




A Proposed Risk Management Regulatory Framework and Implementation Options for Power Reactors

Risk Management Task Force
March 13, 2012



Risk Management Task Force

- Suggested by Chairman Jaczko in late 2010
- Task Force formed in February 2011
- Charter

“To develop a strategic vision and options for adopting a more comprehensive and holistic risk-informed, performance-based regulatory approach for reactors, materials, waste, fuel cycle, and transportation that would continue to ensure the safe and secure use of nuclear material.”

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The Risk Management Task Force (RMTF)

- Commissioner George Apostolakis, Head
- All errors are due to the RMTF members:
 - Christiana Lui, RMTF Executive Director
 - Mark Cunningham
 - George Pangburn
 - William Reckley
- With contributions from:
 - John Adams, Non-power Reactors
 - Michel Call, Spent Fuel Storage
 - Dennis Damon, Fuel Cycle
 - Don Dube, Power Reactor Lessons Learned
 - Earl Easton, Transportation
 - Timothy McCartin, High-level Waste
 - Geary Mizuno, Office of General Counsel
 - Joel Piper, Department of Homeland Security

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RMTF Approach

- Provide a vision for a regulatory system 10-15 years in the future
- The approach should build on the experience of the last 20 years and should be evolutionary rather than revolutionary
- The need for a new regulatory approach was also recognized by the Fukushima Near Term Task Force Recommendation 1:
“Establish a logical, systematic, and coherent regulatory framework for adequate protection that appropriately balances defense-in-depth and risk considerations.”

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What if technology evolved as slowly as our regulations?



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A Proposed Risk Management Regulatory Framework

Mission
Ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment

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Objective
Manage the risks from the use of byproduct, source and special nuclear materials through appropriate performance-based regulatory controls and oversight

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Risk Management Goal
Provide risk-informed and performance-based defense-in-depth protections to:

- Ensure appropriate barriers, controls, and personnel to prevent, contain, and mitigate exposure to radioactive material according to the hazard present, the relevant scenarios, and the associated uncertainties; and
- Ensure that the risks resulting from the failure of some or all of the established barriers and controls, including human errors, are maintained acceptably low

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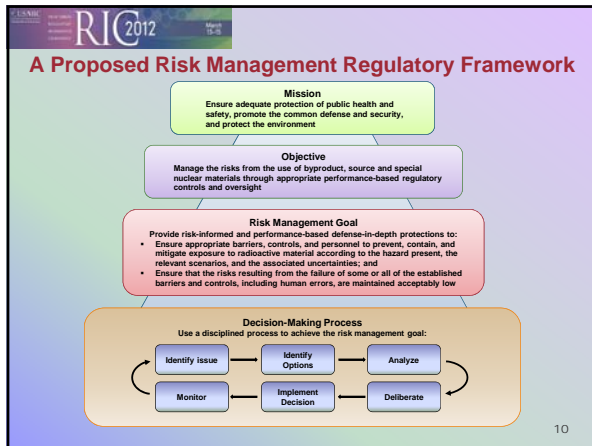
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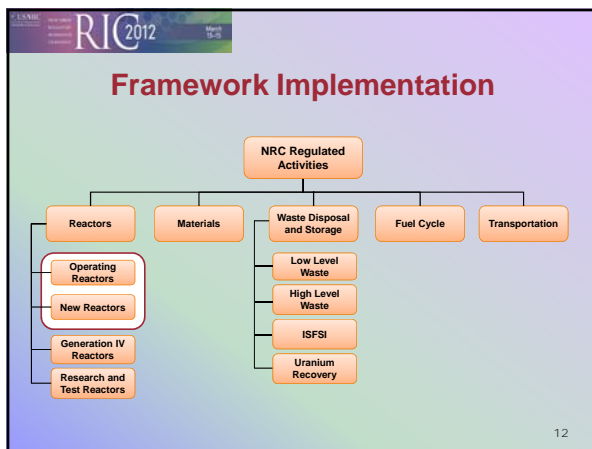
Decision-Making Process
Use a disciplined process to achieve the risk management goal:

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graph TD; A[Identify Issue] --> B[Identify Options]; B --> C[Analyze]; C --> D[Deliberate]; D --> E[Implement Decision]; E --> F[Monitor]; F --> A;
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Operating Reactors: Design Basis

Finding:
The concept of design basis events and accidents continues to be a sound licensing approach, but the set of design basis events and accidents has not been updated to reflect insights from the power reactor operating history and more modern methods such as PRA.

Recommendation:
The set of design basis events/accidents should be reviewed and revised, as appropriate, to integrate insights from the power reactor operating history and more modern methods such as PRA.

