

KHNPDCDRAIsPEm Resource

From: Ciocco, Jeff
Sent: Thursday, January 28, 2016 7:45 AM
To: apr1400rai@khnp.co.kr; KHNPDCDRAIsPEm Resource; Harry (Hyun Seung) Chang; Andy Jiyong Oh; Christopher Tyree
Cc: Foli, Adakou; Zimmerman, Jacob; Wunder, George; Lee, Samuel
Subject: APR1400 Design Certification Application RAI 375-8466 (09.05.03 - Lighting Systems)
Attachments: APR1400 DC RAI 375 EEB 8466.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 the RAI questions. 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



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

Recipients:

"Foli, Adakou" <Adakou.Foli@nrc.gov>
Tracking Status: None
"Zimmerman, Jacob" <Jacob.Zimmerman@nrc.gov>
Tracking Status: None
"Wunder, George" <George.Wunder@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
"Christopher Tyree" <Christopher.tyree@aecom.com>
Tracking Status: None

Post Office: HQPWMSMRS08.nrc.gov

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REQUEST FOR ADDITIONAL INFORMATION 375-8466

Issue Date: 01/28/2016
 Application Title: APR1400 Design Certification Review – 52-046
 Operating Company: Korea Hydro & Nuclear Power Co. Ltd.
 Docket No. 52-046
 Review Section: 09.05.03 - Lighting Systems
 Application Section:

QUESTIONS

09.05.03-9

In response to RAI 8179, Question 09.05.03-1, the applicant stated that the isolation devices between the Class 1E buses and the non-Class 1E lighting circuits have the proper capabilities according to RG 1.75 and IEEE Std. 384-1992. The applicant provided a markup for Section 9.5.3 of the DCD Tier 2, which incorporated the above response. However, the applicant did not discuss how they conform to RG 1.75 in the DCD markup.

Please revise Section 9.5.3.3 of the DCD Tier 2 to incorporate a discussion of the conformance of the isolation devices with RG 1.75.

09.05.03-10

In response to RAI 8179, Question 09.05.03-2, the applicant provided the illumination levels, measured in unit of lux, for normal lighting in different areas of the APR1400 standard design. The staff converted the APR1400 illuminances from lux to foot candles (fcd) (1 lux = 0.0929 foot candles) for a comparison with the levels recommended by NUREG 0700, Tables 12.1 and 12.10. The staff notes that the APR1400 illuminances or lower limits of the illuminance ranges in some areas of the plant are lower than the recommended illuminances in NUREG 0700, as shown in the table below. For example, illuminances in the reactor building are 27.87 fcd and 18.58 fcd versus the recommended 50 fcd in NUREG 0700; the lower limit of the illuminances range at the auxiliary panel is 23.23 fcd compared to 50 fcd recommended by NUREG 0700.

- a- Please provide justifications for illuminances that are lower than the levels recommended by NUREG 0700.
- b- In DCD Tier 2, Section 1.2.14, the applicant provided a summary of the APR1400 standard design plant arrangement, which includes the following buildings: emergency diesel generator (EDG) building, alternate alternating current (AAC) gas turbine generator (GTG) building, and component cooling water (CCW) heat exchanger building. The applicant stated that the auxiliary building also houses two EDG rooms and an emergency core cooling system (ECCS) equipment area. In addition, in Section 9.3.3.2.5 of the DCD Tier 2, the applicant stated that ESF equipment rooms are located in the auxiliary building.

Please provide the illuminance levels in fcd units for the above buildings and equipment rooms/areas. If these illuminances are different than that recommended by NUREG 0700, please provide justifications for the differences.

