

Overview of RISC Working Group Efforts on Treatment of Uncertainty in Decisionmaking using Probabilistic Risk Assessments

Fernando Ferrante
Office of Nuclear Reactor Regulation
U.S. NUCLEAR REGULATORY COMMISSION

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Outline



- Brief description of Risk-Informed Steering Committees (RISCs)
- Scope of Working Groups (WGs) on Treatment of Uncertainty in Decision-making
- Discussion of WG activities, insights gained
- Presentation of recommendations

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Background on RISC



- NRC RISC and NEI RISC are steering committees comprised of counterpart senior management from NRC, NEI
- NRC RISC was formed in October 2013 to advance the use of risk-informed decisionmaking (RIDM) in licensing, oversight, rulemaking and other regulatory areas by:
 - Establishing strategic direction of NRC staff activities
 - Developing and communicating an internal vision for future regulatory use of Probabilistic Risk Assessment (PRA)
 - Providing guidance to the NRC staff consistent with the Commission's PRA Policy Statement
 - Engaging external stakeholders on the use of PRA, listen to concerns and communicate NRC actions
 - Discussing initiatives that can be taken by the NRC to incentivize continued development of PRAs

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RISC WG on Uncertainty



- RISCs agreed on specific topics to address via counterpart NRC and NEI WGs that include technical staff working on specific subjects impacted by RIDM
- NRC and NEI WGs were created to address treatment of uncertainty in RIDM with specific objectives:
 1. Identify the specific causes for not being able to address uncertainties in current risk-informed applications in an efficient or effective manner
 2. Evaluate current approaches to addressing uncertainties in risk-informed decision-making and identify any gaps that need to be resolved
 3. Propose enhancements to the existing framework for addressing practical aspects of the treatment of uncertainty in risk-informed decision-making
 4. Identify potential education mechanisms for both PRA practitioners and broader audiences, with respect to the treatment of uncertainty in decision-making

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RISC WG Activities



- NRC and NEI RISCs Public Meeting on February 7, 2014 (Summary ML14057A519)
- Public Meeting between NRC and NEI Working Groups on August 6, 2014 (Summary ML14247A433, Presentation ML14216A061)
- NRC and NEI RISCs Public Teleconference on September 29, 2014 (Summary ML14275A209, Presentation ML14273A203)
- Public Meeting between NRC and NEI Working Groups on October 16, 2014 (ML14300A386, Presentations ML14290A205, ML14290A192, ML14290A189, ML14290A197, ML14290A195)
- NRC and NEI RISCs Public Teleconference on October 30, 2014 (Summary ML14309A230, Presentation ML14304A433)
- Public Meeting between NRC and NEI Working Groups at Workshop on November 20, 2014 (Summary ML14343A784, and NEI Workshop Presentation ML14324A630)
- NRC and NEI RISCs Public Meeting on December 17, 2014 (Summary ML15009A139)

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Specific Causes



Foundational aspects

- Inconsistencies in the treatment of uncertainty
- Model uncertainty and completeness issues
- Guidance and "culture gaps"

Implementation aspects

- "Aggregation" (summation of hazard contributors)
- Understandable process for dealing with irreducible uncertainties
- How to deal with varying levels of confidence in the mean estimates for specific hazards
- Communicating importance of uncertainty to decision-makers at different levels

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Current Approaches



- Review of NRC guidance and available documents
 - NRC Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis"
 - NRC Inspection Manual Chapters (IMCs) (e.g., IMC 0609)
 - NUREG-1855, "Guidance on the Treatment of Uncertainties Associated with PRAs in Risk-Informed Decision Making"
 - EPRI 1016737, "Treatment of Parameter and Model Uncertainty for Probabilistic Risk Assessments"
 - EPRI 1026511, "Practical Guidance on the Use of PRA in Risk-Informed Submittals with a Focus on the Treatment of Uncertainties"
 - NRC Office Instruction LIC-504, revision 3, "Integrated Risk-Informed Decision-Making Process for Emergent Issues"
- Brief discussion of other sources of information

