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IROFS Risk-Informed Prioritization Tool used for Fuel Facility Construction Inspections

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Purpose

Risk-informed inspection planning tool that will provide input into the construction inspection plan and provide inspectors insights into how to prioritize inspections of Items Relied On For Safety (IROFS).

This planning tool is only one tool in developing inspection plans.

Conceptual Design

- Same fundamental methodology for inspection prioritization used for previous construction projects that streamlines and has evolved from previous lessons learned
- Uses an accident sequence paradigm of the facility to understand total risk
- Uses risk information from the applicant's Integrated Safety Analysis (ISA) Summary (i.e., accident sequences and IROFS)

Information Sources

- Risk information comes from the ISA Summary
  - Provides a list of the accident sequences, their likelihood, and their consequences.
  - Provides a list of the IROFS and associates the IROFS with accident sequences.
- Risk is evaluated based on the sequences considering both the likelihood and the consequences.
- The risk calculation is limited by the level of detail in the ISA Summary

Input – Phase 1: IROFS

IROFS input table derived from ISA Summary and dependent upon level of detail.

IROFS Number	Control Type (Passive, Active, or Admin)	Components	Safety Function Description
PPB2-CRIT1	passive	hopper, outlet, and gasket	Hopper and outlet design **prevent UO2 leaks** with a double gasket at the outlet
PPB2-CRIT2	administrative	N/A	Two sample measurements by two persons to ensure contents are dry before transfer to hopper, **prevents the introduction of water** to the blender
PPB2-CRIT3	administrative	N/A	Posting **excluding water** from the blender room
PPB2-CRIT4	passive	piping, drains, and roof	Double piping, floor drains, and roof integrity **prevents water accumulation** in the blender room
PPB2-SUMP	active	DP cell and pump	Water level in the blender room is measured with a DP cell, when level is too high a sump pump **drains water** from the blender room floor
PPB2-VENT	active	enclosure, fans, filters, detectors, and isolation vents	The blender is within a ventilated enclosure. Fans are active to ensure the enclosure is at a **negative pressure**. The fan ducts include HEPA filters to **catch any released powders**. A radiation detector near the HEPA filter signals if there is a radiological release, which will **isolate the enclosure**.
PPB2-INRT	passive	smoke detector, Ar/N2 tanks, piping and nozzles, enclosure, and isolation vents	Smoke detection leads to inert gas **fire suppression** system actuation. The system isolates the ventilated enclosure and pressurized tanks of Argon and Nitrogen gas inject gas into the enclosure through nozzles.

Input – Phase 2: Accident Sequences

The accident sequence (not IROFS) is used to assess risk. The accident sequence input table is derived from ISA Summary contents and dependent upon level of detail.

Sequence Name	Initiator Likelihood Index	Consequence Category	IROFS			
PPB2-NCS-1	-2	3	PPB2-CRIT1	PPB2-CRIT3	PPB2-CRIT4	PPB2-SUMP
PPB2-NCS-2	-2	3	PPB2-CRIT1	PPB2-CRIT3	PPB2-CRIT4	PPB2-SUMP
PPB2-NCS-3	-1	3	PPB2-CRIT3	PPB2-CRIT2		
PPB2-RAD-1	-2	2	PPB2-CRIT1	PPB2-VENT		
PPB2-SMC-1	-3	3	PPB2-CRIT3	PPB2-CRIT4	PPB2-SUMP	
PPB2-SMC-2	-3	2	PPB2-VENT			
PPB2-FLD-1	-2	3	PPB2-CRIT1	PPB2-SUMP		
PPB2-FLD-2	-3	3	PPB2-CRIT1			
PPB2-FIR-1	-2	2	PPB2-INRT	PPB2-VENT		

Methodology Outline

Input

- IROFS from ISA Summary
- IROFS associated with each accident sequence

Tool

- Calculates risk-informed importance score based on likelihood and consequence indices
- Ranks IROFS according to the risk-informed importance score

IROFS Name	Risk-informed Importance Category
A-1	0.10
B-2	0.12
C-3	0.05
D-4	0.01
E-5	0.00
F-6	0.55
G-7	0.50

Limitations

- Risk-informed importance score is calculated by approximating the risk associated with each IROFS
  - Importance Score provides the approximate importance of IROFS to other IROFS. The importance score only gives the order of magnitude of the result.

- Ranking amongst IROFS is important in informing priority during inspection. Numerical values of the scores should not be construed as important in and of themselves.

Next Steps

How Will Results Be Used

- One input to the construction inspection plan for construction inspections
- Determine the risk-informed sample sizes and, if necessary, adjust the sample size providing greater flexibility
- Consolidate construction inspection efforts thereby reducing overlap/redundancies
- Focuses communications with applicant regarding IROFS changes/updates that may potentially impact construction inspections

Questions?