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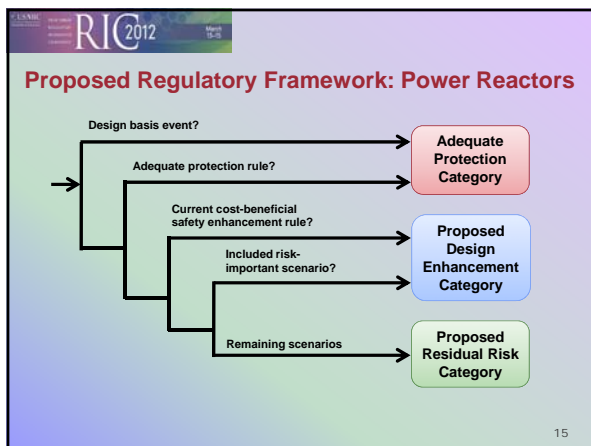
Operating Reactors: Beyond Design Basis

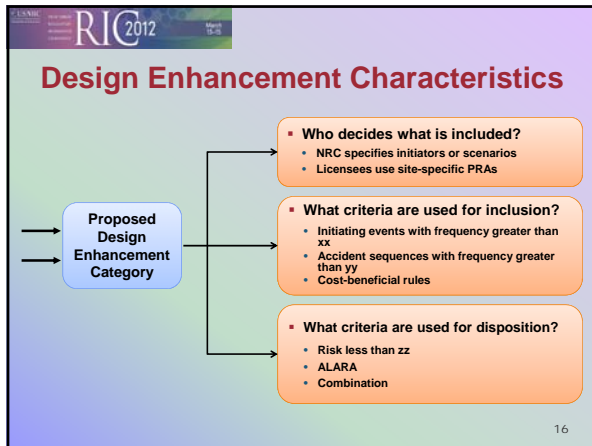
Finding 1:
Requirements for beyond-design-basis accident scenarios (e.g., Station Blackout) were established at different times and in different ways. Differences in implementation approaches have reduced the consistency of NRC's regulatory and oversight activities.

Finding 2:
The extent to which licensee activities undertaken as part of voluntary industry initiatives can be credited has been a source of contention in the Reactor Oversight Process and has reduced the efficiency of that process.

Recommendation:
NRC should establish via rulemaking a *design enhancement category* of regulatory treatment for beyond-design-basis accidents. This category should use risk as a safety measure, be performance-based (including the provision for periodic updates), include consideration of costs, and be implemented on a site-specific basis.

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- Implementation - Power Reactors**
- Maintain regulatory stability while evolving towards the 10- to 15-year vision of a more coherent and understandable framework
 - Pursue specific rule and guidance changes to implement the proposed approach while preserving the basic structure of current regulations and oversight programs
 - No top-down overhaul
 - Examples include 10 CFR 50.65 and Regulatory Guide 1.174
 - For the design enhancement category
 - Define inclusion, exclusion and disposition guidelines
 - Define appropriate treatment of barriers, controls and personnel to be commensurate with roles in managing site-specific risks
 - Define analysis and reporting requirements, change control provisions, and conforming changes to other regulations and guidance
 - Update NRC policies, guidance and procedures
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- Challenges**
- A change would be required within the agency and externally to increase understanding of the value and use of risk concepts and the risk management language
 - The proposed risk-informed and performance-based concept of defense in depth may require the development of additional decision metrics and numerical guidelines
 - The approach would likely require developing new or revised risk-assessment consensus codes and standards
 - Consideration of cost in the design enhancement category in the power reactor regulatory program would necessitate a reconsideration of the agency's tools for performing cost-benefit analysis
 - A long-term commitment from the Commission and senior agency management would be required for implementation
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Benefits

- Updated knowledge from contemporary studies, such as risk assessments, would be incorporated into the regulations and guidance thus improving their realism and technical basis
- Implementation of a systematic approach would foster a consistent regulatory decision-making process throughout the agency and improved resource allocation
- Consistency in language and communication would be improved across the agency and externally
- Issue resolution would be achieved in a systematic, consistent and efficient manner
- The design enhancement category proposed for the power reactor regulatory program would clarify the attributes of all requirements established as substantial safety (beyond-design-basis) improvements. This approach may contribute to the resolution of the "patchwork" issue identified by the Fukushima Near-Term Task Force

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A Voice from the Past

*We Athenians, in our own persons, take our decisions on policy and submit them to proper discussions; for we do not think that there is an incompatibility between words and deeds; the worst thing is to rush into action before the consequences have been properly debated. And this is another point where we differ from other people. **We are capable at the same time of taking risks and of estimating them beforehand.** Others are brave out of ignorance; and, when they stop to think, they begin to fear. But the man who can most truly be accounted brave is he who best knows the meaning of what is sweet in life and what is terrible, and then goes out undeterred to meet what is to come.*

Funeral Oration Delivered by Pericles circa 430 B.C.
Thucydides, *History of the Peloponnesian War*, Book B, Paragraph 40

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