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Protecting People and the Environment

Key Principles for Inspection of Risk-Informed Initiatives

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NEI Lessons-Learned Workshop, January 30 - 31, 2019


Vision

- Licensees implement risk-informed initiatives in a manner consistent with what was approved in licensing. This provides operational flexibility while ensuring an appropriate level of safety.

- NRC monitors implementation under the ROP to verify that safety conclusions drawn during licensing remain valid.

Objectives

- To present high level principles the NRC plans to apply during oversight of risk-informed initiatives.

- To solicit early feedback or questions related to oversight of risk-informed initiatives.

Key Principles

1. Risk-informed initiatives – when implemented properly – appropriately focus NRC and licensee resources on areas of greatest safety significance.
2. "Trust but verify." NRC expects/assumes that licensees are implementing risk-informed initiatives IAW current licensing bases (CLB) but performance-based inspection is needed to verify.
3. Inspection should be consistent with ROP bases (both technical and policy).
4. NRC strives to ensure any changes to the inspection program promote efficiency without compromising safety.
5. Inspections should focus on those aspects of risk-informed initiatives that – if improperly implemented – could lead to increased plant risk.

Principle 1 – Win/Win

When properly implemented, risk-informed initiatives benefit all stakeholders.

NRC understands the value of RI initiatives and has a long history of encouraging implementation.

"The use of PRA technology should be increased in all regulatory matters to the extent supported by the state-of-the-art in PRA methods and data…" [Commission's 1995 PRA Policy Statement]

Risk-informed approaches "…better focus licensee and regulatory attention on design and operational issues commensurate with their importance to public health and safety." [SECY-98-144]

Principle 2 – Trust But Verify

NRC position on need to inspect risk-informed initiatives has been consistent:

"[T]he Commission plans to conduct inspections of § 50.69 implementation." [2004 50.69 FRN]

"Each entry into the RMTS is required to be properly documented to permit proper review and oversight to determine compliance with the TS requirements." [2007, 4B Safety Evaluation]

"The licensee does not need to report the results of the [performance] monitoring to the NRC but should retain them on site for inspection." [1998, RG 1.174]

Principle 3 – Inspection IAW ROP

NRC will inspect RI initiatives consistent with the ROP's existing technical basis document, IMC 0308:

- *Inspectable areas are based on their risk importance in measuring a cornerstone objective.*
- *Inspection frequency, how many activities to inspect, and how much time to spend inspecting activities in each inspectable area is based on risk information.*
- *Selection of activities to inspect in each inspectable area is based on plant-specific risk information.*
- *The more fully a [performance] indicator measures an area, the less extensive is the scope of inspection.*

Principle 4 – Inspect Efficiently

NRC will continue to focus on efficient utilization of resources commensurate with safety.

It is expected that level of effort will scale with verified successful implementation of program.

"…recent changes in the external environment…provide a compelling opportunity to better focus NRC resources on the most safety and security significant aspects of our work, while continuing to enhance the effectiveness, efficiency and agility of our licensing and oversight functions." [SECY-18-0060]

Principle 5 – Focus on Safety

NRC will focus on inspectable areas of greatest safety impact.

"Regulatory activities should be consistent with the degree of risk reduction that they achieve." [Principles of Good Regulation]

"…inspection will also consider the implementation of RISC–3 treatment focusing on programmatic and common cause issues, which could undermine the categorization process and its results." [50.69 FRN]

Questions?

1. Risk-informed initiatives – when implemented properly – appropriately focus NRC and licensee resources on areas of greatest safety significance.
2. "Trust but verify." NRC expects/assumes that licensees are implementing risk-informed initiatives IAW current licensing bases (CLB) but performance-based inspection is needed to verify.
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5. Inspections should focus on those aspects of risk-informed initiatives that – if improperly implemented – could lead to increased plant risk.

