What Society Needs in Part 53

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The Breakthrough Institute

- Independent research center that identifies and promotes technological solutions to environmental and human development challenges.
- Represents Society and its collective interests.
- Does not receive funding from industry.



Realizing a Technology-inclusive Rule

A technology-inclusive rule is defined in the Nuclear Energy Innovation and Modernization Act (NEIMA) of 2019 as a regulatory framework developed using methods of evaluation that are flexible and practicable for application to a variety of reactor technologies, including, where appropriate, the use of risk-informed and performance-based techniques and other tools and methods.



Concerns and Opportunities

- Part 53 is necessary to improve the general welfare of Society by enabling both innovation and commercialization of advanced nuclear reactors.
- It remains unclear how either Framework A or Framework B conforms with NEIMA or meets the needs of Society.
- NRC is crafting prescriptive and deterministic rule language and frameworks that could constrain development of emerging technologies vital to climate change mitigation, energy security and other pressing concerns in Society.
- A 1000-page proposed rule package that industry will not use will not be responsive to NEIMA.
- Part 53 should establish high-level safety goals and allow greater flexibility for a wide range of diverse and emerging technologies.
- Frameworks A and B could represent acceptable methods and should be relocated to guidance documents, which offer both clarity and flexibility.



The Mandated Regulatory Approach

Some amount of prescription is necessary in regulatory requirements.

Deterministic

Objectives Hierarchy:
A performance-based regulation identifies safety objectives at a high level.



Prescriptive

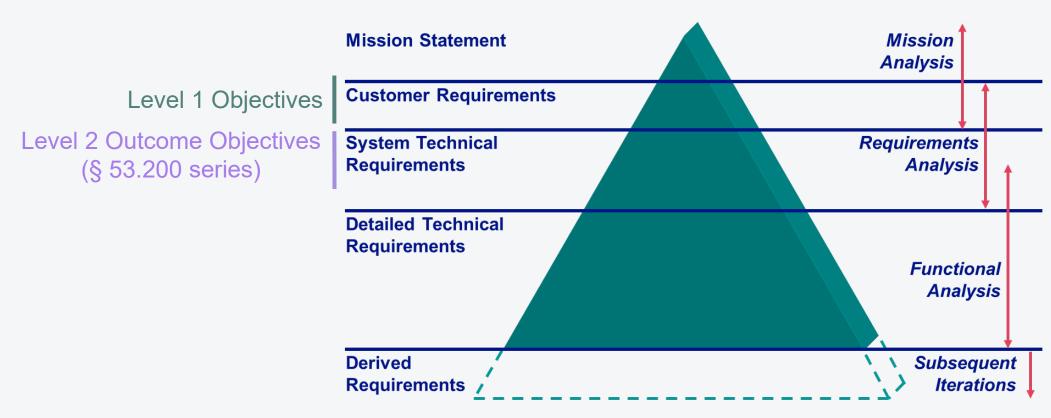
Risk is defined as a situation involving exposure to danger.

Risk-based

Probabilistic risk analysis (PRA) is one way to risk-inform a regulation, but not the only way.



Typical Requirements Management Structure*

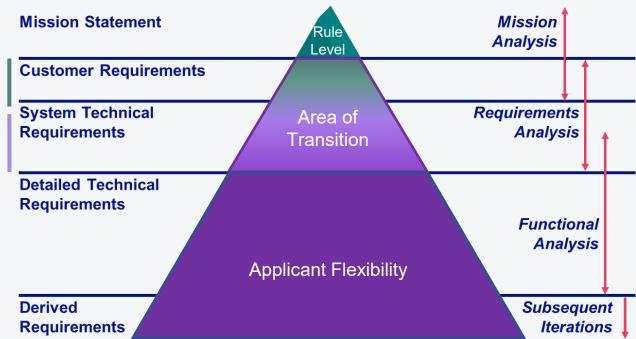


^{*} Attribution: https://www.ans.org/file/980/RIPB+CoP+2-28-20+Presentation+Systems+Engineering.pdf, Slide 8

