KHNPDCDRAIsPEm Resource

From:	Ciocco, Jeff
Sent:	Tuesday, September 01, 2015 5:18 AM
To:	apr1400rai@khnp.co.kr; KHNPDCDRAIsPEm Resource; Harry (Hyun Seung) Chang; Andy Jiyong Oh; Erin Wisler
Cc:	Walker, Jacqwan; Junge, Michael; Ward, William; Lee, Samuel
Subject:	APR1400 Design Certification Application RAI 185-8185 (18 - Human Factors Engineering)
Attachments:	APR1400 DC RAI 185 COLP 8185.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, 90 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,

Jeff Ciocco
New Nuclear Reactor Licensing
301.415.6391
jeff.ciocco@nrc.gov

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Hearing Identifier: KHNP_APR1400_DCD_RAI_Public
Email Number: 234

Mail Envelope Properties (408eaf0f52d64426a502268369c0f9f6)

Subject: APR1400 Design Certification Application RAI 185-8185 (18 - Human Factors Engineering)
Sent Date: 9/1/2015 5:18:22 AM
Received Date: 9/1/2015 5:18:25 AM
From: Ciocco, Jeff

Created By: Jeff.Ciocco@nrc.gov

Recipients:
"Walker, Jacqwan" <Jacqwan.Walker@nrc.gov>
Tracking Status: None
"Junge, Michael" <Michael.Junge@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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Files	**Size**	**Date & Time**
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image001.jpg	5040	

Options
Priority: Standard
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Recipients Received:

Request for Additional Information 185-8185

Issue Date: 09/01/2015
Application Title: APR1400 Design Certification Review – 52-046
Operating Company: Korea Hydro & Nuclear Power Co. Ltd.
Docket No. 52-046
Review Section: 18 - Human Factors Engineering
Application Section:

QUESTIONS

18-23

Title 10, Section 50.34(f)(2)(iii) requires that a reactor design applicant provide a control room design that reflects state-of-the-art human factor principles prior to committing to fabrication...control room panels and layouts. NUREG--0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Chapter 18, "Human Factors Engineering," provides guidance for NRC staff to perform a review of the human factors engineering design portion of a reactor design. NUREG-0711, provides additional details, including detailing the review criteria to assist the staff in performing its design review.

NUREG-0711, Rev. 3, Section 4.4, Criterion 4, 5th bullet, states that for each high-level function, the applicant should identify requirements related to parameters indicating that the high-level function is achieving its purpose (e.g., reactor vessel level returning to normal).

The technical report, APR1400-E-I-NR-14003, Rev 0, "Functional Requirements Analysis and Function Allocation Implementation Plan," Section 4.3.3, provides Table 4-1, "Example of a Function Definition Table for a Critical Function." The functional data table (FDT) provides a means of documenting how a high-level function is achieving its purpose, by describing the lower-level functions that support the respective high-level function, all the way down to a particular component.

Section 4.3.3 (pg 15) discusses the decomposition of the functions into lower-level supporting functions. Table 4-1 is provided as an example of the documentation of a high-level function.

The staff has the following questions that should be addressed so that the staff can verify that the design satisfies this NUREG-0711 criterion:

1. An example of linking the lower level functions with a 1.0, 1.1, 1.2, etc., structure is provided. If Table 4-1 is used as an example, does this mean that the lower level functions will have their own FDTs? So, for the lower level function of “Safety Injection,” code: 310000, there would be another table that looks exactly like Table 4-1, but with data relevant to this lower level function?

2. Do the high-level functions have documentation of their decomposition to a component level in the FDTs? By the example table 4-1, the text in Section 4.3.3, and Figure 4-3, it is difficult to determine how the functions in the FDT are attached to the success path resource trees (which decompose the functions all the way to a component). The example Table 4-1 does not indicate a component level of specificity (there isn’t a cell where a component can be entered/identified).


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