References

- Regulatory Guide 1.174, Revision 3, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," Jan 2018, (ML17317A256).
- Final SE for NEI Topical Report NEI 06-09, "Risk-Informed Technical Specifications Initiative 4b, Risk-Managed Technical Specifications Guidelines," May 17 2007, (ML071200238).
- SECY-98-144, "White Paper on Risk-Informed and Performance-Based Regulation," June 22, 1998.
- 10 CFR50.69, Final Rule, Risk-Informed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors, November 22, 2004 (69 FR 68008).
- IMC-0308 Attachment 2, "Technical Basis for Inspection Program," January 5, 2018 (ML16306A386).
- SECY-18-0060, "Achieving Modern Risk-Informed Regulation," May 23, 2018 (ML18110A187).
- Use of Probabilistic Risk Assessment Methods in Nuclear Regulatory Activities; Final Policy Statement, August 16, 1995 (60 FR 42622).

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History and Experience with Inspection of Risk-Informed Initiatives

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Oversight of Technical Specification Surveillance Frequency Control Program

- Oversight conducted via Reactor Oversight Process (ROP) baseline Inspection Procedure (IP) 71111.22, "Surveillance Testing." (ML18177A109)
- Verifies that surveillance testing activities provide objective evidence that risk or safety significant structures, systems, and components (SSCs) remain capable of performing their intended safety functions.
- 14 to 22 inspection samples conducted per year.
- Flexibility afforded to inspector on sample selection.
- IP provides guidance on attributes to consider if a sample on implementation of the Surveillance Frequency Control Program (SFCP) is selected.

Oversight of Technical Specification Risk-Informed Completion Times

- Oversight conducted via ROP baseline IP 71111.13, "Maintenance Risk Assessments and Emergent Work Control." (ML17194A934)
- Verifies that appropriate risk assessments (RAs) and corresponding work controls and risk management actions (RMAs) are implemented during planned and emergent maintenance activities.
- 14 to 24 inspection samples conducted per year.
- Flexibility afforded to inspector on sample selection.
- IP provides guidance on attributes to consider if a sample on Risk Informed Completion Times (RICT) is selected.

Oversight of 10 CFR 50.69

- Oversight conducted via ROP special and infrequently performed IP 37060, "10 CFR 50.69 Risk-Informed Categorization and Treatment of Structures, Systems, and Components Inspection." (ML102700396)
- Verifies: (1) that programs and procedures have properly incorporated the approved license amendment associated with 10 CFR 50.69, (2) proper implementation of the 10 CFR 50.69 categorization, and (3) properly implementation of alternate treatment requirements.
- IP performed at discretion and approval by Regional Administrator.

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History and Experience with Inspection of Risk-Informed Initiatives

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Working Group

- Objective: Ensure a smooth transition to oversight for licensees approved for RI initiatives
  - Training/awareness for inspectors
  - Monitoring oversight activities
  - Recommendations on Inspection Procedure changes (if needed)
  - Recommendations on other oversight document changes (if needed)

- Supporting Personnel
  - Program office support from Division of Risk Assessment (DRA) and Division of Inspection and Regional Support (DIRS)
  - Regional support from Senior Reactor Analysts, region based Inspectors, Resident/Senior Resident Inspectors

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Insights from Vogtle 10 CFR 50.69 Inspection

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NEI Lessons-Learned Workshop, January 30 - 31, 2019


Overview of the Presentation

- General Information
- Process Challenges
- Technical Challenges (One Individual's Observations from Vogtle)
- Potential Benefits from Implementation

General Information

- My Background and Experience





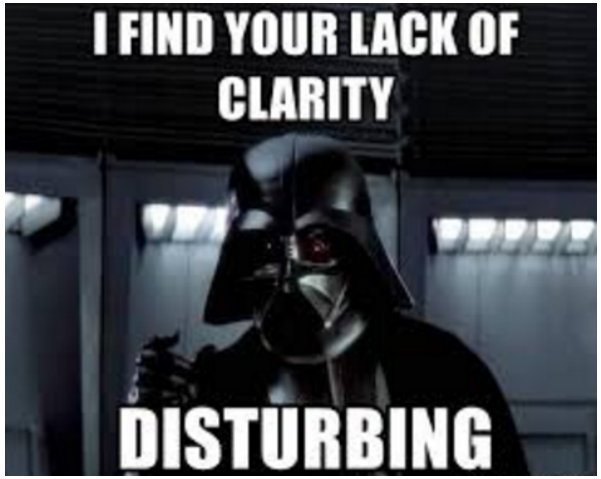



General Information (Continued)

