

Safety Improvements Using Risk Insights

Technical Session T8

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AGENDA

Historical Background

Derecho Analysis

High Energy Arc Fault (HEAF)

New Reactors

Be riskSMART



Meeting the Challenge of Becoming a More Modern Risk-Informed Regulator

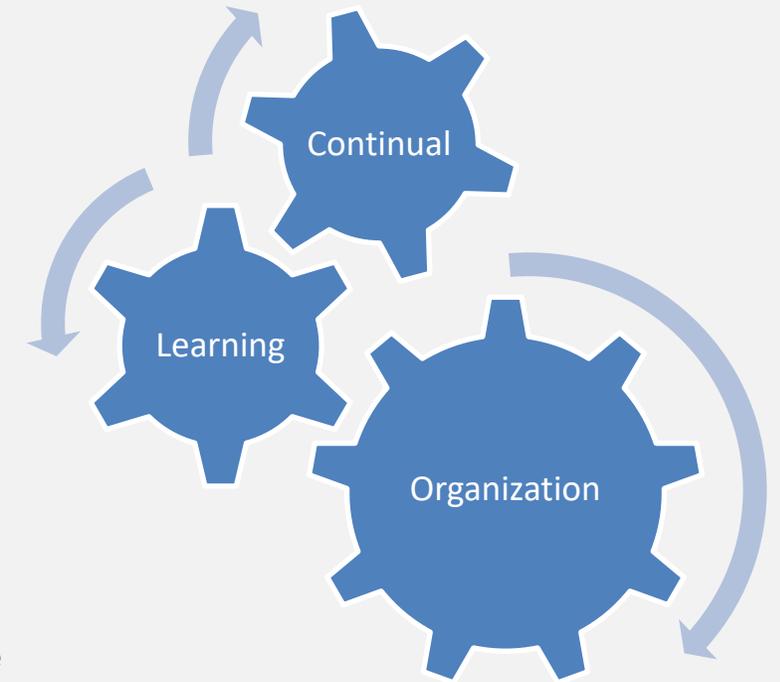
- Risk assessment technology continues to mature and is used increasingly in regulatory matters to support safety decisions.
- Risks are dynamic. Effective risk management relies on vigilant assessment and use of operating experience.
- Risk technology and insights complement traditional defense in depth to achieve an acceptable level of residual risk.
- Transformation is in progress to further risk-inform.



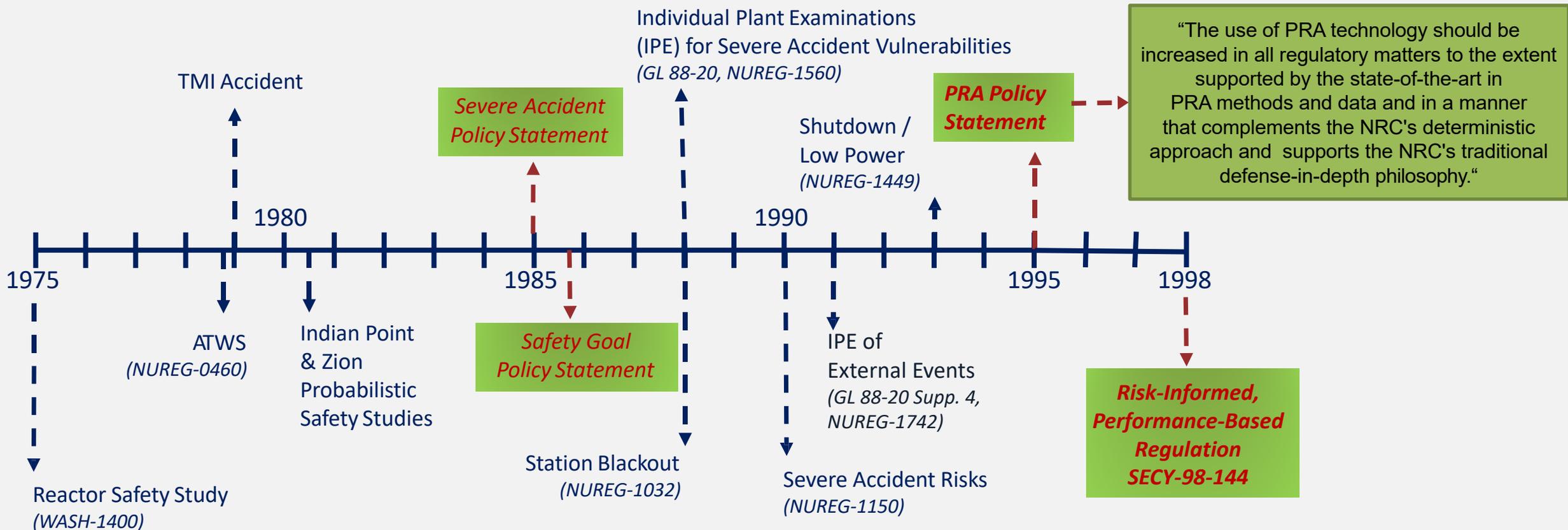
Value Added

Pursue a common understanding of risk (– and +) and communication of risk information across the agency.

