

## KHNPDCDRAIsPEm Resource

---

**From:** Ciocco, Jeff  
**Sent:** Tuesday, April 19, 2016 7:10 AM  
**To:** apr1400rai@khnp.co.kr; KHNPDCDRAIsPEm Resource; Jung-ho Kim (jhokim082@gmail.com); Andy Jiyong Oh; Christopher Tyree  
**Cc:** Drzewiecki, Timothy; Karas, Rebecca; Steckel, James; Williams, Donna  
**Subject:** APR1400 Design Certification Application RAI 461-8579 (15.06.03 - Radiological Consequences of Steam Generator Tube Failure (PWR) 07/1981)  
**Attachments:** APR1400 DC RAI 461 SRSB 8579.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,

Jeff Ciocco  
New Nuclear Reactor Licensing  
301.415.6391  
[jeff.ciocco@nrc.gov](mailto:jeff.ciocco@nrc.gov)



**Hearing Identifier:** KHNP\_APR1400\_DCD\_RAI\_Public  
**Email Number:** 513

**Mail Envelope Properties** (6e54d7384f284edeacbdd0bcff06e045)

**Subject:** APR1400 Design Certification Application RAI 461-8579 (15.06.03 - Radiological Consequences of Steam Generator Tube Failure (PWR) 07/1981)  
**Sent Date:** 4/19/2016 7:10:01 AM  
**Received Date:** 4/19/2016 7:10:03 AM  
**From:** Ciocco, Jeff

**Created By:** Jeff.Ciocco@nrc.gov

**Recipients:**

"Drzewiecki, Timothy" <Timothy.Drzewiecki@nrc.gov>  
Tracking Status: None  
"Karas, Rebecca" <Rebecca.Karas@nrc.gov>  
Tracking Status: None  
"Steckel, James" <James.Steckel@nrc.gov>  
Tracking Status: None  
"Williams, Donna" <Donna.Williams@nrc.gov>  
Tracking Status: None  
"apr1400rai@khnp.co.kr" <apr1400rai@khnp.co.kr>  
Tracking Status: None  
"KHNPDCDRAIsPEM Resource" <KHNPDCDRAIsPEM.Resource@nrc.gov>  
Tracking Status: None  
"Jungcho Kim (jhokim082@gmail.com)" <jhokim082@gmail.com>  
Tracking Status: None  
"Andy Jiyong Oh" <jiyong.oh5@gmail.com>  
Tracking Status: None  
"Christopher Tyree" <Christopher.tyree@aeacom.com>  
Tracking Status: None

**Post Office:** HQPWMSMRS07.nrc.gov

Files	Size	Date & Time
MESSAGE	608	4/19/2016 7:10:03 AM
APR1400 DC RAI 461 SRSB 8579.pdf		90783
image001.jpg	5040	

**Options**

**Priority:** Standard  
**Return Notification:** No  
**Reply Requested:** No  
**Sensitivity:** Normal  
**Expiration Date:**  
**Recipients Received:**

## REQUEST FOR ADDITIONAL INFORMATION 461-8579

Issue Date: 04/19/2016

Application Title: APR1400 Design Certification Review – 52-046

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

Docket No. 52-046

Review Section: 15.06.03 - Radiological Consequences of Steam Generator Tube Failure (PWR) 07/1981

Application Section:

### QUESTIONS

15.06.03-5

10 CFR 52.47(a)(2)(iv) requires that an application for a design certification include a final safety analysis report that provides a description and safety assessment of the facility. The safety assessment analyses are done, in part, to show compliance with the radiological consequence evaluation factors in 52.47(a)(2)(iv)(A) and 52.47(a)(2)(iv)(B) for offsite doses, 10 CFR 50, Appendix A, General Design Criteria (GDC) 19 for control room radiological habitability, and the requirements related to the technical support center in 10 CFR 52.47(b)(8) and (b)(11) and Paragraph IV.E.8 of Appendix E to 10 CFR Part 50. The radiological consequences of design basis accidents are evaluated against these regulatory requirements and the dose acceptance criteria given in Standard Review Plan (SRP) 15.0.3. NRC staff needs to ensure that a suitably conservative estimate is determined for the radiological release associated with the steam generator tube rupture event (SGTR).

NRC staff issued RAI 370-8450, Question No. 15.06.03-2, during the review of Section 15.6.3 of the APR1400 Design Control Document (DCD). In Question No. 15.06.03-2, NRC staff questioned the termination criteria for the analysis of the SGTR event. Steam relief through the main steam safety valves (MSSVs) on the affected steam generator is a significant contribution to the radiological consequences associated with the SGTR event. Chapter 15 safety analysis of the SGTR event typically extends to the point that the steam relief through the affected steam generator is terminated (i.e., steam relief through affected steam generator is terminated, break flow is terminated; see examples in AP1000 DCD, Palo Verde final safety analysis report (FSAR), McGuire FSAR, Catawba FSAR, Oconee FSAR). The analysis presented in the APR1400 DCD, however, is terminated once operator action is initiated at 30 minutes.

The KHNP response to RAI 370-8450, Question 15.06.03-2 did not alleviate NRC staff concerns because:

1. The RAI response failed to demonstrate that steam relief through the MSSVs on the affected steam generator would be terminated with the initiation of operator action.
2. The RAI response contained information that appears to contradict information contained in the APR1400 DCD. Particularly, the RAI response states, "The analysis in the DCD conservatively assumed that the break flow rate at 30 minutes is maintained until the time at which the primary and secondary pressure are same, or the break flow is terminated." However, Table 15.6.3-5 of the APR1400 DCD shows that steam mass relief from the affected steam generator is 0.0 beyond 30 minutes (i.e. steam relief through the affected steam generator is terminated immediately upon initiation of operator action).

NRC staff requests that KHNP:

## **REQUEST FOR ADDITIONAL INFORMATION 461-8579**

1. Extend the CESEC-III analysis of the SGTR event until acceptable analysis termination criteria are met (e.g. steam relief through affected steam generator is terminated, break flow is terminated)
2. Update Section 15.6.3 of the APR1400 DCD as appropriate.
3. Update the analysis of radiological consequences as appropriate.

