Human Performance Monitoring Implementation Plan

Technical Report

Non-proprietary

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REVISION HISTORY

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1. OVERVIEW

1.1. Purpose

This document supports the COL applicant by providing the Implementation plan for monitoring human performances during operation.

Human performance monitoring helps to ensure that the human-system interface (HSI) design, developed through the application of the Human Factors Engineering Program Plan (HFEPP) (Reference 2.1), maintains its intended purposes over time.

It assures that the conclusions drawn from the Integrated System Validation (ISV) (Reference 2.2, Section 5.0) remain valid with time and that no significant safety degradation occurs due to changes made in the plant.

The COL applicant is expected to develop and operate a human performance monitoring program for this activity.

1.2. Scope

The scope of human performance monitoring provides reasonable assurance that (Reference 2.3, Section 13.4):

- Personnel can effectively use the HSI design, including within the control room and between the control room, local control panels, and technical support center
- Human performance that may be affected by changes made to the HSIs, procedures, and training is not negatively affected
- Important human actions (IHAs) can be accomplished within the criteria for time and performance
- Human performance established during ISV remains at an acceptable level

1.3. Acronyms

CAP	corrective action program
HA	human action
HFE	human factors engineering
HSI	human-system interface
IHA	important human action
ISV	integrated system validation
RG	Regulatory Guide

2. APPLICABLE REFERENCES

2.1 KHNP APR1400-E-J-NR-12002-P, Human Factors Engineering Program Plan
2.2 KHNP APR1400-E-J-NR-12010-P, Human Factors Verification and Validation Implementation Plan
2.3 NUREG-0711, Human Factors Engineering Program Review Model, Rev. 3

3. METHOD

Human performance monitoring will be implemented by a systematic program of the COL applicant. The goal of this activity is to trend human performance after the plant is operational, or after modifications were made to demonstrate that the performance is consistent with that assumed in the various analyses that were conducted to justify the modification.

The human performance monitoring program will be performed in accordance with Section 13.4 of Reference 2.3.

4. IMPLEMENTATION

4.1. Assumption

Human performance monitoring is performed through a COL applicant's program during operation and begins at the initial loading of the plant fuel. Special attention is paid to this HFE element when changes in HSI, procedures, or training program are made in the plant.

This plan provides guidance for the human performance monitoring program that will be developed by the COL applicant. This program may be integrated with plan wide performance monitoring programs used by the COL applicant (e.g., performance monitoring tools or corrective action program (CAP)).

4.2. Input

The inputs to the human performance monitoring include:

- Human performance data from the operation
- Human performance criteria
- Performance criteria in ISV
- Performance criteria for IHAs
- Performance criteria before the changes were made

4.3. Process

COL applicant's human performance monitoring program will include the following activities.

4.3.1. Identify human performances to be monitored

This activity defines the level of human performances to be monitored during the operation based on safety importance.

The human performances includes: 1) human performances used in ISV, 2) human performances in IHAs, and 3) human performances that may be affected by the changes in HSI, procedures, or training program.

In the case when the performance of plant or personnel cannot be readily measured under actual design basis conditions, the COL applicant can use best available data that most closely approximate the performance under actual conditions.

This activity also defines criteria for the performances identified. The criteria may include 1) the performance criteria used in ISV, 2) the performance criteria that may affect the plant safety, 3) time

windows for IHAs, or 4) levels of performances before changes.

4.3.2. Collect human performance data

This activity collects human performance data during operation. Different methods can be used for measurement and collection, depending on performances. The APR1400 provides operational log data for the use of computer-based procedure and can store plant parameters in the database. The level of monitoring human performance can be commensurate with their safety important.

4.3.3. Identify performance degradation or failures

This activity defines the significance of failure, the circumstances surrounding failure or degraded performance degradation, and characteristics of the failure. For significant failure and degradations, this activity identifies the cause of failure and degradation.

4.3.4. Determine corrective actions

This activity stipulates corrective actions and identifies the implementation of any corrective actions necessary to preclude the recurrence of unacceptable failures or degraded performance. These corrective actions should be established before the degradations compromise plant safety.

Feedback of the corrective actions and trending the performances should be accomplished in a timely manner.

4.4. Output

Degradations in performance will be detected and corrective actions taken before they negatively impact plant safety through a program that (Reference 2.3, Section 13.4):

- Defines and address the significant failures, including the circumstances, characteristics and extent of the failure
- Identifies the cause and corrective action for significant failures
- Ensures the implementation of corrective actions that are necessary to prevent the recurrence of unacceptable failures or future performance degradation
- Includes the trending of failures and performance degradation

Figure 1. Process of Human Performance Monitoring

5. RESULTS

The human performance programs that include strategies and implementing process will be developed and .documented in accordance with this plan.