

KHNPDCDRAIsPEm Resource

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Sent: Thursday, August 20, 2015 10:15 AM
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Cc: Foli, Adakou; Wunder, George; Lee, Samuel
Subject: APR1400 Design Certification Application RAI 164-8179 (09.05.03 - Lighting Systems)
Attachments: APR1400 DC RAI 164 EEB 8179.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 this RAI. We may adjust the schedule accordingly.

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

Thank you,

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REQUEST FOR ADDITIONAL INFORMATION 164-8179

Issue Date: 08/20/2015

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

09.05.03-1

DCD Tier 2, Section 9.5.3.3 states: "The emergency AC [alternating current] lighting powered from the Class 1E sources is classified as non-Class 1E circuits. Lighting circuits are electrically isolated from Class 1E circuits by the use of isolation devices and separation distance as indicated in IEEE Std. [Standard] 384-1992." IEEE Std. 384-1992 "IEEE Standard Criteria for Independence of Class 1E Equipment and Circuits," is endorsed by NRC RG 1.75, "Criteria for Independence of Electrical Safety Systems." IEEE Std. 384 requires electrical isolation of power circuits to be achieved by Class 1E isolation devices that must meet certain criteria. NRC RG 1.75, Position (1) provides additional criteria (capability and periodic testing) for an acceptable breaker or fuse that is automatically opened by fault current.

- a- Please provide additional information about the isolation devices such as class, type, and number of isolation devices, which will be used to electrically isolate the Class 1E circuits from the non-class 1E lighting circuits. Also, please discuss how the APR1400 design conforms with NRC RG 1.75 in regards to lighting systems.
- b- Please provide an ITAAC for the isolation devices in DCD Tier 1, Section 2.6.8.1 to confirm recommendations of NRC RG 1.75. In addition, please provide reference to IEEE Std. 384-1992 and NRC RG 1.75 in DCD Tier 2, Section 9.5.11, "References," for completeness.

09.05.03-2

DCD Tier 2, Section 9.5.3.1 stated that the lighting systems provide adequate illumination levels as specified in NUREG 0700, "Human-System Interface Design Review Guidelines," and IESNA lighting handbook in various areas of the plant during normal and off-normal conditions.

Please provide the illumination levels for normal lighting for: (1) various tasks and work areas as specified in NUREG-0700, Table 12.1, "Nominal illumination levels for various tasks and work areas," (2) in-plant areas as specified in NUREG-0700, Table 12.10, "Range of recommended illuminances for inspection/assembly activities," and (3) all other areas/rooms of the plant that are required for control and maintenance of equipment and plant access routes during normal plant operations.

09.05.03-3

DCD Tier 2, Section 9.5.3.2 states: "[The normal lighting system] is energized from non-Class 1E 480 VAC buses and permanent non-safety [PNS] buses as long as power is available from the standby auxiliary transformers or unit auxiliary transformers. [...]. Emergency AC lighting system is energized from Class 1E 480 Volts AC (VAC) bus backed up by the Class 1E EDG and the non-Class 1E AAC [alternate AC] source to provide reasonable assurance that the emergency lighting AC system is available during a LOOP [loss of offsite power]." However, as stated in DCD Tier 2, Section 8.4, the non-Class 1E AAC source provides backup power to the non-Class 1E PNS 4.16 Kilo Volts (KV) buses during a LOOP and to the dedicated Class 1E 4.16 KV bus during a station blackout (SBO).

Please provide the backup power sources for the emergency AC lighting system during the following events: 1) a LOOP and 2) an SBO.

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09.05.03-4

DCD, Tier 2, Section 9.5.3.2 stated that the emergency direct current (DC) lighting system consists of DC lighting fixtures fed from non-Class 1E 125 VDC station batteries and self-contained battery pack lighting fixtures. Section 9.5.3.3 stated that the emergency DC lighting powered from the station battery or the individual self-contained battery provides adequate illumination for safe shutdown operations and for movement of personnel to the access and egress routes during LOOP, safe shutdown earthquake (SSE), and SBO.

Please clarify whether illumination during LOOP, SSE, and SBO is provided by the emergency DC lighting powered from both “the station battery and the individual self-contained battery” or from either “the station battery or the individual self-contained battery.” Also, please confirm that all safe-shutdown operations can be performed with the self-contained battery lighting if illumination after loss of AC power is provided by the self-contained battery lighting only.



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