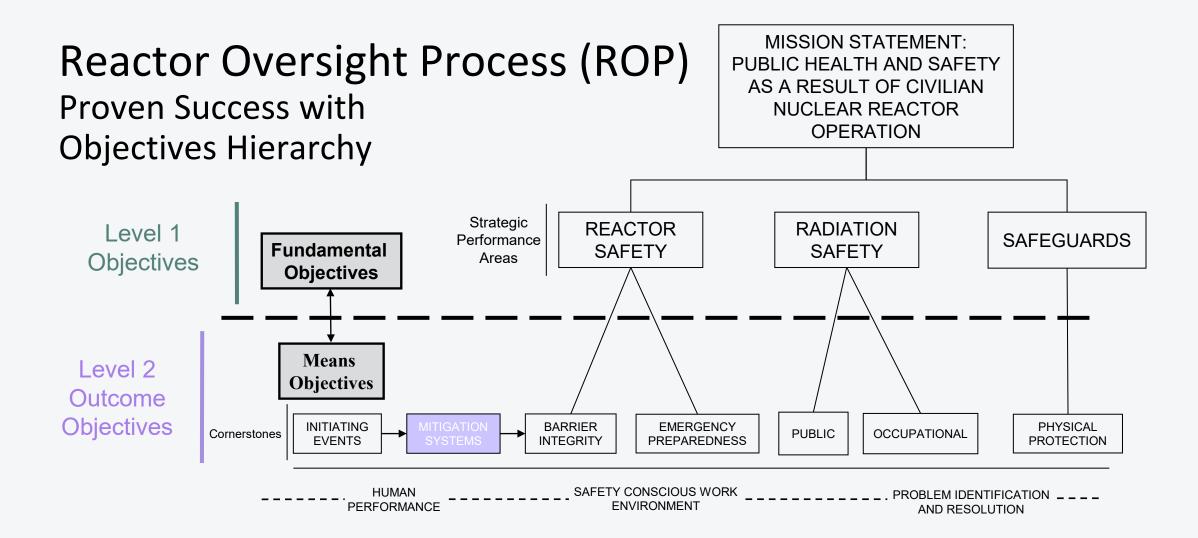


Part 53 Requirements Management Structure

Level 1 Objectives
Level 2 Outcome Objectives
(§ 53.200 series)

