

## **KHNPDCRAIsPEm Resource**

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**From:** Ciocco, Jeff  
**Sent:** Monday, November 16, 2015 10:59 AM  
**To:** apr1400rai@khnp.co.kr; KHNPDCRAIsPEm Resource; Harry (Hyun Seung) Chang; Andy Jiyong Oh; Christopher Tyree  
**Cc:** Stutzcage, Edward; McCoppin, Michael; Olson, Bruce; Vera, John; Lee, Samuel  
**Subject:** APR1400 Design Certification Application RAI 308-8339 (12.02 - Radiation Sources)  
**Attachments:** APR1400 DC RAI 308 RPAC 8339.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 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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## REQUEST FOR ADDITIONAL INFORMATION 308-8339

Issue Date: 11/16/2015  
Application Title: APR1400 Design Certification Review – 52-046  
Operating Company: Korea Hydro & Nuclear Power Co. Ltd.  
Docket No. 52-046  
Review Section: 12.02 - Radiation Sources  
Application Section: 12.02

### QUESTIONS

12.02-19

This is a follow-up to RAI 7896, Question 12.02-4 (26741).

SRP 12.2 indicates that RG 1.112 includes acceptable basis for developing source terms (if used appropriately). RG 1.112, references NUREG-0017 as the basis for the information in RG 1.112.

In the response to Question 12.02-4 the applicant provided a list of decontamination factors assumed for various plant components. Some of these decontamination factors are inconsistent with decontamination factors provided in NUREG-0017, and no justification is provided for the differences.

The differences are, 1) the use of a decontamination factor of 10 for crud for the deborating IX (NUREG-0017 would indicate the value should be 1). 2) All of the decontamination factor values associated with the pre-holdup ion exchanger are inconsistent with values from NUREG-0017 for a CVCS mixed bed ion exchanger except for noble gases and tritium. 3) The FSAR indicates that there are two steam generator blowdown ion exchangers which are generally aligned in series and while NUREG-0017 provides different values for the second steam generator blowdown ion exchanger in series, the applicant uses the decontamination values for the initial ion exchanger to apply to both demineralizers. 4) The applicant assumes that the CVCS system does not remove any Yttrium, based on WASH-1258, which is inconsistent with NUREG-0017. WASH-1258 is older than NUREG-0017 and is not referenced in the SRP or in RG 1.112.

Underestimating decontamination factors results in underestimating the source term and subsequently the shielding and zoning for that component. Overestimating the source term results in underestimating the source terms, shielding, and zoning for components downstream of the component with the overestimated decontamination factor. If the overestimation is only applied to the specific component but is not carried forward to downstream components, the overestimation is acceptable because all source terms are conservative or appropriate, but this does not appear to be the case in the above situations.

Therefore, for the differences from NUREG-0017 specified above, please do one or a combination of the following two options, as appropriate for the APR 1400 design;

1) Recalculate all effected source terms, including any effected airborne source terms, based on the values from NUREG-0017 and adjust the FSAR appropriately; or

## REQUEST FOR ADDITIONAL INFORMATION 308-8339

2) Verify that the values which differ from NUREG-0017 are anticipated to represent the normal decontamination factors of the equipment, during normal operation; Indicate how and why the values selected were chosen; Specify how the COL applicant will ensure that the decontamination factors provided will be representative of the actual equipment selected during plant operation; and update the FSAR to provide additional information of how the values were chosen and how the COL applicant will ensure the decontamination factors are representative of the expected decontamination factors of the equipment used during operation.

Staff notes that if any of the assumed decontamination factors are not representative of what would be expected of the equipment during normal operation, the assumptions are not acceptable and must be revised to appropriate values, unless the applicant can demonstrate that the unrealistic assumptions do not result in any underestimation in plant shielding thicknesses, radiation zoning, effluent releases, waste generation rate source term and storage considerations (such as the potential generation of explosive gas in resins from radiological effects on the resin), or any other information or analysis in the FSAR or relevant to the design.



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