38th Nuclear Safety Standards Committee
38th Waste Safety Standards Committee

Joint Session

27 November 2014

Agenda Item NW2.2
Human Factor Engineering (DS492)

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DPP Justification

Why HFE safety guide?

- A cross-cutting activity that affects I&C design, plant procedures, training, and many other things and that addresses the interfaces between these things
- Advances in I&C technology (digital)
- Implementation of EOPs, SAMGs
- Enhancement of human-machine interface
  - New plants
  - Modification of existing plants (CRs, TSC, etc.)
- Some MS require a specific chapter on HFE in SAR

A systematic consideration of HFE is needed

Currently no specific safety guide available
HFE in IAEA safety standards

- SSR 2/1 Requirement 32
  - Systematic consideration of human factors, including the human–machine interface, shall be included at an early stage in the design process for a nuclear power plant and shall be continued throughout the entire design process

- DS 431 Chapter 8
  - Consideration of human-machine interface in I&C design
  - Focus on providing the information to operate the plant in all operational states and accident conditions
  - HFE not discussed in detail (this was not objective of DS 431)
Objectives & Scope

- To provide specific recommendations to meet SSR 2/1 Req. 32 related to HFE:
  - Operation and maintenance of plant systems
  - Design of controls and displays navigations
  - Equipment layout
    - Control room, Supplementary control room, Emergency response center, Local controls, etc.

- Some topics (although important) outside the scope:
  - The plant organizational factors
  - Intentional acts as well as aspects of human performance relating to ‘trustworthiness and background checks’
Fukushima Implications

• Account for the performance of plant operators and other critical personnel during accidents
  • multiple challenges to human performance, including challenges to situation assessment, planning, decision making, communication, coordination, and task execution
    • unavailability of required information
    • misleading sensor indications
    • lack of relevant procedural guidance

• To be reflected in human-machine interface design
Provisional TOC

1. INTRODUCTION
2. HFE PROGRAM MANAGEMENT
3. REVIEW OF OPERATING EXPERIENCE
4. FUNCTIONAL REQUIREMENTS ANALYSIS AND FUNCTION ALLOCATION
5. TASKS ANALYSIS
6. STAFFING AND QUALIFICATION
7. HUMAN RELIABILITY ANALYSIS
8. HUMAN SYSTEM INTERFACE DESIGN
9. PROCEDURE DEVELOPMENT
10. TRAINING PROGRAMME DEVELOPMENT
11. HUMAN FACTORS VERIFICATION AND VALIDATION
12. DESIGN IMPLEMENTATION
13. HUMAN PERFORMANCE MONITORING
REFERENCES
GLOSSARY
ANNEXES
Comments resolution

- 25 comments received
- 19 accepted
- 6 rejected
Reasons for rejection

- New safety guide not necessary - expand DS431
  - HFE is a cross-cutting activity that affects I&C design, plant procedures, training, the interfaces, etc.
  - It is not just an I&C issue and it would be inappropriate to cover it in an I&C document
  - SAR require a chapter on HFE
- Delete HRA Section
  - HRA is an issue of looking at reliability to try and improve the decisions on human engineering design
- Address security in the design and operation
  - The intend is to provide recommendations to meet provisions of SSR 2/1 Requirement 32
  - Reference to security publications will be made without providing details

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