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RISC WG Workshop



- Public meeting on November 20, 2014, that involved a tabletop workshop
- Purpose of Workshop:
 - Identify gaps and/or enhancements to guidance in order to improve the communication and handling of uncertainties in risk-informed decisions
- Workshop used a series of hypothetical examples to examine how well existing NRC and industry guidance addresses uncertainties
- Significant discussion took place, summary provides detailed insights and recommendations

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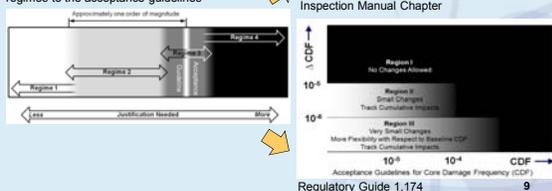
Gaps & Enhancements



GAP: Significant available guidance exists, but level of visibility has not percolated to main documents and specific applications.

- OPTIONS:**
- Revision of major documents
 - Development of application-specific guidance

NUREG-1855 Relationship of the comparison regimes to the acceptance guidelines



Regulatory Guide 1.174

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Gaps & Enhancements 

GAP: Despite existing guidance, specific expectations on what to provide and how to interpret are not always clear (for both practitioners and decision-makers).

OPTIONS:

- Specific items of clarification in NUREG-1855
- "Pilot" of Revision 1 of NUREG-1855
- Joint NRC-Industry workshop focused on applications and supporting guidance
- Periodic training workshop that would include discussion of emerging issues and/or new guidance to facilitate consistent interpretation of the treatment of uncertainties in risk-informed decisionmaking; similar to existing fire PRA-related training.

GAP: Guidance should be enhanced to address situations where the quantitative results are not as meaningful as the other type of insights (e.g., when dealing with lack of confidence in mean estimates).

OPTIONS:

- Enhancement of risk-informed guidance documents with respect to the qualitative treatment of uncertainties
- Efforts to address specific areas (e.g., external flooding)

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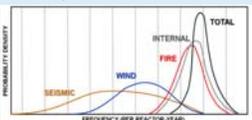
Gaps & Enhancements 

GAP: Addressing consideration of Mitigating Strategies in risk-informed decision-making in the post-Fukushima era via incorporation in PRA modeling or other means.

OPTIONS:

- Development of application-specific guidance
- Consideration of PRA credit for Mitigating Strategies

GAP: Additional guidance on aggregation of different risk contributors with respect to decision-making, when dealing with differences in the treatment of uncertainty



OPTIONS:

- Consider additional technical work in this area
- Evaluate existing guidance for acceptance guidelines

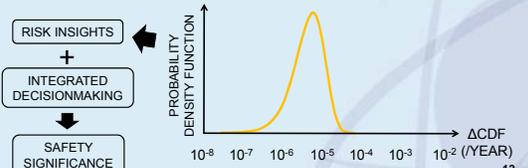
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Gaps & Enhancements 

GAP: Significant PRA training exists focused on technical aspects of uncertainty and PRA modeling (for practitioners), with less attention to specific training for decision-making with an appropriate balance of technical, regulatory, and decision-making perspective.

OPTIONS:

- Facilitate further communication via joint workshops/training
- Develop/enhance specific training for decision-makers that addresses PRA aspects that impact specific applications with respect to the treatment of uncertainty



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Conclusions



- NRC and NEI WGs participated in activities to identify specific challenges, gaps, and enhancements needed in the treatment of uncertainty in decision-making
- A set of recommendations was developed based on public meetings discussions, tabletops, and workshops
- NEI WG developed white paper based on interactions, which is under review by the NRC WG and will be discussed at future public meetings between RISCs
- Additional follow-up activities will be considered by the RISCs for implementation via appropriate processes

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