U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Risk-Informed and Performance-Based Regulation at the NRC

February 4, 2009

Bruce Mallett, OEDO
John Monninger, RES
Mark Cunningham, NRR
Charles Ader, NRO
George Pangburn, FSME
Catherine Haney, NMSS

Acronym Slide

EPRI	Electric Power Research Institute
FAQ	Frequently Asked Questions
HLW	High Level Waste
IAEA	International Atomic Energy Agency
MOU	Memorandum of Understanding
NEA	Nuclear Energy Agency
OECD	Organization for Economic Cooperation and Development
PRA	Probabilistic Risk Assessment
RAI	Request for Additional Information
RG	Regulatory Guide
RIPB	Risk-Informed and Performance-Based
RISC	Risk-Informed Safety Class
SRP	Standard Review Plan

Agenda

- Evolution of Risk-Informed and Performance-Based Regulation
- Reactor Areas
  - Operating Reactors
  - New Reactors
- Materials and Waste Areas
  - Materials and Low-Level Waste
  - Fuel Cycle, Storage, and High-Level Waste

Evolution of Risk-Informed and Performance-Based Regulation

John Monninger, Deputy Director
Division of Risk Analysis
Office of Nuclear Regulatory Research

Evolution of RIPB Regulation

Policy and Direction

- Safety Goal Policy Statement (1986)
- PRA Policy Statement (1995)
- NRC Strategic Plans (Vols. 1-4, 1997-2013)

Planning and Implementation

- PRA Implementation Plan (1994 – 1999)
- Risk-Informed Regulation Implementation Plan (2000 – 2007)
- Risk-Informed, Performance-Based Plan (2007 – Present)

Risk Assessment Models

- Initial technology development (1970s – 1980s)
- Plant specific vulnerability analysis (1990s)
- Risk models in regular use (2000s)

Risk Assessment Guidance

- Technical reports (NUREGs)
- Regulatory Guides
- Standard Review Plans
- Development and endorsement of consensus standards
- Training

Applications Across NRC

- Rulemakings
- Regulatory Analyses
- Generic Issues Program
- Events Assessment
- Oversight Processes
- License Amendments & Reviews

Collaboration

- US Government Agencies
  - NASA
  - OMB
  - DOE
- International Activities
  - OECD/NEA
  - IAEA
- EPRI Research MOU
- Professional Societies and Academia

Status of RIPB Regulation

- Two decades of RIPB Regulation
- RIPB is an integral piece of our regulatory programs
- Successful, ongoing, and planned applications

Risk-Informed and Performance Based Regulation for Operating Reactors

Mark Cunningham, Director
Division of Risk Assessment
Office of Nuclear Reactor Regulation

Operating Reactors

- Successful Applications
  - 10 CFR 50.44 (combustible gas control)
  - Reactor oversight process
  - Licensing actions
    - Inservice inspection
    - Technical specifications
- Near-term Focus Areas
  - 10 CFR 50.48(c) (fire protection)
  - 10 CFR 50.36 (technical specifications)
    - Initiatives 4B and 5B
  - 10 CFR 50.69 (special treatment requirements)
- Longer-term Activities
  - 10 CFR 50.61(a) (pressurized thermal shock)
  - 10 CFR 50.46(a) (emergency core cooling acceptance criteria)
  - Digital systems

Operating Reactors

- Near-term Focus Areas
  - 50.48(c) (fire protection)
    - Reviewing pilot plant submittals
    - Establishing infrastructure
      - Regulatory guidance
      - Fire PRA acceptance guidelines
    - Resolving technical issues
      - Plant-specific RAIs
      - FAQ process

Operating Reactors

- Near-term Focus Areas
  - 50.36 (technical specifications)
    - Implementing initiatives 4B and 5B
      - Understanding extent of industry interest
      - Ensuring sufficient infrastructure
        - » Staff expertise
        - » Review guidance
  - 50.69 (special treatment requirements)
    - Agreeing on RISC 3 treatment

Risk-Informed and Performance Based Regulation for New Reactors

Charles Ader, Director
Division of Safety Systems and Risk Assessment
Office of New Reactors

New Reactors

- Successful Applications - Regulatory framework established
  - 10 CFR Part 52
  - RG 1.206, Combined License Applications
  - SRP 19.0, PRA and Severe Accident Evaluation
  - Interim Staff Guidance issued
- Near-term Focus Areas - Ongoing reviews of applicants' PRAs
  - Design Certifications
  - Combined License Applications

New Reactors

- Risk insights from applicants' PRAs used to inform NRC reviews
  - Provided to technical review branches
  - Used to support issue resolution
  - Used to support inspection program
- Longer-term activities
  - Risk-managed technical specification applications
  - Risk-informed inservice inspection of piping
  - 10 CFR 50.69 (special treatment requirements)

Risk-Informed and Performance Based Regulation in Materials, Fuel Cycle, and Waste

George Pangburn, Deputy Director
Office of Federal and State Materials and Environmental Management Programs

Catherine Haney, Deputy Director
Office of Nuclear Material Safety and Safeguards

Materials and Low-Level Waste

- Successful Applications
  - Materials inspection frequency and approach
  - Materials licensing guidance (NUREG-1556 Series)
  - Materials security activities including increased controls and additional security measures
  - Response to materials events

Materials and Low-Level Waste

- Applications in Process
  - Development of security rulemaking for materials licensees
  - Reviews of DOE non-HLW determinations and performance assessments

Fuel Cycle, Storage, and High-Level Waste

- Successful Applications
  - Issued guide for nuclear material and waste applications
  - Issued Part 70 and approved Integrated Safety Analyses
  - Completed dry cask storage facility PRA
  - Issued Part 63, Yucca Mountain Review Plan, and inspection procedures

Fuel Cycle, Storage, and High-Level Waste

- Applications in Process
  - Revise Fuel Cycle Oversight Process
  - Risk-inform construction inspections
  - Enhance dry cask Standard Review Plan and review process
  - Conduct Yucca Mountain licensing review