

DOE 2010 ISM Champions Workshop

The Safety Component of Design for the MOX Fuel Fabrication Facility (MFFF)



ISA: Natural Phenomena/External Man-made Hazards

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Presenter

- Jo Ziegler is an engineer in the Nuclear Safety Group working on the MOX Project for Shaw AREVA MOX Services here at Savannah River Site (SRS). She is an employee of AREVA Federal Services. She has worked on the MOX Project since 2006.
- Ms. Ziegler has many years of experience in the nuclear field. Ms. Ziegler supports updates to the Integrated Safety Analysis, the License Application, and the Nuclear Safety Evaluation for Natural Phenomena Hazards and External Man-made Hazards for the MOX Fuel Fabrication Facility (MFFF) under construction at SRS. Ms. Ziegler has lived in Aiken and supported projects at SRS since 1990, as needed and requested by her employer.

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Natural Phenomena Hazards at MFFF

- Credible natural phenomena which can affect the MFFF during the period of facility operation could result in dispersion of radioactive material and hazardous chemicals.
- Natural phenomena are also considered as initiators of other events, such as explosions, leaks, or fires.

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Natural Phenomena Hazards at MFFF

(Cont'd)

The NPHs applicable to MFFF include the following:

- Earthquake (including soil liquefaction and subsidence)
- Tornado (including tornado missiles)
- Severe wind
- External fire
- Rain, snow, and ice

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External Man-made Hazards at MFFF

- External Man-made Hazards (EMMH) are those hazards that arise outside of the MFFF property boundary from the operation of nearby public, private, government, industrial, chemical, nuclear, and military facilities and transportation routes that could impact MFFF operations.

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External Man-made Hazards at MFFF

(Cont'd)

The EMMH events applicable to the MFFF include the following:

- Explosions from SRS facilities that could directly impact MFFF IROFS
- Events that result in a loss of offsite power to the MFFF
- Events that result in a fire (and/or smoke) that spreads to the MFFF

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Overall Approach to NPH/EMMH Analysis

Preliminary Hazards Analysis →

Preliminary Accident Analysis →

Process Hazards Analysis →

Dose Consequence Analysis →

NPH/EMMH Nuclear Safety Evaluation

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NPH/EMMH NSE Preparation

- Preliminary Hazards Analysis was used to screen applicable NPH and EMMH events.
- Preliminary Accident Analysis initially documented event scenario consequences for Safety Assessment of Design Basis and screened intermediate and high consequence NPH and EMMH events.
- Process Hazards Analysis for process units evaluated NPH and EMMH events and suggested IROFS for the ISA.
- Subsequent dose consequence calculation established maximum doses for some NPH and EMMH events.

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NPH/EMMH NSE Preparation (Cont'd)

- Characterize safety strategy for NP/EMMH events (primarily mitigation)
- Select Items Relied on for Safety (IROFS) for NPH/EMMH events (active or passive engineered controls)
- Describe the IROFS
- Demonstrate IROFS reliability

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IROFS Reliability Demonstration

The following criteria form the basis for the IROFS reliability demonstration:

- Application of single failure criterion
- Application of industry codes and standards
- Application of the MOX Project QA Program
- Application of management measures

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Summary

- The NPH/EMMH NSE incorporates the results of the PHA, the PrHA, and the dose consequence analysis to demonstrate that the performance requirements of 10 CFR §70.61 are satisfied.
- This demonstration includes identifying the safety strategy for each NPH/EMMH event scenario and the IROFS required for implementing the strategy.
- IROFS designation has impact on design.

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