

Overview of Licensed Operator Simulator Training Data and Use

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Outline

- Introduction
- Overview of Simulator Training
- Considerations of simulator data fidelity for estimating human error probabilities in human reliability analysis (HRA)
- Conclusions

Introduction

- Risk-significant real nuclear power events are
 - Rare: limited data
 - Unique: response of a specific crew
- Simulator data is a good supplemental data source for HRA, in the US (104 reactors):
 - Generate ~ 10,000 simulator scenarios annually
 - Any scenario is exercised by multiple crews
 - Performed by the licensed operators
- Simulator data fidelity would affect applicability of simulator data for HRA

Overview of Simulator Training

- Types of Simulator Scenarios
 - Annual Exams and Exam practice
 - Periodic exams and training
 - Instructional training
- Periodic training for a dual unit station
 - ~ 5 training weeks a year
 - ~13 crews per training week
 - Usually 4 scenarios per training week
 - Usually around 4 malfunctions per scenario
 - Usually one or two critical tasks per malfunction

An Example Malfunction

Malfunction: Loss of Emergency Cooling Water (ECW) 1A	
Task: Lead Performer	Expected Response
1. Crew	Recognize loss of emergency water (EW) flow to A train
2. Crew	Secure ECW pump 1A
3. Crew	Manually trip Diesel Generator (DG) prior to the DG trips automatically
4. Crew	Ensure the charging cooling pump 1A is in service
5. Crew	Verified natural circulation
6. Shift Manager	Determines need to cooldown
7. Shift Manager	Declare an Alert HA1/EAL2 due to damage to EW structure or notify ED that escalation is appropriate

Considerations of Simulator Data Fidelity for HRA

- Command Presence
- Sensitivity to Cues
- Stress
 - Performance Pressure
 - Environmental
 - Emotional Distraction
- Success Criteria
- Other considerations
 - Simulator
 - Scenario
 - Training
 - Staffing

Conclusions

- Simulator data are good for estimating human error probabilities in HRA
 - Data amount and results sampling
 - Similarity in work place and people to real events
- Fidelity issues are likely manageable
 - Require careful data screening