

COMMISSIONERS' TECHNICAL ASSISTANTS BRIEF

ON

**Draft Final Technical Study of Spent Fuel Pool Accident Risk
at Decommissioning Nuclear Power Plants**

Office of Nuclear Reactor Regulation

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5/9

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NRR

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BACKGROUND AND STATUS

- **June preliminary draft report concluded that:**
 - **Zirconium fires can occur for several years after shutdown**
 - **The offsite consequences are unacceptably high**
 - **Frequency about $2E-5$ per year. Dominated by human error**
- **Extensive scrutiny by industry, other stakeholders and NRC- sponsored technical review**
- **Industry committed to design and operational actions, and proposed a seismic checklist**
- **Risk has been requantified and draft report prepared**
- **Draft-for-comment due to be issued 2/11/00**

TECHNICAL RESULTS

- **In current draft report, risk is reduced significantly due primarily to industry commitments**
 - **Human-error driven sequences reduced to about $2E-7$ per year**
 - **Heavy load sequences reduced to about $2E-7$ per year**
 - **Seismic failure frequency bounded by $3E-6$ per year, but not fully quantified due to seismic checklist approach**
 - **Overall risk reduced by about an order of magnitude**
- **Criticality issue and other stakeholder comments addressed**
- **NRC analysis shows that zirconium fires will generally not be possible after 5 years. Acceptance of shorter times would require plant specific analysis**

COMPARISON WITH OTHER RISK MEASURES AND RESULTS

- Decommissioning reactor large release frequency: $<3E-6$
- RG 1.174 large early release (LERF) baseline guideline: $1E-5^1$
- Oversight process LERF threshold for "yellow" finding: $1E-6 = \Delta LERF$
- LERF guideline for "substantial increase in protection": $1E-6 = \Delta LERF$
- Range of IPE LERF estimates: $2E-6$ to $2E-5$

¹ For evaluation of EP options, the distinction between early and late release is important because of the extra time available for ad-hoc protective actions. However, for insurance, this distinction makes little or no difference, because it is the size of the release, not the timing, which determines the extent of offsite impact.

THREE PHASES OF SPENT FUEL POOL

- **IMMEDIATELY AFTER PLANT SHUT DOWN:**

Large early offsite release due to zirconium fire possible.

Design basis systems and operating practices retained. Full requirements for EP, Insurance and security in place

- **EARLY DECOMMISSIONING PHASE**

Large late releases possible. Relaxation of EP requirements justified. (*Relaxation of insurance ?*)

Industry commitments, seismic checklist and staff assumptions required.

Frequency within RG 1.174 guidelines. NRC could consider insurance relief

Staff analyzed one year of cool down, but shorter times could be justified.

late = 10 to 12 hours

- **ZIRCONIUM FIRES NO LONGER POSSIBLE:**

Report justifies 5 years. Shorter times could be justified plant-specifically

Offsite EP and insurance requirements can be eliminated

RISK INFORMED DECISION MAKING

- **Baseline risk and changes to risk**

Reg guide 1.174 uses a baseline frequency of 1E-5 per year for LERF-like hazards. The SFP zirconium fire frequency meets that guideline. There are no proposals for regulatory relief that would lead to changes in frequency

- **Margin**

Thermal inertia of gives significant time for heat up to a zirconium fire.

- **Defense in depth**

Given safety margin, DID not a major issue. However, given risk analysis uncertainties, should retain baseline level of EP, including procedure to classify accidents and notify offsite authorities.

In late decommissioning phase, EP no longer required.

- **Monitoring performance**

Licensees should monitor characteristics important to controlling risk, including industry commitments, staff assumptions and seismic checklist.

IMPACT ON RULE MAKING

- **Slow evolution of release justifies reduction in EP requirements. Defense-In-Depth considerations indicate need for retaining a baseline EP capability.**
- **Risk analysis does not justify reduction in security function. Reduction of requirements could be justified on the basis of reduced complexity**
- **Current report does not take a position on insurance. The frequency of zirc fire is not "incredible," but may be low enough for the commission to conclude that licensees could be relieved from insurance requirements. However, some operating plants have comparably low frequencies of large releases.**
- **Rule making should include requirement to monitor performance in areas important to risk.**
- **In late decommissioning phase, EP and insurance requirements could be lifted.**

POTENTIAL STAKEHOLDER REACTION

- **While overall risk estimates are greatly reduced from the June report, the seismic analysis is not fully quantitative.**
- **While report justifies large reductions in EP, it does not definitively justify similar reductions in insurance and it does not justify reductions in the functional requirements for security**
- **Report shows importance of industry commitments for controlling risk. Future decommissioning licensees need to commit to these actions.**
- **Stakeholders concerned about criticality and other issues will find in-depth treatment.**