

## KHNPDCDRAIsPEm Resource

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**From:** Ciocco, Jeff  
**Sent:** Monday, June 08, 2015 9:16 AM  
**To:** apr1400rai@khnp.co.kr; Chang, Harry (hyunseung.chang@gmail.com); Yunho Kim (yshh8226@gmail.com); KHNPDCDRAIsPEm Resource; Steven Mannon  
**Cc:** Lee, Samuel; Steckel, James; Ray, Sheila; Foli, Adakou  
**Subject:** APR1400 Design Certification Application RAI 24-7928 (8.4 - Station Blackout)  
**Attachments:** APR1400 DC RAI 24 EEB 7928.pdf; image001.jpg

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.

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  
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**From:** Ciocco, Jeff

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

**Recipients:**

"Lee, Samuel" <Samuel.Lee@nrc.gov>  
Tracking Status: None  
"Steckel, James" <James.Steckel@nrc.gov>  
Tracking Status: None  
"Ray, Sheila" <Sheila.Ray@nrc.gov>  
Tracking Status: None  
"Foli, Adakou" <Adakou.Foli@nrc.gov>  
Tracking Status: None  
"apr1400rai@khnp.co.kr" <apr1400rai@khnp.co.kr>  
Tracking Status: None  
"Chang, Harry (hyunseung.chang@gmail.com)" <hyunseung.chang@gmail.com>  
Tracking Status: None  
"Yunho Kim (yshh8226@gmail.com)" <yshh8226@gmail.com>  
Tracking Status: None  
"KHNPDCDRAIsPEm Resource" <KHNPDCDRAIsPEm.Resource@nrc.gov>  
Tracking Status: None  
"Steven Mannon" <steven.mannon@aecom.com>  
Tracking Status: None

**Post Office:** HQCLSTR01.nrc.gov

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image001.jpg	4840	

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# REQUEST FOR ADDITIONAL INFORMATION 24-7928

Issue Date: 06/08/2015

Application Title: APR1400 Design Certification Review – 52-046

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

Docket No. 52-046

Review Section: 08.04 - Station Blackout

Application Section:

## QUESTIONS

### 08.04-1

In Section 8.4.1.2 of the DCD Tier 2, the applicant stated that the emergency alternating current (EAC) power system for the APR1400 consists of two redundant systems that have four independent Class 1E emergency diesel generators (EDGs). One Class 1E EDG (train A in Division 1 or train B in Division 2) is required to operate the ac-powered decay heat removal systems. The applicant selected the EAC power configuration group "C" in accordance with Table 3, "Emergency AC Power Configuration Groups," of NRC RG 1.155. However, it is not clear to the staff why the applicant selected the configuration group C. According to Table 3 of RG 1.155, (1) the number of EAC power sources is the total number of dedicated EAC sources for all units; and (2) the number of EAC power sources required to operate AC-powered decay heat removal systems is based on all the AC loads required to remove decay heat (including AC-powered decay heat removal systems) to achieve and maintain safe shutdown at all units at the site with offsite power unavailable. APR1400 has 4 Class 1E EDGs in total. Section 8.3.1.1.2.3 of the DCD Tier 2 stated that, following a loss of offsite power (LOOP), the Class 1E EDGs are started and the safety buses are isolated from offsite sources and fed solely from their associated EDGs. Since one EDG is required to power the decay heat removal systems in each division during a LOOP, a total of 2 EDGs are required to operate the decay heat removal systems in both divisions following a LOOP. Therefore, based on Table 3 of RG1.155, the EAC power configuration group would not be "C."

Please explain how the applicant selected the EAC power configuration group C. Also, please clarify whether each of the 4 EDGs is 100% redundant between the divisions. If the EAC power configuration is different than group C, please provide the appropriate SBO coping duration.

### 08.04-2

Section 8.4.1.1 of the DCD Tier 2 states: "The AAC GTG is started and manually connected to the set of required shutdown equipment within 10 minutes in accordance with Position C.3.2.5 of NRC RG 1.155." In Section 8.4.1.4, the applicant also stated that the station blackout (SBO) loads for the alternate ac gas turbine generator (AAC GTG) are energized by manual operation.

Please clarify whether the AAC GTG is capable of energizing the SBO loads within 10 minutes of the onset of the SBO. If not, please revise the statement to identify the intended equipment (e.g., buses).

### 08.04-3

Section 8.4.1.1 of the DCD Tier 2 states: "During an SBO, a non-class 1E AAC gas turbine generator (GTG) with sufficient capacity, capability, and reliability provides power for the set of required shutdown loads (non-design-basis accident (non-DBA)) to bring the plant to safe shutdown."

As defined in 10 CFR 50.2, safe shutdown (non-DBA) for SBO means "bringing the plant to those shutdown conditions specified in plant technical specifications as Hot Standby or Hot Shutdown, as appropriate." Please clarify the shutdown conditions (i.e., hot standby or hot shutdown) in which the AAC GTG is capable of bringing the plant.

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### 08.04-4

In Section 8.4.1.3, the applicant stated that the alternate ac gas turbine generator (AAC GTG) is manually aligned to power two permanent non-safety (PNS) 4.16 kV switchgears (division I and II) through two in-series normally-open circuit breakers during a loss of offsite power (LOOP) event. The staff notes that since the AAC GTG will be aligned to power the Class 1E 4.16 kV buses during a station blackout (SBO), the PNS 4.16 kV buses will be without power during the SBO.

Please clarify whether there is any equipment that is normally powered from the PNS buses, and that needs to operate during an SBO. If so, please confirm that the equipment will have reliable power to operate during the SBO.

### 08.04-5

Section 8.4.2.2 of the DCD Tier 2 states: "NRC RG 1.155 Position C.3.4 is related to the training and procedures for all operator actions necessary to cope with an SBO. Conformance with NRC RG 1.155 position C.3.4 is described in Sections 13.2 and 13.5." RG 1.155 provides guidance on procedures and training for (a) restoring EAC when the EAC is unavailable (Position C.1.3), (b) restoring offsite power and use nearby power sources when offsite power is unavailable (Position C.2), and (c) coping with SBO for at least the coping duration and restoring normal long-term cooling (Position C.3.4). The staff finds no specific procedures and training related to RG 1.155 in DCD Sections 13.2 and 13.5.

Please clarify whether the COL applicant is required to address training and procedures related to RG 1.155 positions C.1.3, C.2, and C.3.4. If so, please provide the COL item for the RG 1.155 positions C.1.3, C.2, and C.3.4, or provide justification for any exception.