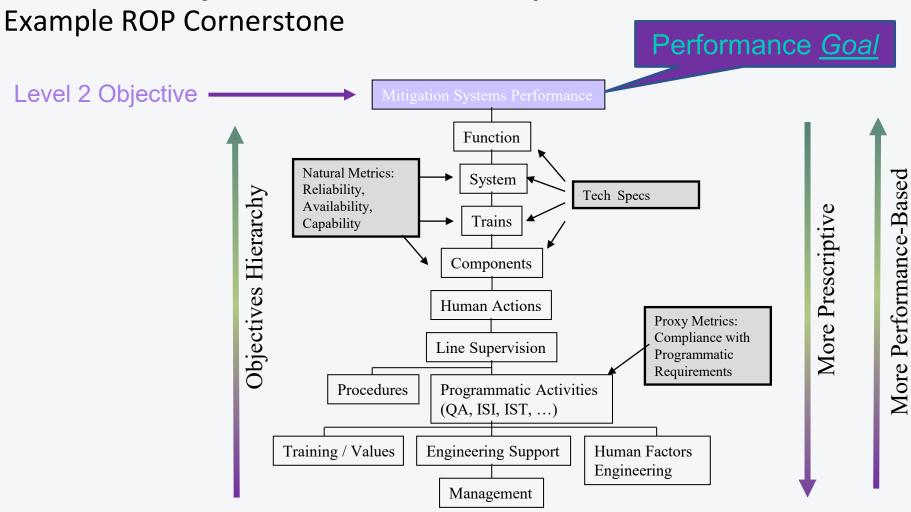




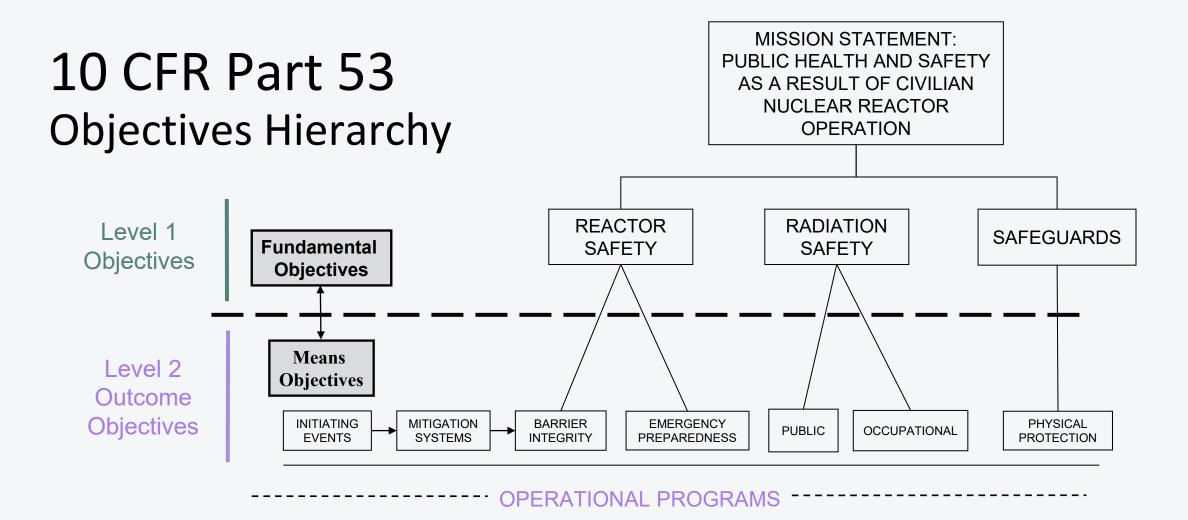




Means Objectives Hierarchy









Operational Programs

Each applicant must describe operational programs that emphasize and reinforce industry best practices, for example in the following areas:

- **Quality Management**
- **Human Performance**
- Safety Conscious Work Environment
- **Problem Identification and Resolution**
- Radiation Management As Low as Reasonably Achievable
- **Operator Training and Qualification**



NRC Staff Response

- What does the NRC staff think about this overview of a technologyinclusive, risk-informed and performance-based approach to Part 53?
- Does it make sense?
- Can the current rule be simplified to focus on safety performance in a structured objectives hierarchy?
- Can Framework A and B be relocated to guidance as acceptable methods vice requirements?
- What does NRC staff intend to do with this stakeholder input?



Community of Practice (CoP)

Tomorrow, July 29, the American Nuclear Society's Riskinformed, Performance-based Principles and Policy Committee (RP3C) will host a CoP webinar, "A Performance-Based Approach for Part 53," that is open to the public.

- Stakeholders can access the RP3C CoP site on ANS Collaborate at the link below: https://collaborate.ans.org/communities/grouphome?CommunityKey=0984f3cf-63e2-4c9a-8538-84c2c97c034d
- Recorded CoP presentations are posted on RP3C's website at the link below: http://www.ans.org/standards/rp3c/ (Just scroll down to find presentations)



Quantitative Health Objectives (QHOs)

- On July 21, 2022, NRC staff briefed Commissioners and stated the following:
 - OHOs have served us well for decades
- However, this assertion does not support inclusion of QHOs in Part 53 because:
 - For decades QHOs have NOT been codified in regulation.
 - If that is the rationale, why the significant shift in policy?
 - How does this rationale comport with prior Commission direction to keep QHOs out of regulations?
- NRC staff's position continues to ignore scientific basis for why QHOs should not be codified in regulations.
 - QHOs do not provide a valid performance metric
 - QHOs do not reflect health effects observable in the population
 - QHOs introduce significant challenges associated with limitations of dosimetry
- Why does NRC staff believe that codifying QHOs is appropriate or justified?



As Low as Reasonably Achievable (ALARA)

- NRC staff has said that they envision an ALARA program that would operate like it does with currently operating reactors.
- If this is the case, why does the staff not cross-reference existing sections of Part 50 and Part 20 for ALARA as they have done elsewhere in Part 53?
- Why does NRC staff believe that codifying ALARA is appropriate or justified?



