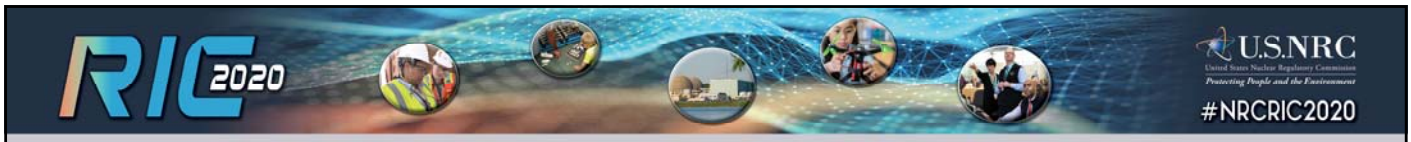

RIC SESSION TH33

Tools for Enhancing Integrated Safety Analysis Human Reliability Insights

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U.S. Nuclear Regulatory Commission

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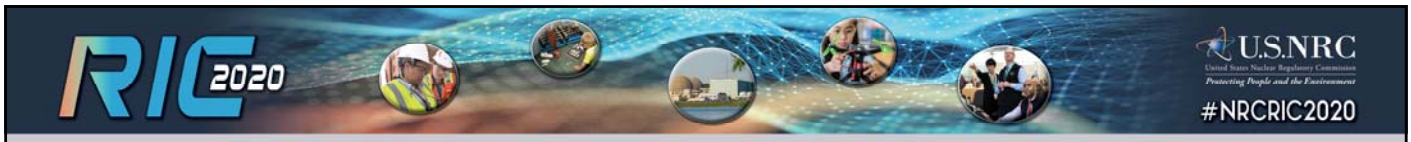
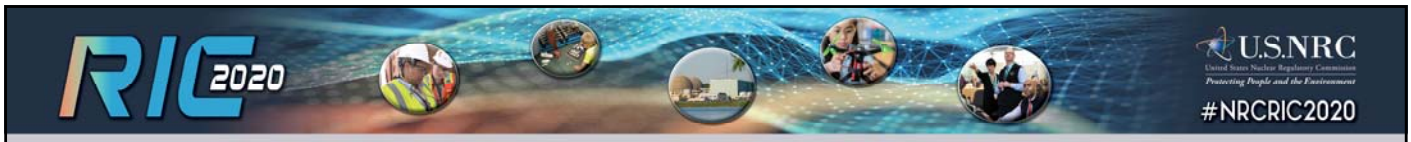


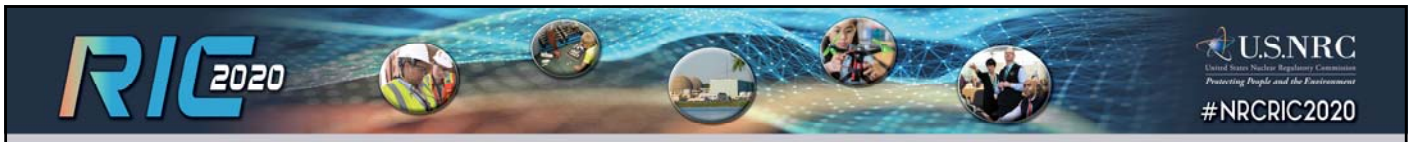
Overview

- Integrated Safety Analysis (ISA) Regulatory Framework
- Current Sources of Human Reliability Insights
- New Tools
  - Integrated Human Event Analysis System General Methodology (IDHEAS-G)
  - Integrated Human Event Analysis System for Events and Conditions Assessment (IDHEAS-ECA)
- Demonstration of IDHEAS-ECA



