

## KHNPDCDRAIsPEm Resource

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**From:** Ciocco, Jeff  
**Sent:** Tuesday, November 10, 2015 7:12 AM  
**To:** apr1400rai@khnp.co.kr; KHNPDCDRAIsPEm Resource; Harry (Hyun Seung) Chang; Andy Jiyong Oh; Erin Wisler  
**Cc:** Zhao, Jack; Jackson, Terry; Ward, William; Lee, Samuel  
**Subject:** APR1400 Design Certification Application RAI 300-8297 (07.03 - Engineered Safety Features Systems)  
**Attachments:** APR1400 DC RAI 300 ICE 8297.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 response time for the RAI questions. We may adjust the schedule accordingly.

07.03-3: 90 days  
07.03-4: 90 days  
07.03-5: 45 days

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

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



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

**Recipients:**

"Zhao, Jack" <Jack.Zhao@nrc.gov>  
Tracking Status: None  
"Jackson, Terry" <Terry.Jackson@nrc.gov>  
Tracking Status: None  
"Ward, William" <William.Ward@nrc.gov>  
Tracking Status: None  
"Lee, Samuel" <Samuel.Lee@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  
"Harry (Hyun Seung) Chang" <hyunseung.chang@gmail.com>  
Tracking Status: None  
"Andy Jiyong Oh" <jiyong.oh5@gmail.com>  
Tracking Status: None  
"Erin Wisler " <erin.wisler@aecom.com>  
Tracking Status: None

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## REQUEST FOR ADDITIONAL INFORMATION 300-8297

Issue Date: 11/10/2015  
Application Title: APR1400 Design Certification Review – 52-046  
Operating Company: Korea Hydro & Nuclear Power Co. Ltd.  
Docket No. 52-046  
Review Section: 07.03 - Engineered Safety Features Systems  
Application Section: SRP 7.3

### QUESTIONS

07.03-3

Describe how the response time for an integrated safety I&C system is ensured to meet the response time requirements in the safety analyses.

10 CFR 50.55a(h)(3) states “Applications filed on or after May 13, 1999, for construction permits and operating licenses under this part, and for design approvals, design certifications, and combined licenses under Part 52 of this chapter, must meet the requirements for safety systems in IEEE Std. 603-1991 and the correction sheet dated January 30, 1995.” IEEE Std. 603-1991, Clause 6.1, "Automatic Control," requires timely automatic control action when events occur too quickly for operators to intervene.

10 CFR 52.47(b)(1), which requires that a design certification application contain the proposed inspections, tests, analyses, and acceptance criteria (ITAAC) that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a plant that incorporates the design certification is built and will operate in accordance with the design certification, the provisions of the Atomic Energy Act, and the NRC's regulations.

ITAAC Item 16 in Table 2.5.1-5, "Reactor Trip System and Engineered Safety Features Initiation ITAAC," of APR1400 FSAR Tier 1 includes one design commitment and associated inspection, tests, and analyses which ensure that the plant protection system (PPS) provide reactor trip (RT) and engineered safety features (ESF) initiation signals to meet the required response time for trip and initiation conditions. ITAAC Item 20 in Table 2.5.4-4, "Engineered Safety Features-Component Control System ITAAC," of APR1400 FSAR Tier 1 also includes one design commitment and associated inspection, tests, and analyses which ensure the ESF-Component Control System (ESF-CCS) to provide ESF actuation within required response time for ESF functions. Technical Report, APR1400-Z-J-NR-14013, Rev. 0, "Response Time Analysis of Safety I&C System" includes estimated response times for an integrated safety I&C system, which include sensors, auxiliary process cabinet-safety (APC-S), PPS, ESF-CCS, and field actuated components for the ESF systems. However, there is lack of design commitment and associated inspection, tests, and analyses in the APR1400 application to ensure that the integrated safety I&C system can meet the response times required in the safety analyses and also proposed in Technical Report, APR1400-Z-J-NR-14013, Rev. 0, "Response Time Analysis of Safety I&C System."

07.03-4

Describe the reasons why the response times are calculated differently for some safety actuation signals which are generated from the same ESF-Component Control System (ESF-CCS).

10 CFR 50.55a(h)(3) states “Applications filed on or after May 13, 1999, for construction permits and operating licenses under this part, and for design approvals, design certifications, and combined licenses under part 52 of this chapter, must meet the requirements for safety systems in IEEE Std. 603-1991 and the correction sheet dated January 30, 1995.” IEEE Std. 603-1991, Clause 6.1, requires timely automatic control action when events occur too quickly for operators to intervene.

## REQUEST FOR ADDITIONAL INFORMATION 300-8297

It is not clear why the response times are calculated differently for some safety actuation signals generated from the same ESF-CCS. For example, Figure 7.12-3, "Response Time Analysis for ESF-CCS," in Technical Report, APR1400-Z-J-NR-14013, Rev. 0, "Response Time Analysis of Safety I&C System" shows multiples of different controller racks and component interface modules (CIM) before sending an actuation signal to its destination. However, Figure 7.12-6, "Response Time Analysis for ESF-CCS," in the same technical report just shows one of each controller rack before sending an actuation signal to its destination. Provide necessary descriptive information or clarification on how the response times are calculated differently for some ESF actuation signals which are executed in the same safety I&C system.

07.03-5

Demonstrate how the ESF-2 initiation signals from the PPS will not be overridden or prevented from the completion of the protection action by any erroneous commands from the ESCM on the operator console. Also, clarify where the manual reset will be conducted for the ESF control commands.

10 CFR 50.55a(h)(3) states "Applications filed on or after May 13, 1999, for construction permits and operating licenses under this part, and for design approvals, design certifications, and combined licenses under Part 52 of this chapter, must meet the requirements for safety systems in IEEE Std. 603-1991 and the correction sheet dated January 30, 1995." IEEE Std. 603-1991, Clause 5.2 requires that the safety system be designed so that once initiated automatically or manually, the intended sequence of protective actions of the execute features shall continue until completion.

Based on the logic of Figure 4-15, "Simplified Component Control Logic," in Technical Report APR1400-Z-J-NR-14001, Rev. 0, "Safety I&C System," ESF-2 commands could be overridden by erroneous commands from ESCM on the operator console. Describe why ESF-2 initiation signals from PPS are overridden by commands from the ESCM, including spurious commands from ESCM. In addition, clarify where the ESF signals are manually reset after steady state conditions are reached.



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