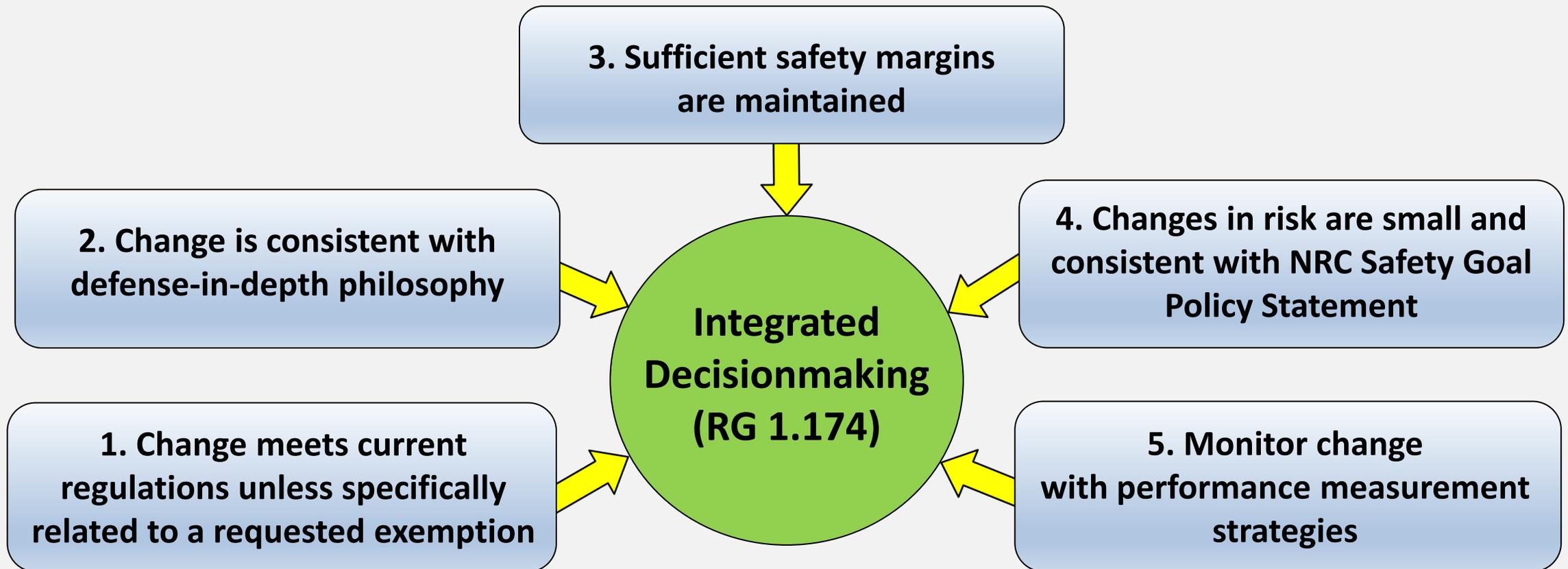
- Enhanced decisionmaking, more efficient use of resources, and reduction of unnecessary burden
Objectives of the Commission policy on probabilistic risk assessment (PRA)
- Improved mission delivery, reduced costs, and focused corrective actions towards key risks
Objectives of the Office of Management and Budget policy requiring enterprise risk management
- Agile, adaptive, and enhanced efficiency
NRC Futures Assessment



Major Policies Shaping Risk-Informed Thinking for the NRC



Integrated Decisionmaking Principles



*All elements of Integrated Decisionmaking should be considered more than just the numbers alone.
Integrated Decisionmaking is a place for critical thinking and dialogue.*

Background on the LIC-504 Process

LIC-504 (ADAMS Accession No. ML19253D401) was created to address recommendations in the Government Accountability Office (GAO) report, GAO-04-415, “Nuclear Regulation—NRC Needs to More Aggressively and Comprehensively Resolve Issues Related to the Davis-Besse Nuclear Power Plant’s Shutdown,” issued 2004

The major revision of LIC-504 (Rev. 5, 2020) included several significant changes prompted by previous uses of the process (e.g., considering enterprise risk and exposure to workers, guidance on how to consider risk significance to recommend generic communications).

