
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.: 510-8650
SRP Section: 18 – Human Factors Engineering
Application Section: 18.6 Treatment of Important Human Actions (TIHAs)
Date of RAI Issue: 08/01/2016

Question No. 18-127

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 [Final Safety Analysis Report] 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.

NUREG-0711, Criterion 7.4(1), states: "The applicant should identify risk-important human actions (RIHAs) from the PRA/HRA [Probabilistic Risk Assessment/Human Risk Assessment]. The human factors engineering staff is responsible for ensuring that RIHAs included in the HFE design process are the same as those identified in Chapter 19 ["Probabilistic Risk Assessment and Severe Accident Evaluation"]."

The response to RAI 128-7980, Question 18-13 (ADAMS Accession No. ML15352A246), included a list of risk-important human actions (RIHAs), and stated that the list would be included in the treatment of important human actions (TIHA) results summary report (ReSR). The ReSR is the product prepared by the COL [combined license] applicant to complete the TIHA program element.

The staff reviewed the list and compared it to the list of "key operator actions" in FSAR Tier 2, Chapter 19, Rev 0, Tables 19.1-24, 25, 38, 39, 55, 56, 61, 62, 72, 73, 78, 79, 104, 105, 117, 118, 130, 131, 145, 146, 159, and 160. The staff found that some of the actions listed in these tables were not on the list provided in response to Question 18-13.

Further, APR1400-E-I-NR-14006, "Treatment of Important Human Actions Implementation Plan" (TIHA IP), which will be used by a COL applicant to complete the TIHA program element, does not provide enough detail to ensure that a person with the qualifications described in the TIHA IP (which do not include knowledge of PRA) will be able to identify and include all of the RIHAs listed in FSAR Tier 2 Chapter 19 in the HFE program. These RIHAs should be clearly labeled and listed in Chapter 19 as part of the design process.

Because of the reasons stated above, the staff finds the response to Question 18-13 inadequate and asks the applicant to address the following issues in order to close this issue.

1. Provide in FSAR Tier 2, Chapter 19, a list of risk-important human actions identified from the PRA/HRA per Criterion 7.4(1).
2. Revise APR1400-E-I-NR-14006 to reference the list in FSAR Tier 2, Chapter 19 that contains the RIHAs to ensure that the RIHAs included in the HFE design process are the same as those identified in Chapter 19.

Response

1. The risk-important human actions (RIHAs) lists will be documented in APR1400-E-I-NR-14006, "Treatment of Important Human Actions Implementation Plan" (TIHA IP) as Appendix C, "preliminary TIHA output for RIHAs." Moreover, Section 4.1, "Risk-Important Human Actions" related with PRA knowledge will be revised as indicated in the Attachment associated with this response.
2. Section 7, "References" of the TIHA IP will be revised as indicated in the Attachment associated with this response.

Impact on DCD

There is no impact on the DCD.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports

Technical report APR1400-E-I-NR-14006-NP, Rev. 0 "Treatment of Important Human Actions," Subsection 4.1, 7, and Appendix C will be revised as indicated in the Attachment associated with this response.

