
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.: 128-7980
SRP Section: 18 – Human Factors Engineering
Application Section: 18.6 Treatment of Important Human Actions (TIHAs)
Date of RAI Issue: 08/05/2015

Question No. 18-16

Section 7.4 (2), “Review Criteria,” of NUREG-0711, states in part that the applicant should identify deterministically-important human actions from the DCD Chapter 15 transient and accident analyses (TAA). Additionally, Section 1.2.2, “Review Elements,” of NUREG-0711 states in part that the NRC staff accepts implementation plans for review when the results for an HFE element are not available for the review.

Section 18.6.2.b, “DIHAs,” in DCD Chapter 18 states that DIHAs and their associated HFE characteristics are identified from the transient and accident analysis (TAA) in DCD Chapter 15. Section 4.2, “Deterministically-Important Human Actions Analyses,” in APR1400-E-I-NR-14006-P, “Treatment of Important Human Actions Implementation Plan” (TIHA IP) Revision 0, describes the process for compiling the DIHAs and their associated HFE characteristics from the TAA in DCD Chapter 15.

DCD Chapter 15, “Transient and Accident Analyses,” Revision 0, identifies operator actions credited for event mitigation (DIHAs). Some of the HFE characteristics are also included in DCD Chapter 15; however, the time required to perform those actions was not included in the TAA.

Provide the list of deterministically-Important human actions (DIHAs) from the TAA for staff review and the associated HFE characteristics.

Specify where the HFE characteristics are documented if they are not available in DCD Chapter 15 (e.g., time required).

Revise the application to reflect the RAI response.

Response

The list of deterministically-important human actions (DIHAs) from transient and accident analyses (TAA) is provided in the attachment associated with this response.

The HFE characteristics will be analyzed in COL application phase and documented in the TIHA results summary report.

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

There is no impact on any Technical, Topical, or Environmental Report.

Table 1. Treatment of Important Human Actions (TIHA) Output for Deterministically-Important Human Actions (DIHAs) from Chapter 15

Scenario	Action	Reference	Time Available	HFE Characteristics			Comment
				HSI Inventory	Staffing	Time Required	

TS

Note

1. Time available is expressed in terms of time from the event initiation and not the cue for an HA

Abbreviations

1. ADV atmospheric dump valve
2. AFW auxiliary feedwater
3. SG steam generator
4. EOP emergency operating procedure

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Question No. 18-17

Section 7.4 (2), "Review Criteria," of NUREG-0711, states that applicants should identify deterministically-important HAs from the following licensing analyses: operator actions identified in the D3 coping analyses performed for DCD Chapter 7, as specified in Section 1 and 2 of Interim Staff Guidance DI&C-ISG-02, Diversity and Defense in Depth (D3) Issues (NRC, 2009). Section 1.2.2, "Review Elements," in NUREG-0711 states in part that when results are not available for review, the NRC staff accepts implementation plans as the basis for making a safety finding for a particular plant design.

Section 18.6.2.b, "DIHAs," in DCD Chapter 18 states that DIHAs and their associated HFE characteristics are identified from the D3 analysis in DCD Chapter 7. Section 4.2, "Deterministically-Important Human Actions Analyses," in APR1400-E-I-NR-14006-P, "Treatment of Important Human Actions Implementation Plan" (TIHA IP) Revision 0, describes the process for compiling the DIHAs and their associated HFE characteristics from the D3 coping analysis in DCD Chapter 7.

The staff reviewed DCD Chapter 7, "Instrumentation and Controls," Revision 0 and did not find any discussion of credited manual operator actions or their associated HFE characteristics. The staff reviewed the APR1400-Z-A-NR-14019-P, "CCF Coping Analysis," Revision 0, which is referenced in DCD Chapter 7. Section 5.3 of the CCF Coping Analysis provides an analysis of the effects of transients and accidents described in DCD Chapter 15 concurrent with a common cause (CCF) failure of the safety I&C system, and it identifies operator actions that would be required to mitigate the consequences of these events. Additionally, it appears that the associated HFE characteristics are also included in this report (i.e., Table 4-1).

Provide the list of deterministically-important human actions (DIHAs) from the D3 coping analysis for staff review and the associated HFE characteristics.

Specify where the HFE characteristics are documented if they are not available in DCD Chapter 15 (e.g., time required).

Revise the application to reflect the RAI response.

Response

The list of deterministically-important human actions (DIHAs) from the D3 coping analysis (D3CA) is provided in the attachment associated with this response.

The HFE characteristics will be analyzed in COL application phase and documented in the TIHA results summary report.

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

There is no impact on any Technical, Topical, or Environmental Report.

Table 1. Treatment of Important Human Actions (TIHA) Output for Deterministically-Important Human Actions (DIHAs) from D3 Coping Analysis

Scenario	Action	Reference	Time Available	HFE Characteristics			Comment
				HSI Inventory	Staffing	Time Required	

TS

Note

1. Time available is expressed in terms of time from the event initiation and not the cue for an HA

Abbreviations

1. CIAS containment isolation actuation signal
2. CSAS containment spray actuation signal
3. D3CA defense-in-depth and diversity coping analysis
4. EDG emergency diesel generator
5. EOP emergency operating procedure
6. HA human action
7. MFIV main feedwater isolation valve
8. MSIV main steam isolation valve
9. RCP reactor coolant pump