

KHNPDCRAIsPEm Resource

From: Ciocco, Jeff
Sent: Wednesday, August 24, 2016 1:42 PM
To: apr1400rai@khnp.co.kr; KHNPDCRAIsPEm Resource; Andy Jiyong Oh; Junggho Kim (jhokim082@gmail.com); James Ross
Cc: Kent, Lauren; Junge, Michael; Ward, William; Williams, Donna
Subject: APR1400 Design Certification Application RAI 518-8654 (18 - Human Factors Engineering)
Attachments: APR1400 DC RAI 518 HOIB 8654.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 RAI question response times. We may adjust the schedule accordingly.

18-128: 30 days
18-129: 45 days
18-130: 45 days
18-131: 45 days

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

Thank you,

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Subject: APR1400 Design Certification Application RAI 518-8654 (18 - Human Factors Engineering)
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U.S.NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

REQUEST FOR ADDITIONAL INFORMATION 518-8654

Issue Date: 08/24/2016
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: HSI Design

QUESTIONS

18-128

Title 10 of the Code of Federal Regulations (10CFR) Section 52.47(a)(8) requires an applicant for a design certification to provide an FSAR which includes the information necessary to demonstrate compliance with any technically relevant portions of the Three Mile Island requirements set forth in 10 CFR 50.34(f), with certain exceptions. Section 10 CFR 50.34(f)(2)(ii) requires an applicant to "Establish a program, to begin during construction and follow into operation, for integrating and expanding current efforts to improve plant procedures. The scope of the program shall include.....human factors engineering..." The current NRC guidance for developing a human factors engineering (HFE) program is NUREG-0711, Rev 3, "Human Factors Engineering Program Review Model." The applicant stated in the FSAR, Tier 2, Chapter 18 "Human Factors Engineering," that it was working in accordance with the criteria of NUREG-0711 in establishing its HFE program. This regulatory basis applies to all questions in this Request for Additional Information (RAI).

NUREG-0711, Criterion 8.4.4.2(15), "Computer-Based Procedure Platform," states that the applicant's computer-based procedures should be consistent with the design review guidance in NUREG-0700, Section 8, and DI&C-ISG-5, "Highly-Integrated Control Rooms - Human Factors issues (HICR - HF)," Section 1 (NRC, 2008).

Item #22 of DI&C-ISG-5 states, "The computer-based procedure system should not change the approved procedure." The response to RAI 383-8458, Question 18-105 (ADAMS Accession No. ML16142A045) states, "CBP consists of Editor, CP, and Executor. Editor is a tool to write CP. Executor is a tool to execute CP, which is written by Editor. Executor does not have the capability to change a CP."

Please state whether Editor can change a procedure after it has been approved. If Editor can change the procedure, please explain how Item #22 is satisfied.

18-129

Acceptance criterion 8.4.5(2) of NUREG-0711 states that the applicant should specify the alarms and other information personnel need to detect degraded I&C and HSI conditions in a timely manner, and to identify their extent and significance.

The response to RAI 383-8458, Question 18-110 (ADAMS Accession No. ML16103A429), addresses the HSI needed to "support" degraded I&C and HSI conditions and also addresses HSI that will be required for operators to manage the plant during degraded I&C and/or HSI conditions; however, the response does not describe how the alarms and other information personnel need to detect degraded I&C and HSI conditions in a timely manner will be identified.

REQUEST FOR ADDITIONAL INFORMATION 518-8654

Describe in the submittal the alarms and other information that will be available for personnel to detect degraded I&C and HSI conditions in a timely manner, and to identify their extent and significance will be identified (describe how personnel will know that the HSI as well as the I&C system are degraded). Or, identify where in the application the information is located.

18-130

NUREG-0711, Criterion 8.4.6.2(2) states that the applicant should base the general approach to testing on the test's objective(s). The following aspects of the tests should be described: tasks or scenarios used, performance measures, test procedures, and data analyses. Also, NUREG-0711, Section 1.2.2, "Review Elements," states that an implementation plan (IP) is acceptable if it is verifiable, i.e., the final results can be evaluated using NUREG-0711 criteria, and the IP describes the products (expected results from executing the methodology).

The Human-System Interface (HSI) Design (HD) IP, APR1400-E-I-NR-14007 (Rev. 0), Section 4.1.7, "Basic HSI Tests and Evaluations," prescribes that a performance-based test will be performed with US operators to ensure the effectiveness of the APR1400 Basic HSI. The response to RAI 8458, Question 18-111 (ADAMS Accession No. [ML16123A371](#)) states, "...when there is a need to conduct specific design performance tests using the Basic HSI Test Facility, Section 5 of the Human Factors Verification and Validation Implementation Plan, APR1400-E-I-NR-14008 (Rev. 0) will be used as guidance. Tests will follow a test procedure and results will be documented." However, the HD IP was not revised to include this direction.

Include this direction in the HD IP.

18-131

Attachment 4/4 of the response to RAI Attachment 4/4 of the response to RAI 400-8425, Question 18-125 (ADAMS Accession No. [ML16144A662](#)), says, "...Section 4.4.1.14, "Important Human Actions." However, it appears this should refer to Section 4.1.4.14. Please revise the document if necessary.