LIC-504
 evaluations result
 in two distinct
 outcomes:

1. Determine whether prompt regulatory actions are necessary.
2. Use best available information to develop risk-informed recommendations for management consideration; specifically including the following:
 - ✓ Use conservative assumptions in the absence of information
 - ✓ Use best available information
 - ✓ Rely on performance monitoring (NUREG/CR-1855) to address uncertainties

The way LIC-504 teams develop recommendations has evolved to accommodate some key elements of the Be riskSMART (NUREG/KM-0016) framework.

Example 1—LIC-504 Duane Arnold Derecho

PROBLEM:

- Derecho highlighted a “combined event” not modeled in PRAs (weather-related loss of offsite power (LOOP) coincident with potential loss of emergency service water); potential for generic issue with previously unknown risk.

APPROACH:

- Using LIC-504 guidelines, determine whether prompt regulatory actions (i.e., orders to shut down or impose compensatory measures) were needed.

SOLUTION:

- Communicate risk insights within the NRC and with industry.
- Update Standardized Plant Analysis Risk (SPAR) models to improve realism and review team recommendations for further updates.

KEY TAKEAWAYS:

- Review the combined event effects and generate risk-informed recommendations that could help enhance plant safety and future regulatory processes.



Example 2—Aluminum High Energy Arc Fault

PROBLEM:

- Path forward on risk posed by aluminum HEAFs.

APPROACH:

- Evaluate operating experience.
- Improve modeling of aluminum HEAFs.
- Mitigate the impact from aluminum HEAFs.
- Develop the strategies for a risk-informed resolution (Be riskSMART).
- Continue communication and outreach.

SOLUTION:

- Perform LIC-504 review and communicate risk insights.

KEY TAKEAWAYS:

- Plants are safe; however, HEAF events are credible.
- Use LIC-504 to continue to identify any potential safety issues that may be applicable to operating light-water reactors and develop risk-informed options to disposition them.

San Onofre 4160 V (2001)



Example 3—New Reactors—NuScale

PROBLEM:

- Review inadvertent actuation block (IAB) valves and consider passive components and applicability of the single-failure criterion (SFC).

APPROACH

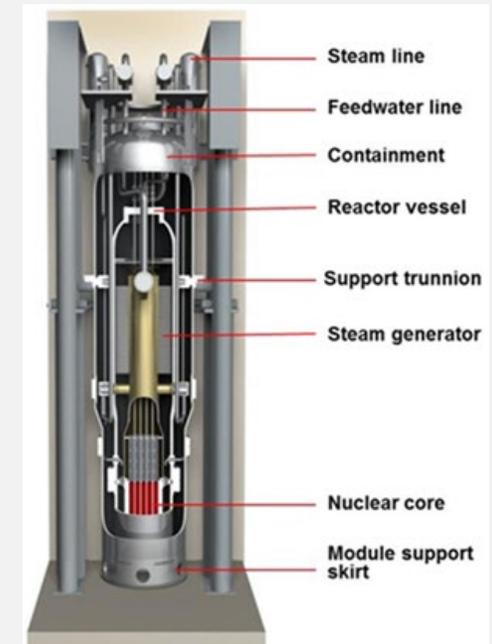
- SFC is one element of a defense-in-depth approach.
- SECY-05-0138, “Risk-Informed and Performance-Based Alternatives to the “Single-Failure Criterion” (ADAMS Accession No. ML051950619)
 - (1) Eliminate unlikely sequences and postulated single failure
 - (2) Risk-inform based upon safety significance
 - (3) Take a blended approach of diversity, redundancy, and unreliability

SOLUTION:

- Assess options (including regulatory certainty and timeliness) through SECY-19-0036, “Application of the Single Failure Criterion to NuScale Power LLC’s Inadvertent Actuation Block Valves,” (ADAMS Accession No. ML19060A081).
- Conduct review using risk-informed decisionmaking (RIDM) and the 1995 PRA Policy Statement as directed by the Commission in SRM-SECY-19-0036 (ADAMS Accession No. ML19183A408).

KEY TAKEAWAYS:

- SRM-SECY-19-0036 provides direction on the appropriate application and interpretation of both regulatory requirements in 10 CFR Part 50 and risk-informed principles for the NuScale IAB valve. The NRC has some discretion, in fact- or application-specific circumstances, to decide when to apply SFC. The NuScale decision is similar to those in previous Commission documents that addressed the use of SFC and clarified when to apply it.



Three Key Messages

- The NRC supports and advances RIDM through its programs and activities to help enhance safety and focus resources on what is most safety significant.
- The NRC is leveraging the use of risk assessment approaches in RIDM in a manner that complements defense in depth, safety margins, engineering judgment, and enterprise risk.
- The NRC is continuing to increase the use of risk insights through Be riskSMART and other initiatives to expand the use of PRA technology to other business lines to further support other regulatory matters.

Be riskSMART



Questions?

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