

KHNPDCDRAIsPEm Resource

From: Ward, William
Sent: Friday, June 26, 2015 5:59 PM
To: 'apr1400rai@khnp.co.kr'; KHNPDCDRAIsPEm Resource; 'Chang, Harry'; 'Yunho Kim (yshh8226@gmail.com)'; 'Mannon, Steven (steven.mannon@aec.com.com)'
Cc: Ciocco, Jeff; Lee, Samuel; Green, Brian; Junge, Michael
Subject: APR1400 Design Certification Application RAI 54-7963 (18 Human Factors Engineering)
Attachments: image001.jpg; APR1400 DC RAI 54 COLP 7963.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 days to respond to the RAI's questions. We may adjust the schedule accordingly.

18-4: 60 days
18-5: 60 days
18-6: 45 days
18-7: 60 days
18-8: 60 days
18-9: 45 days
18-10: 60 days

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

Thank you,

William R. Ward, P.E.
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Subject: APR1400 Design Certification Application RAI 54-7963 (18 Human Factors Engineering)
Sent Date: 6/26/2015 5:58:37 PM
Received Date: 6/26/2015 5:58:40 PM
From: Ward, William

Created By: William.Ward@nrc.gov

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MESSAGE	916	6/26/2015 5:58:40 PM
image001.jpg	4189	
APR1400 DC RAI 54 COLP 7963.pdf		104419

Options

Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
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REQUEST FOR ADDITIONAL INFORMATION 54-7963

Issue Date: 06/26/2015

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: HFE Program Management

QUESTIONS

18-4

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.

Section 10 CFR 50.34(f)(3) requires an applicant to provide sufficient information to demonstrate that the following requirement(s) has been met.... "(i) Provide administrative procedures for evaluating operating, design and construction experience and for ensuring that applicable important industry experiences will be provided in a timely manner to those designing and constructing the plant."

NUREG-0711, Section 2.4.1 "General HFE Programs Goals and Scope," criterion 2 "Assumptions and Constraints," indicates that applicants should identify any design assumptions and constraints.

NUREG-0711, Section 3.4 "Review Criteria," Subsection 3.4.1 "Scope," criteria 1 "Predecessor/Related Plants and Systems," second bullet states that the operating experience review (OER) should define the relevance of each predecessor plant/design to the new design, when there is more than one predecessor.

APR1400-E-I-NR-14001-P, "Human Factors Engineering Program Plan," Appendix A, "NUREG-0711 Rev. 3 Conformance Table," identifies the sections that are used to demonstrate compliance with various NUREG-0711 acceptance review criteria. This table indicates that Section 4.1 "Assumptions and Constraints" contains the information necessary to demonstrate compliance to NUREG-0711 2.4.1, "General HFE Program Goals and Scope," Criterion 2. Also, useful information was found in Section 8, "Definitions" of the document, as well as in FSAR Tier 2, Section 18.1.1.1 "Assumptions and Constraints Identification."

However, additional information is required to determine if this criterion is met. Specifically, KHNP assumes that the CE 80+ design certification as the predecessor design; Palo Verde Generating Station and KHNP OPR plants as predecessor plants; and Shin-Kori 3&4 as the reference plant, are reasonable predecessor/reference designs/plants. The basis for these assumptions is not specified and the relationship to the APR1400 design is not clear.

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Question 1:

Little information is provided comparing these predecessors and the differences between the designs and APR1400 is not clear. Please provide supplemental information regarding the relationship of the three designs listed here compared to APR1400. Identification of important differences between the listed designs and the likely influence on the design of the APR1400 is of particular importance.

Question 2:

Based on the information in the Program Plan, it appears that Shin-Kori 3&4, as the reference plant, is the closest design to APR1400. Has any human factors validation been completed on that design? Does it comply with NUREG-0711/NUREG-0700 or other equivalent standards?

18-5

Section 10 CFR 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.

Criterion 4, "Facilities," (NUREG-0711 Section 2.4.1, "General HFE Program Goals and Scope") allows the use of a graded HFE approach applied to "facilities other than the MCR and RSF, *providing justification* in the HFE program plan."

