Risk-Informed Modification of ISI Programs

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Practical Take-Aways

- Extension of ISI intervals to 20 years may be justified as a prudent "first step" in optimization of ISI intervals
- Coordination of inspections over extended ISI intervals is prudent to ensure appropriate monitoring/trending of subject components
  - Monitor for potential unknown degradation mechanisms
  - Form basis for potential future applications to further extensions

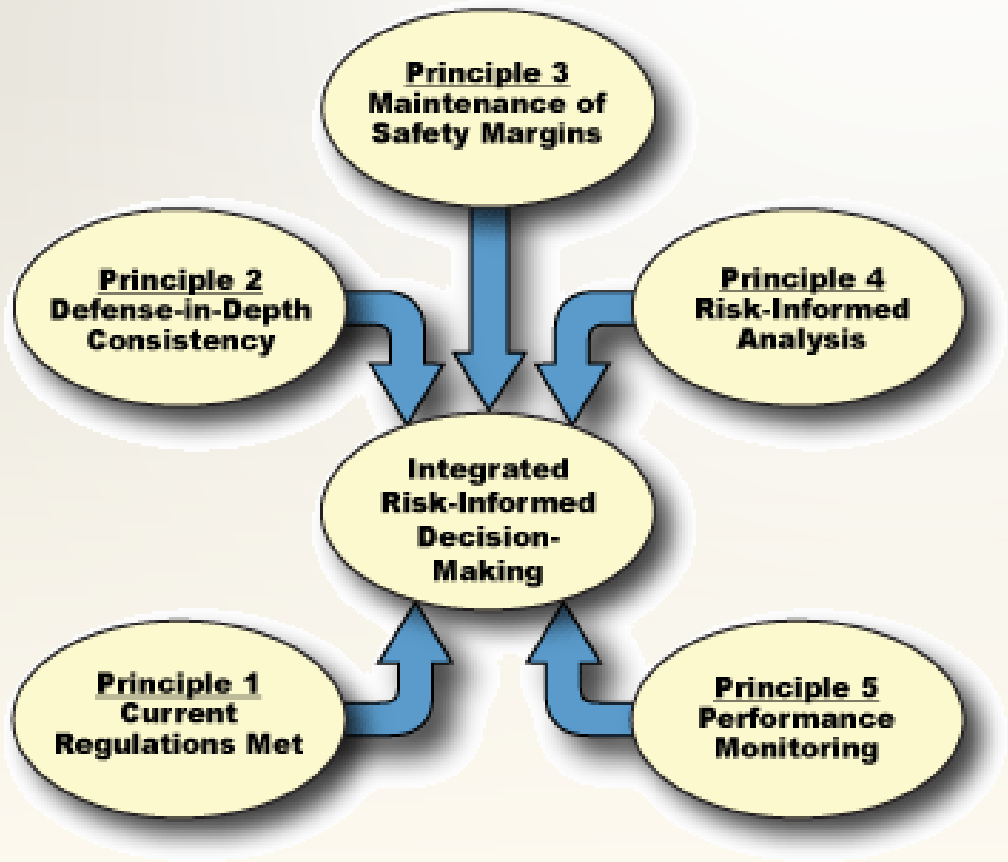
Introduction

NRC has noted an increase in ISI-related submittals that are explicitly or implicitly risk-informed.

Many of these submittals contain novel applications of probabilistic modeling or other risk-based arguments.

These applications are reviewed on their merits under the risk-informed decision-making framework.

Principles of Risk-Informed Decision Making



The five principles of risk-informed decision making are not separable.

For example, PFM may support Principle 3 and 4; but does not address Principle 5.

However, PFM allows for more "weight" to be given to Principle 4 when combined with an adequate performance monitoring plan.

Performance Monitoring: What is it for?

Performance Monitoring, in the Principle 5 sense, provides:

- Direct evidence of presence and/or extent of degradation
- Validation/confirmation of continued adequacy of analyses
- Timely method to detect novel/unexpected degradation

Example (1/2): PWR Weld Exams

WCAP-16168 TR Case

Analysis: Primarily PFM analysis addressing risk delta of conditional RV failure frequency due stress and different inspection scenarios.

Performance monitoring plan: Extension of ISI interval to a maximum of 20 years. Fleet inspections are coordinated to ensure regular data on population level (monitoring and trending).

One-time inspection for subsequent extensions to validate that generic flaw-distribution used in report bounds plant-specific per 10 CFR 50.61a(e) (model validation).

* For more details, see ADAMS Accession No. ML11306A084

Example (2/2): BWR Weld Exams

BWRVIP-05 TR Case

Analysis: Diverse analysis include PFM

Performance monitoring plan: Inspection of leading like-to-like components (RV axial welds). Minimal sampling of circumferential welds where such intersect with axial welds. No change in frequency for inspections of axial welds (e.g. monitoring and trending at same required frequency). Inspections to be conducted on circumferential welds if indications found in axial welds.

* For more details, see NRC Generic Letter No. 98-05

Staff Review: Application Issues (1/2)

Applications without substantive performance monitoring for extended periods of time (20+ years): going up to 36 years with no further inspections.

Lack of incremental approach: moving beyond current operating experience. Over-extended extrapolation from extant data. Monitoring and trending are not addressed.

Applications without well-defined performance monitoring. "No plausible degradation."

Effectively re-assigning significance of component out of the ISI regime.

Lack of timely monitoring for novel/unexpected degradation.

Staff Review: Application Issues (2/2)

Reliance on probabilistic modeling, or other risk arguments, are reviewed on their merits under the risk-informed decision-making framework.

Use of draft regulatory guide DG-1382/RG 1.245, *Preparing Probabilistic Fracture Mechanics Submittals*, is limited to PFM portion of submittals. It does not address or identify other necessary considerations.

Reduction or elimination of monitoring and trending may be a holistic risk to plants and is rarely addressed.

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  - Form basis for potential future applications to further extension

QUESTIONS