Facility Safety Program (FSP)

- NRC staff has said that this program should provide extra flexibility to the licensee.
- However, many stakeholders see the FSP as only a potential new burden.
- This seems to be an area where greater mutual understanding could lead to alignment.
- Could the staff please provide a theoretical example of how flexibility might be improved?



Hearing Process Improvements

- Hearings on "contested" environmental issues are an outlier compared to other Federal agencies.
- Public access to hearings as they are currently conducted is burdensome and time consuming.
 - As such, the process may reduce or discourage public involvement.
- NRC should consider adopting an approach like that taken by other Federal agencies.
 - Contested issues are resolved through a comment/response process in parallel with the comment resolution process for the Environmental Impact Statement.
 - This process meets requirements of the National Environmental Policy Act (NEPA) and the Administrative Procedures Act (APA).
- A streamlined hearing process would be consistent with the Principles of Good Regulation and the intent of NEIMA, which is to enable "innovation and the commercialization of advanced nuclear reactors."
- Is NRC staff willing to consider a more efficient approach to the hearing process?



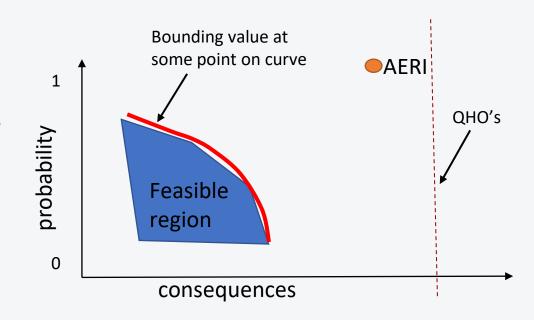
Alternative Evaluation for Risk Insights (AERI)

- Excessively conservative bounding event
- Excessively conservative bounding event frequency
 - NRC's AERI assumes a frequency of 1 bounding event (BE) per reactor year.
 - This assumption is used to eliminate reliance on PRA to justify a postulated event frequency.
- Issues with this assumption
 - While the NRC staff's assumption successfully removes the need for a PRA, it does so at the expense of logic.
 - NRC staff indicated that "Assumed frequency of 1/yr consistent with frequency of all event sequences for LWRs," but bounding events are not "all sequences" and have specific considerations.
- How does AERI provide a performance-based, risk-informed path
- How is AERI aimed at what is "necessary and sufficient" for achieving safety goals?



AERI (Continued)

- This alternative is contrasted to, and thereby constrained by, a PRA "mindset."
 - PRA is just one tool for risk analysis and it is not appropriate for all applications (or applicants).
 - Realistic constraints and bounding event frequencies are typically inputs to PRA, not outcomes.
- All event sequences are contained in a set of possible events
 - Analysis must be grounded in what is possible or feasible.
 - It is not feasible to have a bounding event at a reactor, rebuild the reactor, and resume operation every year.





AERI (Continued)

- This alternative contravenes NRC policy and practice
 - If a reactor experienced a BE, the NRC would likely take enforcement action and provide close oversight under Inspection Manual Chapter 0350, "Oversight of Facilities in a Shutdown Condition Due to Significant Performance and/or Operational Concerns."
 - This level of oversight would continue until NRC approved reactor restart.
 - It is unrealistic to expect a reactor would restart every year after annual BEs.
 - If a reactor had an bounding event the NRC would likely never let it operate again, let alone if it experienced a BE every year.
- History informs the future
 - The undamaged unit at Three Mile Island (TMI) was not approved to restart for several years
 - Davis-Besse required regulatory approval to restart.
- A more comprehensive view of risk must be used to ensure analysis achieves the following:
 - It is bounded by that which is possible.
 - It provides a scientifically defensible regulatory basis.
- How does AERI provide a realistic means of establishing reasonable assurance of adequate protection of public health and safety?



Summary

We appreciate this opportunity to present to the NRC staff and reiterate the requests of numerous stakeholders for workshops to more collaboratively formulate a draft rule that is responsive to NEIMA and Society's needs.