BREAKTHROUGH INSTITUTE

November 1, 2022

Dr. Joy Rempe
Chair, Advisory Committee for Reactor Safeguards
U.S. Nuclear Regulatory Commission

Subject: Comments on NRC's Staff's Preliminary Part 53 Rule Package and October 18-19 ACRS Sub-committee Meeting

Dear Dr. Rempe,

We write on behalf of the Breakthrough Institute (BTI), an independent 501(c)(3) global research center that identifies and promotes technological solutions to environmental and human development challenges. We advocate for appropriate regulation in licensing and oversight of advanced nuclear reactors and NRC's timely deployment of safe, innovative, and economically viable emerging technologies. We also believe new and advanced reactors represent critical pathways to deep decarbonization. BTI does not receive funding from industry.

ACRS plays an important role in leading change from existing regulatory mindsets and encouraging innovation to ensure Part 53 is responsive to Congressional mandates and public interests. We welcome an opportunity to formally present to the sub-committee and/or full-committee in the future.

I. History of Commission Policy on Risk-informed, Performance-based Regulation

In 1998, much needed regulatory reforms were the subject of Congressional hearings. Under threat of deep budget cuts, NRC Commissioners promised to implement risk-informed, performance-based rules and programs. The Commission defined the terms risk-informed and performance-based in its Staff Requirements Memorandum (SRM) for SECY 1998-144[1] and called for performance-based regulations to afford applicants and licensees the flexibility to determine ***how*** they will achieve improved outcomes as well as encourage and reward improved performance. However, performance-based regulatory reforms were not extended to licensing, and Parts 50 and 52 remain largely prescriptive and deterministic to this day.

II. Stakeholder Reception of Part 53

Many stakeholders have objected to the requirement of a formal probabilistic risk assessment (PRA) because of the significant effort and cost to develop one without a commensurate safety benefit. In response, the NRC unveiled Framework B that offered an Alternative Evaluation for Risk Insights (AERI) if a set of overly conservative, deterministic, and prescriptive criteria are met.

[1] Staff Requirements Memorandum for SECY-98-144, "White Paper on Risk-informed and Performance-based Regulation"

On October 19, 2022, and in response to ACRS subcommittee concerns about the volume of rule language, NRC staff responded that they have streamlined the rule package as much as possible; yet it weighs in at 1,252 pages. Generally, the volume of any regulation is commensurate with its level of prescriptiveness. The volume and prescriptive nature of Part 53 undermine regulatory agility and the rule's durability over time.

III. Stakeholder Frustration with the Outcomes

Rather than create incentives for improved safety performance in a technology-inclusive manner, the rule features prescriptive requirements that undermine regulatory agility. It is no wonder that the majority of developers and applicants prefer existing licensing pathways as the "least worst" option. 10 CFR Part 53 is expected to deliver the transformational framework mandated by NEIMA, "to… allow innovation and the commercialization of advanced nuclear reactors." Yet it falls far short of this expectation in its current form.

Framework A's heavy reliance on a formal PRA makes it almost risk-based as opposed to risk-informed. A formal PRA is not necessary to make sound judgements about realistic risk. Risk is commonly defined as an exposure to hazard. A regulation can be risk-informed by qualitative assessments of hazard. Framework B also relies on a formal PRA unless the applicant can meet the unrealistic assumptions in AERI. This is not necessary to inform a licensing decision with reasonable assurance of adequate protection of public health and safety.

Additionally, Frameworks A and B do not sufficiently feature the elements of a performance-based approach. Neither framework affords developers or applicants sufficient flexibility to determine ***how*** to meet performance objectives in ways that encourage and reward improved outcomes. For all these reasons, the preliminary Part 53 rule does not satisfy NEIMA… nor does it conform with prior Commission direction disapproving codification of safety goals applying quantitative health objectives (QHOs).

IV. Stakeholder Feedback Regarding Codification of QHOs

During the October 19, 2022, subcommittee meeting, ACRS member Dr. Vesna Dimitrijevic raised concerns about using the Safety Goals, which would require a Level 3 PRA analysis and introduce associated uncertainties. These same uncertainties make QHOs inaccurate for projections of risk, and observation of effects to confirm performance is not statistically possible. On January 31, 2022, Dr. Adam Stein, Director of Nuclear Energy Innovation at the Breakthrough Institute, authored a white paper on the statistically infeasible use of QHOs as a cumulative risk metric. On February 4, 2022, Dr. Stein submitted the white paper as a comment on the preliminary Part 53 rule development.[2] Dr. Stein also presented this topic to NRC staff during a February 8, 2022, public meeting[3] with non-government organizations. Nevertheless, the NRC staff offers little defense for retaining QHOs in the rule.

[2] ADAMS Accession Number ML22038A112

[3] ADAMS Accession Number ML22049A080, pp. 77-83

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V. Stakeholder Feedback Regarding Framework B and AERI

On October 19, 2022, an ACRS member asked if the NRC staff received concerns that the AERI entry conditions are overly restrictive. In fact, multiple stakeholder[4]s offered extensive critical assessment of AERI during public meetings on June 16, 2022[5], and July 28, 2022[6]. For example, BTI observed that the AERI entry conditions, as currently defined, are overly restrictive to the point of being impossible rather than very unlikely.

VI. Solutions Have Been Offered and Dismissed

On October 18-19, several ACRS subcommittee members, on numerous occasions, requested assistance navigating the complex rule and guidance. One Subcommittee member opined about how to salvage some of the staff's work and avoid "throwing the baby out with the bathwater." To be clear, BTI and many other stakeholders have no qualms with substantial streamlining to achieve the unrealized transformational value of Part 53. However, that may not be altogether necessary.