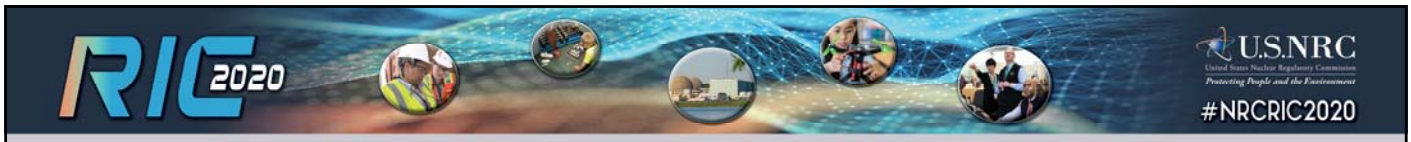
ISA Regulatory Framework

- Title 10 of the Code of Federal Regulations (10 CFR) Part 70, Subpart H (e.g., fuel fabrication, fuel enrichment)
  - 10 CFR 70.4 Definition
    - Systematic process
    - Identify all relative hazards, associated credible accident sequences (likelihoods and consequences)
    - Identify items relied on for safety (IROFS)
  - 10 CFR 70.61 Performance Requirements
    - Limit the risk of credible accident sequences
  - 10 CFR 70.62 (c)
    - Perform an ISA



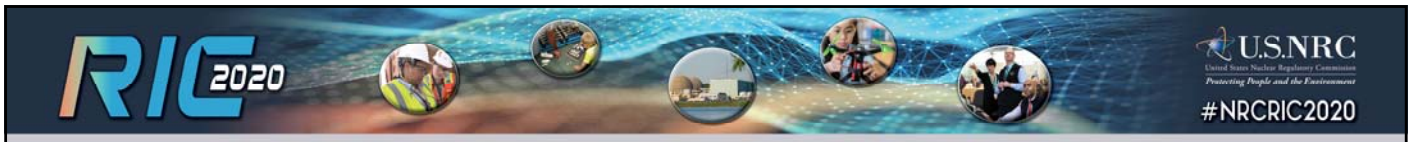
ISA Regulatory Framework

- Other Types of Licensees (e.g., Conversion, Medical Isotope Production)
  - Not required to perform an ISA
  - Recognize ISA as a way to:
    - Analyze process risk
    - Determine safety controls
    - Establish safety basis



Current Sources of Human Reliability Insights

- Fuel cycle facilities have many human-centric processes and controls (administrative)
- Challenge to evaluate accident sequences involving human error
- Common sources of human reliability information:
  - Savannah River Human Error Database
  - Standard Review Plan for Fuel Cycle Facilities License Applications (NUREG-1520)



New Tools

- IDHEAS-G

  Human reliability analysis method to develop human error probabilities for all applications (Draft NUREG-2198)

- IDHEAS-ECA
  - Applies IDHEAS-G
  - Analyzes human events and estimates human error probabilities
  - Applicable to all types of event analyses