Section 2, "Scope," of the HFE program plan and Section 18.1.1.2, "Applicable Plant Facilities," of the DCD Tier 2 document clearly indicate that a graded approach will be used for some parts of the design, however the justification for this is not clear, nor is the method by which this grading will occur.

Please provide a justification for the use of a graded HFE program along with a brief description about how the grading will be implemented. For instance, guidance like NUREG-0696, "Functional Criteria for Emergency Response Facilities" might be applied to the design of the EOF instead of the full scope described in NUREG-0711.

18-6

Section 2.4.3 "HFE Process and Procedures," of NUREG-0711, criterion 5 "HFE Documentation," indicates that applicants should briefly describe the process for making licensing documents available to the NRC for review.

APR1400-E-I-NR-14001-P, Section 6 "Results Summary Report" indicates that all results summary reports "are available for review by the NRC." However, the plan for submitting the

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various ReSRs to the NRC is unclear from the submitted materials. Please provide additional information (or provide a reference to other docketed material) that indicates the KHNP process for submission of ReSRs and other relevant documents to the NRC. If KHNP does not intend to submit ReSRs to the NRC then a method for communicating completion of the ReSRs should be developed so that the NRC understands when they are complete and can thus schedule inspections/audits as needed.

18-7

Criterion 6, "Subcontractor HFE Efforts," of NUREG-0711, Section 2.4.3 addresses the use of subcontractors in the HFE process. Clarification is needed regarding this process to determine if this criterion is met.

Section 18.1.3.6 "Subcontractor HFE Efforts" of the FSAR Tier 2 document states that "Subcontractor compliance with HFE requirements is demonstrated in the procurement specifications of the HSI system." It is unclear how procurement documents typically used to acquire products/services can be used to demonstrate that various standards have been met during the process of manufacturing the product or performing a service.

Please clarify wording used in Section 18.1.3.6 "Subcontractor HFE Efforts" of the FSAR Tier 2 document.

18-8

Criterion 3 "Documentation," of NUREG-0711 Section 2.4.4 "Tracking HFE Issues" indicates that licensees should document actions taken to address issues in the tracking system. Justifications should be included when no actions are required to resolve an issue.

Question 1:

Section 4.6.1.4 "Human Engineering Discrepancies Closeout," of APR1400-E-I-NR-14001-P indicates that "HEDs that do not require action are also documented in the ITS [issue tracking system]." Those HEDs that "do not require action" are later defined in the same section as Priority 3 HED "Not Priority 1 and 2 and acceptable as-is." The description provided in this section does not explain how Priority 3 HEDs are justified and how this justification is documented.

Provide additional information to describe the justification and documentation of Priority 3 HEDs or provide references to other docketed licensing documents that address this issue.

Question 2:

Please clarify the relationship between the ITS and CAP [corrective actions program], if any. Is the HED process completely separate from the CAP or are there interfaces?

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18-9

NUREG-0711, Section 2.4.5 "Technical Program," Criterion 2 states that applicants should identify approximate schedules for completing HFE activities that are not complete at the time of the application.

Figure 4-2, "APR1400 HFE Program Milestones," of APR1400-E-I-NR-14001-P displays the relative order of HFE product completion but does not provide information indicating when applicable ReSRs will be complete.

Please identify any ReSR that are expected to be submitted prior to the completion of the NRC review of the DC application. Also indicate any ReSR that are expected to be submitted after the completion of the DC review. It is not necessary to submit specific calendar dates as these are likely to change and are not within the scope of this criterion.

18-10

Section 2.4.5 of NUREG-0711, criterion 4 indicates that applicants should provide information regarding the tools that will be used in the HFE program.

APR1400-E-I-NR-14001-P, Section 4.7.1 "Design Process Elements" indicates that a full-scope MCR simulator, part-task simulator, mock-ups, and special tools and equipment will be used to support HFE design work. However, it is not clear how these tools will be used to create the final design.

Please provide additional information (at a high-level) about the process or processes that will use these tools (and others described in the implementation plan) to create the final design. For instance, an applicant might describe the use of mock-ups for testing equipment outside of the control room or the applicant might use part-task simulation during the development of the full-scale simulator. The applicant may also choose to provide a reference to this material if it is considered elsewhere in the application submission.