Stakeholders have suggested that NRC staff retain high-level safety objectives in Subparts B and C and relocate the enormous volume of prescriptive criteria under Frameworks A and B to guidance or standard review plans as optional, not required[7,8]. This would allow greater flexibility for innovation and thereby satisfy NEIMA while affording regulatory agility ***and*** predictability. Unlike rules, guidance can be developed, updated and enhanced as needed over time and informed by operating experience and lessons learned. By contrast, changes to regulations involve a laborious, multi-year process that severely constrains regulatory agility.

However, the NRR's executive leadership has argued that the only way to provide predictability is through regulation. They have made this argument before the Commission multiple times on July 21, 2022, and again on October 13, 2022. The argument is specious. By this logic, predictability is not assured by the standard review plan routinely used now to develop and evaluate licensing submittals under Part 50. Such an assertion reveals a fundamental lack of regulatory perspective at senior levels of the Agency. This lack of perspective is not lost on certain NRC Commissioners.

On October 13, 2022, an NRC Commissioner observed that stakeholders continue to complain about the volume of Part 53 and cumbersome frameworks that are not usable or likely to be used. NRR executive leadership responded that it does not want to preclude the Commission from weighing in on the expansive breadth of the rule. This is an abdication of leadership. Hard decisions remain about what is ***necessary and sufficient*** for the Part 53 rule. Now the matter is before the ACRS.

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[4] ADAMS Accession Number ML22244A053
[5] ADAMS Accession Number ML22222A023
[6] ADAMS Accession Number ML22209A004
[7] ADAMS Accession Number ML22250A615
[8] ADAMs Accession Number ML22255A008

VII. Cautions for ACRS

On October 18-19, 2022, some ACRS subcommittee members expressed concerns about how new, corrosive coolant media may affect systems, structures and components; and what if operator action is needed under certain plant conditions? Innovations raise discomfort about unknowns. However, designing a rule that precludes unknowns from occurring is neither realistic nor reasonable, nor is it responsive to NEIMA's mandate to enable innovation. For example, humans are the weakest link in any system. Reduced reliance on operator action is a positive innovation. In a performance-based regulation, flexible operator staffing requirements would incentivize innovations that reduce human error and improve safety outcomes.

Not every potential condition adverse to quality, or instance when operator action may be desired, can or should be prevented through prescriptive regulations. Attempts to do so constrain innovation and disincentivize improved safety performance of evolutionary designs. Moreover, such attempts are unnecessary at this juncture. Plant operators will have a corrective action program to identify, prioritize (based on safety significance) and resolve problems. Moreover, the NRC has many tools in its toolkit to address emergent operating experience, including increased inspection and oversight, enforcement actions, orders, and new regulatory requirements (subject to backfit provisions).

On October 19, 2022, ACRS member Petti reminded his colleagues that guidance does not establish requirements. One ACRS subcommittee member observed that an applicant who chooses not to follow existing guidance would have a daunting mountain to climb. We take issue with this assertion. An applicant may choose a licensing approach not defined in guidance and should not be discouraged from doing so by any member of the NRC staff or the ACRS

A safety determination must be based on engineering judgment and adherence to regulatory requirements, not conformance with established guidance. Regulatory discipline absent a standard checklist must be reinforced by NRC leadership, the ACRS and the Commission going forward. NRC staff should prepare safety evaluations against regulatory requirements, reach a safety finding, and then preserve (in guidance) the approved approach as an acceptable method for an advanced reactor. A successful, high-level Part 53 rule could eventually feature a multitude of technology-specific standard review plans that afford greater regulatory agility.

VIII. Opportunity for ACRS

Discomfort around unknowns associated with civilian use of existing and emerging non-light-water reactor technologies is a fact of life for conservative creatures (engineers). However, for ACRS to right this ship and set it on a course to satisfy NEIMA, its members must temper their discomfort with legislative context and situational awareness.

Legislative context is not limited to NEIMA. Fifty years ago, the Energy Reorganization Act acknowledged the benefits of nuclear energy to "meet the needs of present and future generations, to increase the productivity of the national economy and strengthen its position in

regard to international trade, to make the Nation self-sufficient in energy, to advance the goals of restoring, protecting, and enhancing environmental quality, and to assure public health and safety." The NRC's role is to ***enable*** the safe civilian use of nuclear energy – not to constrain or obstruct deployment with onerous, prescriptive requirements from antiquated regulatory regimes.

Situational awareness of the public's interests is vital to ACRS' role in advising the Commission. Environmentalists, scientists, scholars, activists, thought leaders, and policy makers from both political parties are increasingly supportive of civilian nuclear power. The Russian invasion of Ukraine has accelerated ***urgent*** calls for safe, reliable, and clean nuclear energy.

IX. Closing

Nuclear power advances the Nation's clean energy goals, enhances environmental quality, and supplies reliable electricity to the transmission grid. Rapid deployment of new and advanced reactors is an urgent public interest, and the ACRS plays an important role in ensuring the NRC staff delivers a quality product to the Commission that is responsive to NEIMA.

BTI strongly encourages the ACRS to recommend the Commission redirect the staff to

1. expeditiously work with external stakeholders in a more open, collaborative manner;
2. come to agreement on unresolved issues – like what should be governed by regulation versus guidance; and
3. significantly streamline the rule to be more performance-based and appropriately risk-informed.

A usable rule is more important than a rushed one. Timely agreement on these matters can be reached if the NRC staff is open and receptive to significant revision. A corresponding change in regulatory posture and customer service ethic also are necessary to satisfy NEIMA.

We appreciate this opportunity to share the public's interest in this crucial rule and its as yet unrealized potential to enable the rapid deployment of new and advanced reactors.

Sincerely,

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