

## **KHNPDCDRAIsPEm Resource**

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**From:** Ward, William  
**Sent:** Wednesday, July 06, 2016 9:52 AM  
**To:** KHNPDCDRAIsPEm Resource  
**Subject:** FW: APR1400 Design Certification Application RAI 500-8634 [9.5.1 - Fire Protection Program]  
**Attachments:** APR1400 DC RAI 500 SPSB 8634.pdf

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**From:** Ward, William  
**Sent:** Friday, July 01, 2016 6:25 PM  
**To:** apr1400rai@khnp.co.kr; KHNPDCDRAIsPEm Resource <KHNPDCDRAIsPEm.Resource@nrc.gov>; daegeun.ahn@gmail.com; Andy Jiyong Oh <jiyong.oh5@gmail.com>; Tyree, Christopher (christopher.tyree@aecom.com) <christopher.tyree@aecom.com>  
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**Subject:** APR1400 Design Certification Application RAI 500-8634 [9.5.1 - Fire Protection Program]

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.

**09.05.01-42 : 45days**

**09.05.01-43 : 90days**

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

Thank you,

**William R. Ward, P.E.**  
**Senior Project Manager**  
**U.S. Nuclear Regulatory Commission**  
**m/s T6-D38M**  
**Washington, DC, 20555-0001**  
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**Hearing Identifier:** KHNP\_APR1400\_DCD\_RAI\_Public  
**Email Number:** 559

**Mail Envelope Properties** (14cf1b0560ff451eae31555459208f6b)

**Subject:** FW: APR1400 Design Certification Application RAI 500-8634 [9.5.1 - Fire Protection Program]  
**Sent Date:** 7/6/2016 9:51:31 AM  
**Received Date:** 7/6/2016 9:51:32 AM  
**From:** Ward, William

**Created By:** William.Ward@nrc.gov

**Recipients:**  
"KHNPDCDRAIsPEm Resource" <KHNPDCDRAIsPEm.Resource@nrc.gov>  
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MESSAGE	1434	7/6/2016 9:51:32 AM
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**Options**  
**Priority:** Standard  
**Return Notification:** No  
**Reply Requested:** No  
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**Expiration Date:**  
**Recipients Received:**

## REQUEST FOR ADDITIONAL INFORMATION 500-8634

Issue Date: 07/01/2016  
Application Title: APR1400 Design Certification Review – 52-046  
Operating Company: Korea Hydro & Nuclear Power Co. Ltd.  
Docket No. 52-046  
Review Section: 09.05.01 - Fire Protection Program  
Application Section:

### QUESTIONS

#### 09.05.01-42

This is a follow up to RAI 8022 Question 29, the February 17, 2016 phone call, and the April 22 supplemental response to RAI 8022 Question 29.

SECY 90-016, “Evolutionary Light Water Reactor (LWR) Certification Issues and their Relationship to Current Regulatory Requirements,” states in part:

“Therefore the evolutionary ALWR designers must ensure that safe shutdown can be achieved, assuming that all equipment in any one fire area will be rendered inoperable by fire and that re-entry into the fire area for repairs and operator actions is not possible. Because of its physical configuration, the control room is excluded from this approach, provided an independent alternative shutdown capability that is physically and electrically independent of the control room is included in the design. Evolutionary ALWRs must provide fire protection for redundant shutdown systems in the reactor containment building that will ensure, to the extent practicable, that one shutdown division will be free of fire damage.”

In Section 9.5.1 of the DCD, page 9.5-9, the applicant states:

“Outside the MCR and RCB, the redundant trains for safe shutdown are separated by 3-hour fire-rated barriers.”

In Section 9.5A.3.2.69 “F137-A01C: Cable Spreading Area,” the applicant states in part:

“These fire areas may contain cables from Channel A and C safety-related equipment. This is because cables serving the Train A area (e.g., electrical penetration area) at El. 13 ft 6 in go down to El. 120 ft 0 in, move horizontally to the Division I area, and move vertically up to the MCR area, which is located at elevation 156 ft 6 in. Therefore, separation between channels is not maintained in these areas.”