- What did we inspect?
- What topics will this presentation cover?
- What topics won't be covered?
  - pre-decisional information from the Vogtle inspection
  - an overview of the 50.69 process since this is well understood by those implementing it
  - recommendations on whether to implement or how to accomplish

Process Challenges

- Cultural aspects as a regulator
- Inspector skill sets necessary
- Loss of corporate knowledge
- Ambiguous guidance & requirements
  - IP 37060 requirement 02.01.d and 10CFR50.69 (c)(iv) links safety margins with risk and uses a "reasonable confidence" level which isn't well defined… at least for inspectors
  - 10CFR50.69 (c)(i) refers to PRA of "sufficient quality"



Process Challenges (Continued)

- Unclear Guidance and Requirements - continued
  - Corrective action requirements
  - Reportability requirements under 50.72 and 50.73
- Interface with other inspection programs
- Risk rankings used in the guidance are FV and RAW values

Process Challenges (Continued)

- Timing will be important in coordinating on IP-37060 inspections:
  - Too early = limits the opportunities to review the "feedback" process and the effects of alternate treatment, … which impacts our effectiveness
  - Too late = failure of the agency to be timely in inspections of an active program
- Inspection of SSCs characterized as RISC-3… unrelated to risk calculations
- Visualization of the process
- Risk sensitivity studies
  - Impact of a CCCG
  - Standby SSCs & demands

Technical Challenges

- Independence of technical staff on the IDP, particularly in the PRA discipline
- RISC-3 categorization of systems if they are not present in the PRA model
- HSS categorization of SSCs due to Seismic Margin Analysis
- Use of PRA information during "design basis" portions of the categorization process
- Follow-up effort once IP-37060 has been performed

Benefits of Implementation

- Potential lessening of the "regulatory burden" for a number of systems
- May result in a reduction in inspection and assessment resources and hence increased efficiency and effectiveness
- Greater operational flexibility for our plants
- Potential cost savings for our licensees (especially in the area of procurement)
- Overall improved safety focus by the agency

Questions or Comments?

Acronyms

- FV – Fussell Vesely *
- HSS – High Safety Significance
- IDP – Integrated Decision Making Panel
- LERF – Large Early Release Frequency
- PRA – Probabilistic Risk Assessment
- RAW – Risk Achievement Worth*
- RISC – Risk Informed Safety Classification
- SE – Safety Evaluation
- SSC – Structure, System or Component

* Fussel Vessely and Risk Achievement Worth are risk metrics, similar to Birnbaum values.

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NRC Panel: Inspection of Risk-Informed Initiatives

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Panelists

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  PRA Oversight Branch, DRA, NRR

- **John David Hanna, Senior Reactor Analyst**
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- **Aron Lewin, Reactor Systems Engineer**
  Reactor Inspection Branch, DIRS, NRR

- **Michael Montecalvo, Reactor Operations Engineer**
  PRA Oversight Branch, DRA, NRR

Process for Revisions to Inspection Program Documents

- Revision process governed by Inspection Manual Chapter (IMC) 0040, "Preparing, Revising and Issuing Documents for the NRC Inspection Manual." (ML18003A122)
- Process involves review and feedback from multiple NRC HQ offices and Regions.
- Depending on revision, inspector training may be required prior to Inspection Procedure (IP) implementation.
- Revisions should continue to ensure that Reactor Oversight Process (ROP) baseline inspections are risk-informed and performance-based.

Facilitated Discussion / Question and Answer Session