Building	Area	APR1400 Recommended Lux	APR1400 (Lux converted to foot candles)	NUREG 0700 (Recommended foot candles from Tables 12.10 and 12.1)
Reactor Containment	Operator Deck	300	27.87	50
	Others	200	18.58	50
Auxiliary	Main Control Room	300~1000 250~750	27.87~92.9	100
	a. Operator Console c. Safety Console and Auxiliary Control Panel		23.23~69.68	50
	Computer Room	700	65.03	100
	Technical Support Center	700	65.03	100
	I&C Equipment Room	300	27.87	50

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	Remote Shutdown Room	300~1000	27.87~92.9	100
	Sample Room	700	65.03	100
	Fuel Handling over Pools	300	27.87	50
	Fuel Transfer Pit	400	37.16	50
	Others	100~500	9.29~46.45	20 and 50 depending on the areas
Turbine Generator	Operator Deck	200	18.58	50
	Others	200	18.58	50
Compound	Laboratory, Instrument Repair Room	700	65.03	100
	Secondary Sample Room	700	65.03	100
	Office	500	46.45	100
	Operational Support Center	700	65.03	100
	Counting Room	700	65.03	100
	Control Room	750	69.68	100
Others	General Office	500	46.45	100
	Essential Service Water	200	18.58	50
	Circulating Water Pump House	200	18.58	50
	Electrical Equipment Room such as Switchgear, MCC, LC, Relay, and Protection Panel	300	27.87	50

09.05.03-11

In response to RAI 8179, Question 09.05.03-4, the applicant clarified Section 9.5.3.3 of the DCD Tier 2 stating:

Illumination during [loss of offsite power] LOOP, [safe shutdown earthquake] SSE, and [station blackout] SBO is provided by the emergency DC [direct current] lighting powered from both the station battery and the individual self-contained battery. The self-contained battery fixtures are provided in sufficient quantity in areas to be needed for operation of safe shutdown and for access and egress route thereto. Where sufficient illumination for safe-shutdown operations can't be provided only with self-contained battery pack lighting fixtures, DC lighting fixtures fed from non-Class 1E 125 VDC station batteries are provided to ensure required the illumination level in the area.

The applicant did not revise the DCD to reflect the above clarification. The current statement, "the emergency DC lighting powered from the station battery or the individual self-contained battery provides adequate illumination for safe shutdown operations," in Section 9.5.3.2 is not consistent with the above clarification.

Please revise Section 9.5.3.2 of the DCD Tier 2 to incorporate the above clarification.

09.05.03-12

In response to RAI 8237, Question 09.05.03-5, the applicant provided additional areas where emergency lighting system is required for firefighting, control, and maintenance of equipment used for implementing safe shutdown of the plant during all plant operation conditions as recommended by NUREG-0800. Based on its review, the staff noted that the areas listed by the applicant do not include areas such as the alternate alternating current (AAC) gas turbine generator (GTG) building where equipment used for implementing safe shutdown of the plant during a station blackout (SBO) event are located.

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Please identify other areas required for firefighting, control, and maintenance of equipment used for implementing safe shutdown of the plant during an SBO event, and confirm whether the GTG building is included as one of the aforementioned areas.

09.05.03-13

In response to RAI 8237, Question 09.05.03-7, the applicant states: "The lighting system equipment located in safety-related areas meets seismic Category II requirements not to impact safety-related equipment when subjected to seismic loading of a safe shutdown earthquake. Lighting system equipment in other areas is classified as seismic Category III." The applicant stated that Section 9.5.3.3 of the DCD Tier 2 will be revised with the above statement.

Please discuss and revise the above statement to clarify the term "safety-related areas."

09.05.03-14

In response to RAI 8237, Question 09.05.03-8, the applicant stated that the emergency lighting is inspected and tested periodically in accordance with the plant operating and maintenance procedures, which is identified in Section 13.5.2 of the DCD Tier 2. The applicant provided a markup of Section 9.5.3.4, which incorporated the above information in the response. However, reference to Section 13.2 was omitted from the markup.

Please revise Section 9.5.3.4 of the DCD Tier 2 to incorporate the above statement including the reference to Section 13.5.2. In addition, since the COL applicant is required to develop operating and maintenance procedures as stated in Section 13.5.2, provide in Section 9.5.3.4, the COL item(s) in Section 13.5.2 that address the operating and maintenance procedures related to the emergency lighting systems.



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