In Section 9.5A.3.3.69 “F137-A01D: Cable Spreading Area,” the applicant states in part:

“These fire areas may contain cables from Channels B and D safety-related equipment. This is because cables serving the Train B area (e.g., electrical penetration area) at El. 137 ft 6 in go down to elevation 120 ft 0 in area, move horizontally to the Division II area, and move vertically up to the MCR area, which is located at El. 156 ft 6 in. Therefore, separation between channels is not maintained in these areas.”

During the February 17, 2016, phone call the applicant stated that the information in Sections 9.5A.3.2.69 and 9.5A.3.3.69 is not correct in that these fire areas do not have cables from more than one safety related train in them. The applicant stated that a markup to the DCD correcting these sections would be provided.

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In the supplemental response provided by the applicant, the staff noted that there was no markup provided correcting the text in these two sections. Except for a figure provided, the response is identical to the original response dated November 11, 2015. The applicant is requested to provide a markup for these two DCD sections correcting the information as stated in the February 17, 2016, phone call.

### 09.05.01-43

This is a follow up to RAI 8246 Question 39, the February 17, 2016 phone call, and RAI 8566 Question 41.

10 CFR 52.47(a)(18) requires a DC application to contain a description and analysis of the fire protection design features for the standard plant necessary to comply with 10 CFR 50.48 and GDC 3 in 10 CFR part 50, Appendix A.

In DCD Tier 2, Section 9.5.1, "Fire Protection Program," the applicant states:

"In addition, in the final fire hazard analysis (FHA) and fire safe shutdown analysis (FSSA) a detailed post-fire safe shutdown circuit analysis is included, using a methodology that is similar to NEI 00-01."

The staff reviewed NEI 00-01, "Guidance for Post Fire Safe Shutdown Circuit Analysis," Revision 2, and finds that this document does not consider the effects of heat and smoke on digital equipment or digital I&C cabinets.

During the February 5, 2015 meeting of the Advisory Committee on Reactor Safeguards (ACRS), (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15049A189), the issue of the possible effects of heat and smoke on digital equipment and digital I&C cabinets was discussed.

In the ACRS's letter to the Commission concerning the February 5, 2015, meeting (ADAMS Accession Number ML15039A006) the ACRS stated:

"Fire hazard analyses have not thoroughly evaluated the possibility of fire-induced spurious actuations that may result from heat or fire damage to digital instrumentation and control signal cabinets, when external connections to those cabinets are made via fiber optic cables. Staff consideration of this as a generic issue would be prudent."

In RAI 8246 Question 39, the applicant was requested to state whether the final fire hazards analyses will evaluate/consider the effects from spurious actuations that may be caused by heat from a fire inside or nearby cabinets that contain digital signal processing circuitry, if the external connections to those cabinets are made via fiber optic cables. If applicable, the applicant was requested to provide justification for not evaluating these effects.

The staff reviewed the applicant's response dated November 11, 2015 and noted that there was no mention of the approach that would be used in order to perform the final fire hazard analysis and fire safe shutdown analysis. During the February 17, 2016 phone call with the applicant, the staff explained why the response was not sufficient and what type of information was

## REQUEST FOR ADDITIONAL INFORMATION 500-8634

needed by the staff. The applicant requested a separate RAI be written on this issue. The staff issued RAI 8566 – Question 41 requesting the applicant:

1. Describe the approach that will be used to evaluate the effects from spurious actuations that may be caused by heat from a fire inside or nearby cabinets that contain digital signal processing circuitry, if the external connections to those cabinets are made via fiber optic cables.
2. Describe any defense in depth measures that are provided to minimize the possibility of damage to circuitry inside cabinets or mitigate the consequences of a spurious actuation, should one occur.

The staff reviewed the applicant's response dated June 2, 2016, and noted that there was no description of the approach that will be used to evaluate the effects from spurious actuations or any description of defense in depth measures.

The applicant is requested to:

1. Describe the approach that will be used to evaluate the effects from spurious actuations that may be caused by heat from a fire inside or nearby cabinets that contain digital signal processing circuitry.
2. Describe any defense in depth measures that are provided to minimize the possibility of damage to circuitry inside cabinets or mitigate the consequences of a spurious actuation, should one occur.