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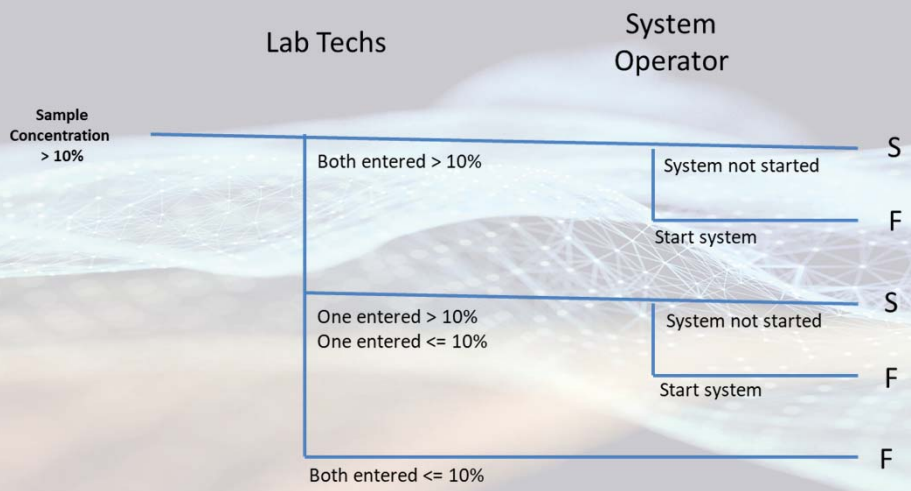
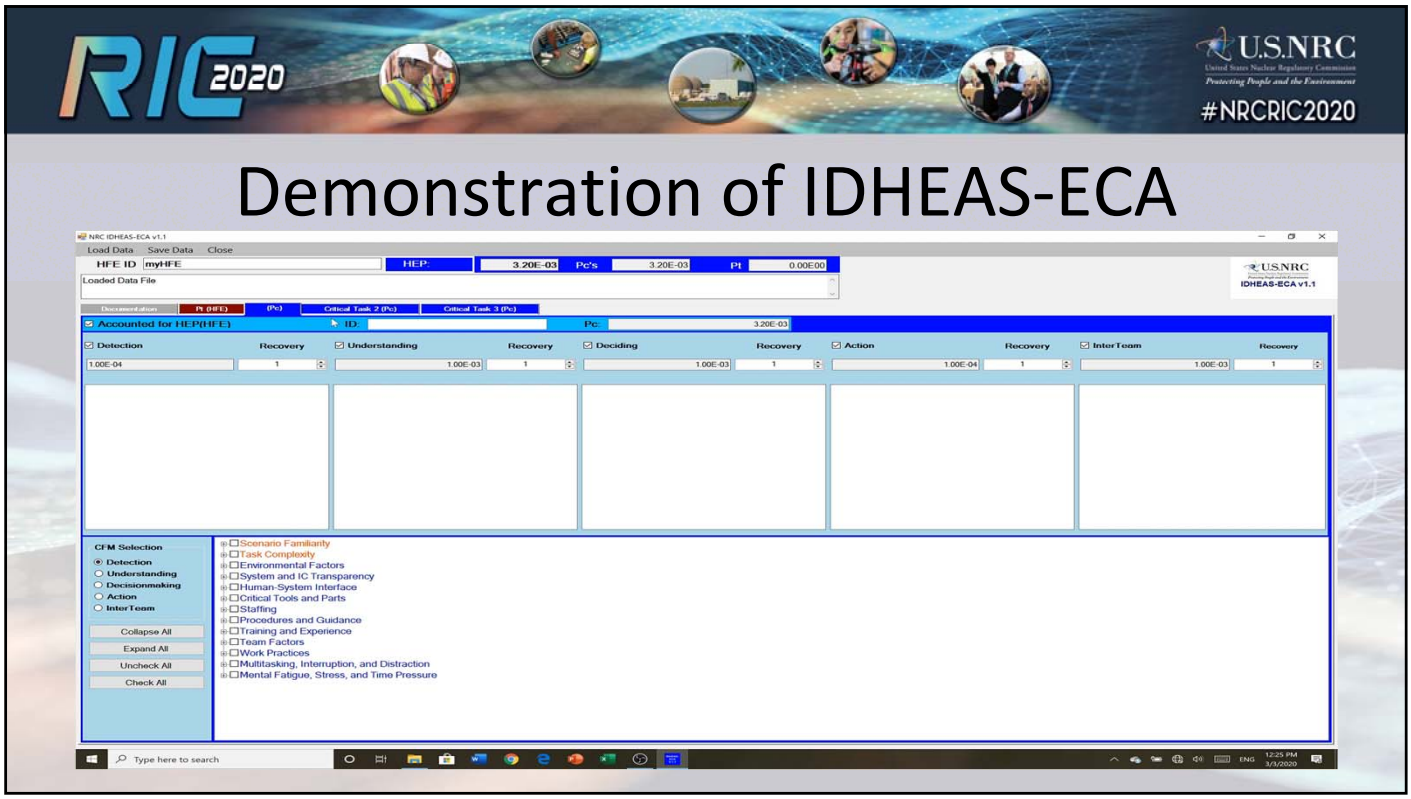
Demonstration of IDHEAS-ECA

