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ACRS Briefing on Spent Fuel Pool Accident Risk for Decommissioning Plants



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**Diane Jackson, Technical Working Group Lead Engineer
SPLB, DSSA**

Presentation Purpose

- ◆ **Broad scope effort**
- ◆ **Following process**
- ◆ **Technical assessment progressing**
- ◆ **Addressing stakeholder concerns**
- ◆ **Results will be incorporated into rulemaking and interim exemption criteria**

Decommissioning Background

- ◆ **Most NRC operating reactor regulations were not developed considering the transition from power operations to decommissioning**
- ◆ **Staff currently issues exemptions on EP and others on a case-by-case basis**
- ◆ **Commission directed staff to resolve this situation by issuing rules for decommissioning**
 - ◆ **Integrated**
 - ◆ **Risk-informed**
- ◆ **Staff formed the Technical Working Group (TWG) to study spent fuel pool (SFP) accident risk**

Technical Working Group (TWG) Product

- ◆ **TWG output is to provide a technical basis on spent fuel pool (SFP) accident risk that will assist NRR:**
 - ◆ **Develop an integrated rulemaking**
 - ◆ **Provide guidance for interim exemption criteria during rulemaking activities**
 - ◆ **Identify areas of large uncertainty that may merit additional work**
- ◆ **Expectation: Generic study such that licensees would not be required to perform site-specific SFP analysis for reduction in regulation**

Technical Working Group (TWG) Study

- ◆ **A comprehensive review of SFP accidents and associated risk at decommissioning plants did not exist**
- ◆ **Key areas of draft report:**
 - ◆ **Decay time estimation based on thermal hydraulic code analysis**
 - ◆ **Risk assessment**
- ◆ **Risk assessment used a broad set of initiating events:**

Loss of SFP cooling	Tornado missiles	Seismic
Heavy load handling	Internal fire	Aircraft
Loss of SFP inventory		

TWG Study (cont.)

- ◆ **Issued draft in June**
 - ◆ **Stakeholder interest in study**
 - ◆ **TWG to gather feedback and additional information**
- ◆ **Staff held several public meetings - April, May, June, July (2-day workshop)**
- ◆ **Received comments and information from stakeholders (e.g., NEI, UCS, individuals) via meetings, telecons, and correspondence**
- ◆ **Major industry concern was that the risk analysis did not give sufficient credit for plant conditions and personnel actions**

Areas of Stakeholder Comment

- ◆ **Probabilistic assessment:**
 - ◆ **Seismic events**
 - ◆ **Human reliability**
 - ◆ **Heavy loads**
- ◆ **Deterministic assessment:**
 - ◆ **Adiabatic spent fuel heatup calculation**
 - ◆ **Zirconium ignition temperature**
- ◆ **Criticality**
- ◆ **Safeguards**
- ◆ **Normal operations**
- ◆ **Concrete aging**
- ◆ **Others**

Human Reliability Analysis (HRA)

Issue: HRA values do not give sufficient credit for operator actions

TWG Resolution/Actions:

- ◆ **Issued draft HRA approach for long term events to identify conditions needed to support a claim of high human reliability**
- ◆ **Provided approach to two HR experts and the public for comment**
- ◆ **No technical comments from public to date**
- ◆ **Based on expert feedback, TWG is revising HRA approach and it will be included in the independent review & final assessment**

Heavy Loads

Issue: Heavy load risk assessment does not give sufficient credit for NUREG-0612 actions (Control of Heavy Loads) and uses upper bound values

NEI Actions: Proposed that all decommissioning plants meet NUREG-0612 Phase I and II actions (operating reactors are required to meet Phase I) and provided raw data on cask lifts

TWG Resolution/Actions:

- ◆ **Reassessed assuming NEI's proposal, improved statistical methods and new information**
- ◆ **Risk values from the reassessment have been included in the independent review**

Seismic Events

Issue: Unique pool characteristics may result in vulnerabilities above the nominal plant (outside scope of TWG assessment)

NEI Action: Action item at workshop to propose seismic checklist

TWG Resolution/Actions:

- ◆ **TWG initial review finds the NEI input is useful for seismic screening of SFPs**
- ◆ **NEI's proposed checklist is included in the independent review**
- ◆ **Additional interactions in the future expected**

Criticality

Issue: Draft study did not sufficiently evaluate potential for criticality

- ◆ **Evaluated using deterministic, physics approach**

TWG Resolution/Actions:

- ◆ **Reassessing criticality using expanded scope of scenarios**

Other Activities

- ◆ Continuing work to finalize study
 - ◆ Additional technical work by NRC contractors (TH & PRA)
 - ◆ Independent, technical, quality review (ITQR) (RES sta & DOE labs)
- ◆ Application of risk-informed principles

Risk-informed Decision Making

- ◆ **Conclusions from the technical study will be formulated using the risk-informed regulatory principles in RG 1.174:**
 - ◆ **Core damage frequency (CDF) & large early release frequency (LERF) goals**
 - ◆ **Defense in depth**
 - ◆ **Safety margins**
 - ◆ **Performance monitoring**
- ◆ **Based on all inputs, a realistic, risk-informed assessment will be developed**

TWG Product And Schedule

TWG is following its plan to finalize its assessment and address stakeholder concerns that will result in a solid technical basis for the development of rulemaking and interim exemption criteria

- ◆ **Release draft report for public comment in early January 2000**
- ◆ **Release final report in early April 2000**