

## KHNPDCDRAIsPEm Resource

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**From:** Ciocco, Jeff  
**Sent:** Tuesday, May 26, 2015 10:51 AM  
**To:** apr1400rai@khnp.co.kr; Chang, Harry (hyunseung.chang@gmail.com); Yunho Kim (yshh8226@gmail.com); KHNPDCDRAIsPEm Resource; Christopher Tyree  
**Cc:** Lee, Samuel; Steckel, James; McKirgan, John; Schmidt, Jeffrey  
**Subject:** APR1400 Design Certification Application RAI 17-7917 (15.4.6 Inadvertent Decrease in Boron Concentration in the Reactor Coolant System)  
**Attachments:** APR1400 DC RAI 17 SRSB 7917.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 90 days to respond to the RAI. We may adjust the schedule accordingly.

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

Thank you,

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**Hearing Identifier:** KHNP\_APR1400\_DCD\_RAI\_Public  
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**Sent Date:** 5/26/2015 10:50:56 AM  
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MESSAGE	634	5/26/2015 10:50:58 AM
APR1400 DC RAI 17 SRSB 7917.pdf		83482
image001.jpg	4840	

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## Request for Additional Information 17-7917

Issue Date: 05/26/2015

Application Title: APR1400 Design Certification Review – 52-046

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

Docket No. 52-046

Review Section: 15.04.06 - Inadvertent Decrease in Boron Concentration in the Reactor Coolant (PWR)

Application Section: 15.4.6

### QUESTIONS

#### 15.04.06-1

10 CFR Part 50 Appendix A, GDC 10 requires that the reactor core and associated coolant, control and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits (SAFDLs) are not exceeded. For an inadvertent reactor coolant system (RCS) boron dilution event, KHNP needs to demonstrate that the system (in this case the alarms and operator response times) has appropriate design margin to assure the SAFDLs are not violated for anticipated operational occurrences (AOOs). The SRP 15.4.6 acceptance criteria for operator action times are 30 minutes during refueling and 15 minutes for all other modes of operation. DCD Section 15.4.6.3.1 calculates the time to criticality assuming complete mixing of the RCS. In Modes 4 and 5 when all reactor coolant pumps (RCPs) are idle and with one shutdown cooling (SDC) train in service (Technical Specifications 3.4.6, 3.4.7 and 3.4.8) the flow rate may not be sufficient to assume complete RCS mixing. Provide a justification that the complete mixing model is conservative including any potential effects of incomplete lower plenum mixing and the corresponding effect on the time to criticality.

Also, demonstrate that the source range detectors, which provide input to the boron dilution alarm system (BDAS) alarm, can sense any postulated incomplete mixing and still preserve adequate operator action times (e.g., 15 minutes in Modes 1 through 5) and update the DCD as appropriate.