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Demonstration of IDHEAS-ECA
NRC IDHEAS-ECA v1.1
Load Data
Save Data
Close
HFE ID
myHFE
HEP
3.20E-03
Pc's
3.20E-03
Pt
0.00E00
Loaded Data File
IDHEAS-ECA v1.1
Documentation
Pt (HFE)
(Pc)
Critical Task 2 (Pc)
Critical Task 3 (Pc)
Accounted for HEP(HFE)
ID:
Pc:
3.20E-03
Detection
Recovery
Understanding
Deciding
Action
InterTeam
1.00E-04
1.00E-03
1.00E-04
CFM Selection
Detection
Understanding
Decisionmaking
Action
InterTeam
Collapse All
Expand All
Uncheck All
Check All
Scenario Familiarity
Task Complexity
Environmental Factors
System and IC Transparency
Human-System Interface
Critical Tools and Parts
Staffing
Procedures and Guidance
Training and Experience
Team Factors
Work Practices
Multitasking, Interruption, and Distraction
Mental Fatigue, Stress, and Time Pressure
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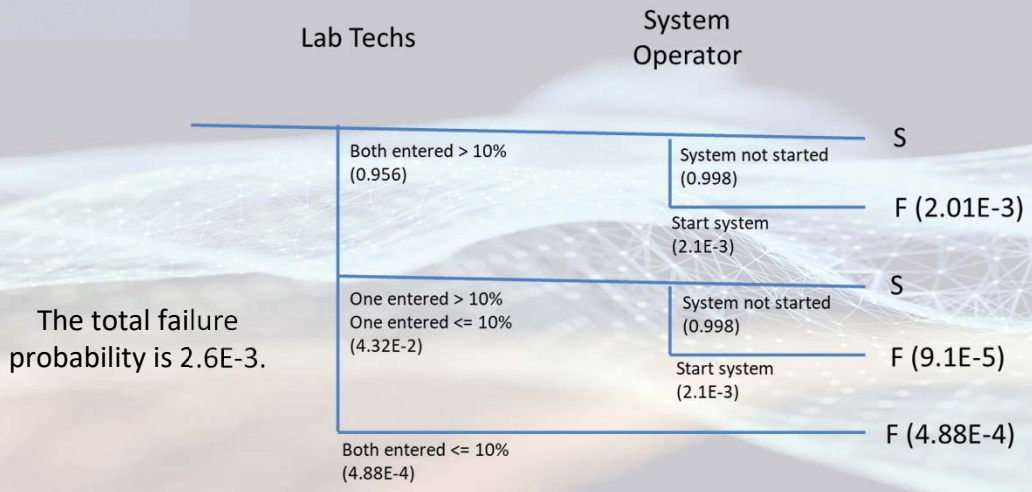
Demonstration of IDHEAS-ECA



The total failure probability is 2.6E-3.

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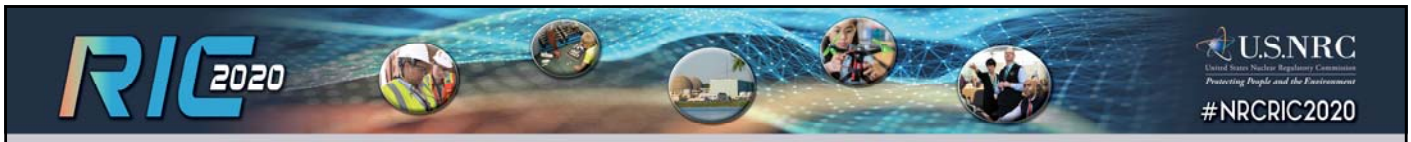

Demonstration of IDHEAS-ECA

- IDHEAS ECA is available for public use
- Regulatory Information Letter 2020-02, “Integrated Human Event Analysis System for Event and Condition Assessment”
  - ADAMS https://adams.nrc.gov/wba/
  - Accession Number: ML20016A480
- For more information and access to the software, send an email to:

  Dr. James Chang

  James.Chang@nrc.gov

  In your email, please provide your name, organization and contact email


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