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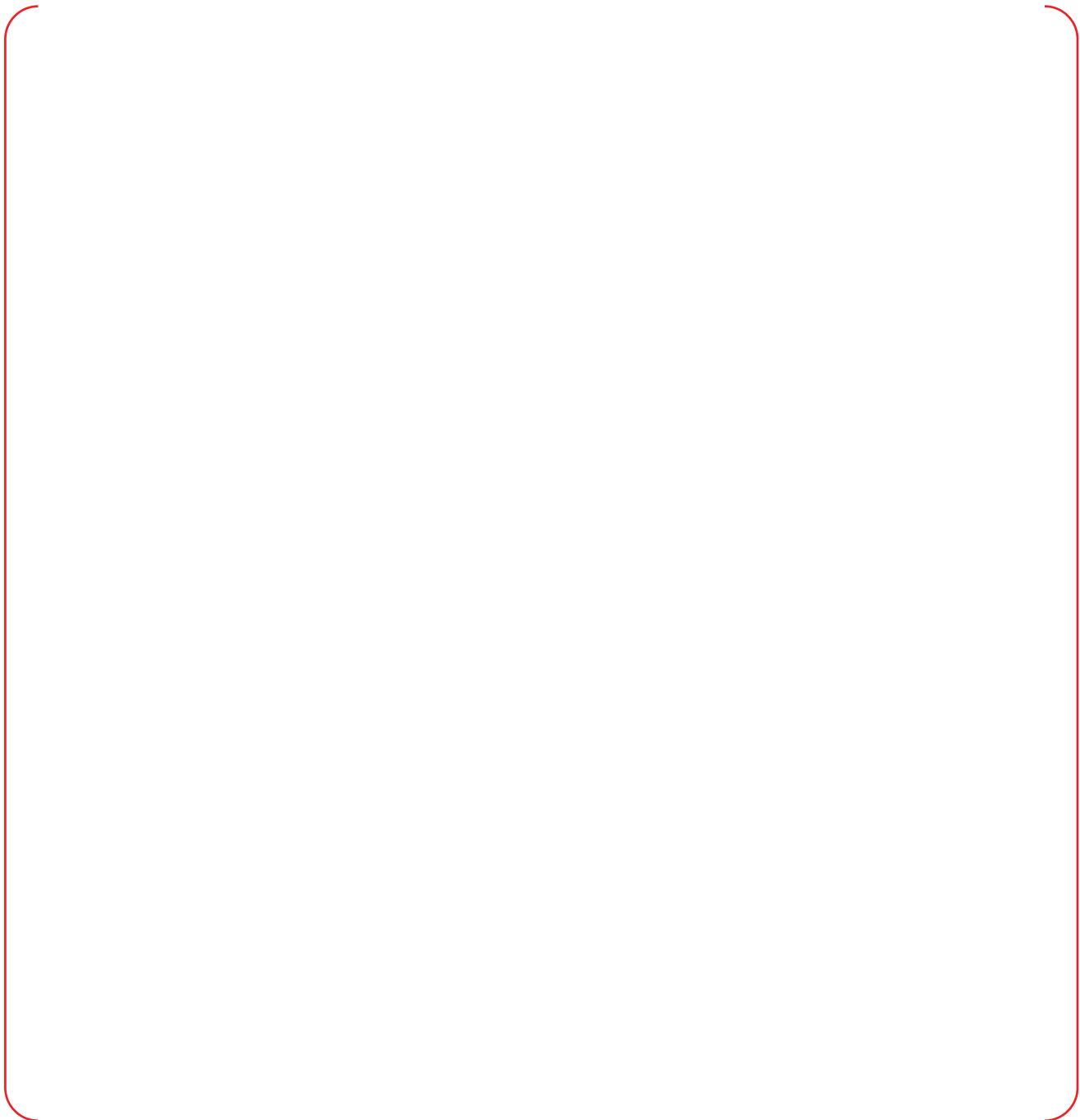
4. IMPLEMENTATION

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4.1 Risk-Important Human Actions

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7. REFERENCES

1. IEEE Std. 497-2002, "IEEE Standard Criteria for Accident Monitoring Instrumentation for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, 2002.
2. Regulatory Guide 1.97, "Criteria For Accident Monitoring Instrumentation for Nuclear Power Plants," Rev. 4, U.S. Nuclear Regulatory Commission, June 2006.
3. NUREG-0711, "Human Factors Engineering Program Review Model," Rev. 3, U.S. Nuclear Regulatory Commission, November 2012.
4. APR1400-K-X-FS-14002, "APR1400 Design Control Document Tier 2," Rev. 0, KHNP, December 2014.
5. APR1400-E-I-NR-14011-P, "Basic Human-System Interface," Rev. 0, KHNP, December 2014.

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6. Full Power Level 1 PRA - Human Reliability Analysis (1-035-N463-105), Rev. 1, KEPCO E&C, April 2015.
 7. Low Power and Shutdown PRA - Human Reliability Analysis Notebook (1-035-N463-705), Rev. 0, KEPCO E&C, April 2015.

APPENDIX-C PRELIMINARY TIHA OUTPUT FOR RIHAs

Table 1. Risk-Important Human Actions (RIHAs) at Power from Chapter 19

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Table 2. Risk-Important Human Actions (RIHAs) at LPSD from Chapter 19



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