

## **KHNPDCRAIsPEm Resource**

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**From:** Ciocco, Jeff  
**Sent:** Tuesday, February 23, 2016 9:40 AM  
**To:** apr1400rai@khnp.co.kr; KHNPDCRAIsPEm Resource; Andy Jiyong Oh; Young H. In (yhin@enercon.com); James Ross  
**Cc:** Ayegbusi, Odunayo; Mrowca, Lynn; Steckel, James; Lee, Samuel  
**Subject:** APR1400 Design Certification Application RAI 416-8358 (19 - Probabilistic Risk Assessment and Severe Accident Evaluation)  
**Attachments:** APR1400 DC RAI 416 SPRA 8358.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, the following RAI question response times. We may adjust the schedule accordingly.

19-35: 30 days  
19-36: 30 days  
19-37: 45 days  
19-38: 30 days

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

Thank you,

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**Hearing Identifier:** KHNP\_APR1400\_DCD\_RAI\_Public  
**Email Number:** 466

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**Subject:** APR1400 Design Certification Application RAI 416-8358 (19 - Probabilistic Risk Assessment and Severe Accident Evaluation)  
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**Received Date:** 2/23/2016 9:40:09 AM  
**From:** Ciocco, Jeff

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**Options**

**Priority:** Standard  
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**Sensitivity:** Normal  
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## REQUEST FOR ADDITIONAL INFORMATION 416-8358

Issue Date: 02/23/2016

Application Title: APR1400 Design Certification Review – 52-046

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

Docket No. 52-046

Review Section: 19 - Probabilistic Risk Assessment and Severe Accident Evaluation

Application Section:

### QUESTIONS

19-35

Item 11 of Section II, “Acceptance Criteria,” of the (Draft) Revision 3 SRP, states, “The PRAs that meet the applicable supporting requirements for Capability Category I and meet the high-level requirements as defined in the ASME PRA Standard (ASME/ANS RA-S-2008 and addenda ASME/ANS RA-Sa-2009) should generally be acceptable for DC and COL applications. Alternatively, the applicant may identify, and justify the acceptability of, alternative measures for addressing PRA quality and technical adequacy. The staff should specifically review the acceptability of these alternative measures in the context of the specific uses and applications of the PRA.”

The staff reviewed the APR1400 design control document (DCD) Section 19.1.4.1.1, “Description of Level 1 Internal Events PRA for Operations at Power,” and found insufficient information describing the accident sequence analysis performed. Specifically, the applicant did not identify and discuss a rationale for accident sequences that were not sequentially ordered according to the timing of the event (ASME/ANS PRA Standard supporting requirements – AS-A6). Therefore, in order for the staff to reach an assurance finding on the conformance to SRP Chapter 19.0 regarding PRA technical adequacy, please revise the DCD with a description of accident sequences not sequentially ordered.

19-36

Item 11 of Section II, “Acceptance Criteria,” of the (Draft) Revision 3 SRP, states, “The PRAs that meet the applicable supporting requirements for Capability Category I and meet the high-level requirements as defined in the ASME PRA Standard (ASME/ANS RA-S-2008 and addenda ASME/ANS RA-Sa-2009) should generally be acceptable for DC and COL applications. Alternatively, the applicant may identify, and justify the acceptability of, alternative measures for addressing PRA quality and technical adequacy. The staff should specifically review the acceptability of these alternative measures in the context of the specific uses and applications of the PRA.”

The staff reviewed the APR1400 design control document (DCD) Section 19.1.4.1.1, “Description of Level 1 Internal Events PRA for Operations at Power,” and found insufficient information describing the accident sequence analysis performed. Specifically,

1. The applicant did not describe the method used to implement event tree transfers
2. The transfers shown in the event trees do not identify the trees they transfer to

## REQUEST FOR ADDITIONAL INFORMATION 416-8358

3. The applicant did not justify accident sequences with reactor trip failure that ended in core damage (ASME/ANS PRA Standard supporting requirements – AS-A11).

Therefore, in order for the staff to reach an assurance finding on the conformance to SRP Chapter 19.0 regarding PRA technical adequacy, please revise the DCD accordingly with the information needed.

19-37

Item 11 of Section II, “Acceptance Criteria,” of the (Draft) Revision 3 SRP, states, “The PRAs that meet the applicable supporting requirements for Capability Category I and meet the high-level requirements as defined in the ASME PRA Standard (ASME/ANS RA-S-2008 and addenda ASME/ANS RA-Sa-2009) should generally be acceptable for DC and COL applications. Alternatively, the applicant may identify, and justify the acceptability of, alternative measures for addressing PRA quality and technical adequacy. The staff should specifically review the acceptability of these alternative measures in the context of the specific uses and applications of the PRA.”

The staff reviewed the APR1400 design control document (DCD) Section 19.1.4.1.1, “Description of Level 1 Internal Events PRA for Operations at Power,” and found insufficient information describing the accident sequence analysis performed. Specifically, the applicant did not identify and describe dependencies that can impact the ability of mitigating systems to operate and function (ASME/ANS PRA Standard – HLR-AS-B). Therefore, in order for the staff to reach an assurance finding on the conformance to SRP Chapter 19.0 regarding PRA technical adequacy, please revise the DCD accordingly with the information needed.

19-38

Item 11 of Section II, “Acceptance Criteria,” of the (Draft) Revision 3 SRP, states, “The PRAs that meet the applicable supporting requirements for Capability Category I and meet the high-level requirements as defined in the ASME PRA Standard (ASME/ANS RA-S-2008 and addenda ASME/ANS RA-Sa-2009) should generally be acceptable for DC and COL applications. Alternatively, the applicant may identify, and justify the acceptability of, alternative measures for addressing PRA quality and technical adequacy. The staff should specifically review the acceptability of these alternative measures in the context of the specific uses and applications of the PRA.”

The staff reviewed the APR1400 design control document (DCD) Section 19.1.4.1.1, “Description of Level 1 Internal Events PRA for Operations at Power,” and found insufficient information describing the accident sequence analysis performed. Specifically, the applicant did not describe how the class 1E ‘A’ and ‘B’ battery assumptions are modeled in the PRA and why varying assumptions are used in different sections of the DCD. The staff found the following assumptions in the DCD:

## REQUEST FOR ADDITIONAL INFORMATION 416-8358

(a) DCD Section 19, states that the class 1E 'A' and 'B' batteries have a 2 hour capacity and require load shedding to extend the capacity to 8 hours which is contrary to information in DCD Section 8, Table 8.3.2-2

(b) In DCD Table 19.1-2 (page 7 of 10), the class 1E 'A' and 'B' batteries have a 4 hour capacity

(c) DCD Table 19.1-3 (page 1 of 5), does not specify which battery trains have extended battery life to 16 hours

(d) DCD Section 19.2.3.3.4.1.1, states class 1E 'A' and 'B' batteries have a minimum capacity of 4 hours and require load management.

Therefore, in order for the staff to reach an assurance finding on the conformance to Standard Review Plan (SRP) Chapter 19.0 regarding PRA technical adequacy, please resolve the inconsistency, revise the key assumptions table as necessary and revise the DCD accordingly.



**U.S.NRC**

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