "Guidance on Monitoring and Responding to Reactor Coolant System Leakage," states that the functional requirements for leakage monitoring systems should include the detector response time. It also states that plants should use multiple instrument locations to ensure that the transport delay time of the leakage effluent from its source to the detector will yield an acceptable overall system response time.

In DCD Tier 2, Section 5.2.5.1.1, "Unidentified Leakage," and TS LCO 3.4.14, "RCS Leakage Detection Instrumentation," the applicant identified the following leakage detection methods: containment sump level, containment airborne particulate radioactivity, and containment atmosphere humidity. DCD Tier 2, Sections 5.2.5.1.1.2 and 5.2.5.1.1.3 state that containment sump level and flow method and containment air particulate monitoring can detect RCS leakage of 0.5 gpm within one hour at full power. Such information is not provided regarding the containment atmosphere humidity monitoring systems. Also missing is information about the number of these detectors and their location.

The applicant is requested to provide the following information:

- a) Clarify whether the containment atmosphere humidity monitoring also has the capability to detect reactor coolant system (RCS) leakage of 0.5 gpm within one hour. Please identify how many humidity detectors there are in the containment and where they are located. Also, provide the correlation between the RCS leakage and containment atmosphere humidity with respect to time to demonstrate the capability of detecting 0.5 gpm within one hour.
- b) Identify how many containment air particulate monitoring detectors there are in the containment and where they are located. Also, provide the correlation between the RCS leakage and containment air particulate radiation level with respect to time to demonstrate the capability of detecting 0.5 gpm within one hour. State the assumption being used for the primary coolant radioactivity concentration to derive the correlation. It should be noted that RG 1.45 states that the analysis of the capabilities of leakage monitoring systems that measure radioactivity should use a realistic primary coolant radioactivity concentration assumption consistent with normal plant operations (as opposed to the maximum concentration permitted by plant technical specifications or used in accident analysis).

REQUEST FOR ADDITIONAL INFORMATION 80-8040

05.02.05-2

Initial Testing Program

10 CFR 52.47(a)(2) requires that a standard design certification applicant provide a description and analysis of the structures, systems, and components (SSCs) of the facility, with emphasis upon performance requirements, the bases, with technical justification therefor, upon which these requirements have been established, and the evaluations required to show that safety functions will be accomplished.

RG 1.68, Appendix A, "Initial Test Program," provides guidance on the initial testing program for reactor coolant system (RCS) leakage detection, which includes the following relevant tests:

- The reactor coolant system leak detection systems;
- The primary to secondary leakage detection system through steam generators;
- The verification of the capability of RCS leakage detection instrumentations;
- Verification of the reactor coolant system leak rates being within specified limits;
- Calibration of the instrumentation being used for reactor coolant leak detection systems;
- The operation of computer programs used to calculate reactor coolant system leakage rates.

DCD Tier 2, Section 14.2.12.1.134, "Leakage Detection System Test," demonstrates the operation of the various leakage detection systems. It will test the sump level switches and flow monitors, airborne radioactivity monitor, and/or atmosphere humidity monitors using simulated signals. Subsection 5.0/5.1, "Acceptance Criteria," of this test states that "the leakage detection system operates as described in Subsection 5.2.6.1."

However, the staff can't find the referenced Subsection 5.2.6.1 in the DCD. Also, it is not clear that the initial tests include the verification of the capability of RCS leakage detection instrumentations.

The applicant is requested to provide Subsection 5.2.6.1 in the DCD Tier 2 and demonstrate that the proposed initial test program has adequately addressed the tests identified in RG 1.68, Appendix A.



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