RISK-INFORMED REGULATION AT U.S. FUEL CYCLE FACILITIES

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Risk-Informed Regulation and Guidance

- **New Rule (Subpart H of 10 CFR Part 70) issued in September 2000**
- **New Staff Guidance:**
  - "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility", March 2002
  - "Integrated Safety Analysis Guidance Document", May 2001
- **By October 2004, licensees are required to**:
  - Complete a site-wide ISA
  - Correct all unacceptable performance deficiencies
  - Submit a site-wide ISA Summary for NRC approval
- **Applies to nuclear fuel fabrication facilities and new enrichment facilities**

Integrated Safety Analysis Requirements

- Licensees perform an Integrated Safety Analysis:
  - Integrate Radiological, Criticality, Fire, Chemical and Environmental Safety Disciplines
  - Use Systematic Methods to (1) Identify Accidents, (2) Determine Likelihoods, and (3) Estimate Consequences
  - Comply with performance requirements
  - Identify Items Relied on for Safety (IROFS), and establish management measures
- NRC will review licensees' ISA Summary

Parameters of Performance Requirements

- Must demonstrate that accident sequence is *highly unlikely*, if:
  - Worker receives
    - (1) 100 rem or more
    - (2) life-endangering chemical exposure
  - Public (Outside "Controlled Area") receives:
    - (1) 25 rem or more
    - (2) Greater than 30 mg soluble uranium intake
    - (3) Irreversible chemical injury

Parameters of Performance Requirements (cont.)

- Must demonstrate that accident sequence is *unlikely*, if:
  - Worker receives
    (1) More than 25 rem but less than 100 rem
    (2) Irreversible chemical injury
  - Public (Outside "Controlled Area") receives
    (1) Greater than 5 rem but less than 25 rem
    (2) Chemically-induced transient illnesses
  - Environment (outside 'restricted area')
    (1) Concentration > 5000 times yearly average releases (10 CFR 20 App B Table 2 value)

Management Measures

- Measures to assure that Items Relied On For Safety are available and reliable when needed
  - Configuration management, training, quality assurance, audits, procurement, problem identification/control, corrective actions
  - Maintenance (corrective/preventive), functional testing, surveillance, calibration
  - Written policies and procedures, large safety margins, signs, safety tags
  - Material handling, shipping, storage
  - Human factors, work environment, workload

Integrated Safety Analysis Review

- Interdisciplinary Integrated Safety Analysis review team
- Preliminary review of Integrated Safety Analysis Summary
- Inspect Integrated Safety Analysis results
- Prepare Safety Evaluation Report

ISA-Related Licensing Outcomes

- Streamlined license will
  - Potentially reduce the number of amendments
  - Shorten license renewal time
  - Improve efficiency and effectiveness
  - Reduce regulatory burden
- Licensees can make facility and procedure changes without prior NRC approval, if the change does not:
  - Downgrade an IROFS
  - Create a new type of severe accident
  - Alter a sole IROFS
- Licensees must submit annually a summary of all such changes to the NRC
- Annual ISA Summary updates could significantly reduce the need for and scope of renewals

Challenges

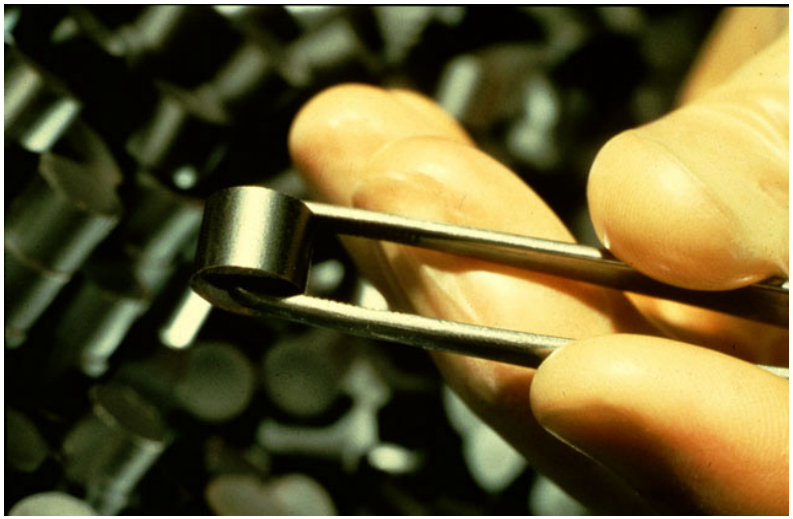
- Conduct reviews of site-wide ISA Summary and onsite ISA starting in late 2002
- Use ISA to risk-inform NRC's licensing reviews and inspection/enforcement actions after ISA approval

Back up Slides

- Back up slides to follow…

Who is Required to Meet Subpart H?
Nuclear fuel fabrication facilities and new enrichment facilities

- Uranium Fuel Fabrication Facilities
  1. Framatome (west)
  2. Framatome (east)
  3. Westinghouse
  4. Global
  5. NFS
  6. BWXT



- MOX
- Future Uranium Enrichment Facilities

Likelihood Qualities

- Qualitative
  - Large safety margin
  - Low failure rate
  - Preference of controls (passive, active, administrative)
  - High level of QA
  - Surveillance capability
  - Redundancy
  - Protection from common cause failures
- Quantitative
  - NUREG-1520 (Standard Review Plan) provides quantitative guidelines for high- and intermediate-consequence accident sequences
  - These are based on less than 1 major fuel cycle event in 100 years

Submittals Made

- April 18, 2001 - Licensees submitted, for NRC approval, an ISA Plan describing:
  - ISA approach
  - Processes to be analyzed
  - Schedule for completing the analyses for each process
- BWXT ISA Plan approved in July 2001
- NFS ISA Plan approved in October 2001

NRC Regulation and Guidance Documents

- New Rule (Subpart H of 10 CFR Part 70) issued in September 2000 http://www.nrc.gov/reading-rm/doc-collections/cfr/part070/
- Staff Guidance:
  - NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility", March 2002 http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1520/index.html
  - NUREG-1513, "Integrated Safety Analysis Guidance Document", May 2001

NRC/NMSS Perspective

- Definition of Risk-Informed (next slide)
- 10 CFR Part 70 is a risk-informed rule
- Integrated Safety Analysis is the designated tool for assessing and managing risk in fuel cycle facilities
- Safety goals and metrics for licensed activities, including fuel cycle facilities, are under development

What is “Risk-informed”?

A “risk-informed” approach to regulatory decision-making represents a philosophy whereby risk insights are considered together with other factors to establish requirements that better focus licensee and regulatory attention on design and operational issues commensurate with their importance to public health and safety.

Where appropriate, a risk-informed regulatory approach can also be used to reduce unnecessary conservatism in purely deterministic approaches, or can be used to identify areas with insufficient conservatism in deterministic analyses and provide the bases foe additional requirements or regulatory actions.

“Risk-informed” approaches lie between the “risk-based” and purely deterministic approaches. The details of the regulatory issue under consideration will determine where the risk-informed decision falls within the spectrum.