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10 CFR Part 53: Risk-Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors

Comment On: NRC-2019-0062-0012
Preliminary Proposed Rule Language: Risk-Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors

Document: NRC-2019-0062-DRAFT-0272
Comment on FR Doc # 2020-24387

Submitter Information

Organization: The Breakthrough Institute

General Comment

See attached file(s)

Attachments

August 29 2022 Amended Comment on Preliminary Part 53 Final

August 23, 2022

Mr. Christopher Regan
Director, Division of Rulemaking, Environmental, and Financial Support
Office of Nuclear Materials Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Comments on Preliminary 10 CFR Part 53, "Risk-Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors" [Regulation Identifier Number RIN-3150-AK31; Docket ID NRC-2019-0062]

Dear Mr. Regan,

We write on behalf of the Breakthrough Institute (BTI) and Kadambi Engineering Consultants (KEC) to comment on the U.S. Nuclear Regulatory Commission (NRC) staff's development of preliminary rule language for licensing advanced reactors in accordance with a Congressional mandate.

As a preliminary matter, BTI is an independent 501(c)(3) global research center that identifies and promotes technological solutions to environmental and human development challenges. We advocate appropriate regulation for licensing and oversight of advanced nuclear reactors to enable the timely deployment of safe, innovative, and economically viable emerging nuclear technologies. We believe new and advanced reactors represent critical pathways to climate mitigation and deep decarbonization. The Breakthrough Institute represents the interests of Society and does not receive funding from industry. KEC is a private non-government company whose objective is to provide nuclear safety consultancy services internationally. The Director of KEC, Dr. Kadambi, is a licensed Professional Engineer (PE) and nuclear safety expert with 50 years of experience in government, the private sector and academia. He was Chair, Standards Board, for the American Nuclear Society (ANS) for five years until June 2011, during which time he instituted initiatives that broke new ground for ANS within the framework of a public-private partnership. He now Chairs the Risk-informed, Performance-based Principles and Policy Committee (RP3C).

As you are aware, the Nuclear Energy Innovation and Modernization Act (NEIMA) of 2019 directed the NRC to establish a rule "to allow innovation and the commercialization of advanced nuclear reactors,"[1] which NEIMA broadly defined as "a nuclear fission (light-water or non-light-water) or fusion reactor (including a prototype plant) with significant improvements compared to currently constructed reactors."[2] NEIMA further mandated that the new rule be performance-based, risk-informed and technology-inclusive. The NRC staff's development of Title 10 *Code of*

[1] https://www.congress.gov/bill/115th-congress/senate-bill/512/text, Section 2
[2] https://www.congress.gov/bill/115th-congress/senate-bill/512/text, Section 3

Federal Regulations (CFR) Part 53 presented an opportunity to incorporate foundational policy for developing risk-informed, performance-based regulations, established in 1999 by the NRC.[3]

Part 53 was envisioned as a transformative alternative to Parts 50 and 52, both of which were developed and codified to license large, light-water reactors. We have closely followed the NRC staff's development of preliminary rule language for the new rule and believe the rule, in its current form, is not sufficiently risk-informed or performance-based. Rather, Framework A is risk-based and prescriptive; Framework B is deterministic and prescriptive; and Framework B's alternative evaluation for risk insights (AERI) is overly conservative. Both frameworks unnecessarily borrow heavily from existing regulations and offer no substantive improvement over currently available licensing pathways.

It is not clear how the proposed Part 53 rule achieves transformational elements of foundational Commission policy. The Staff Requirements Memorandum (SRM) for SECY-98-144 defined a risk-informed and performance-based (RIPB) approach to NRC rulemaking. That definition has been accepted by NRC staff and endures to the present. The NRC staff's full and complete comprehension and application of this foundational policy is crucial to its success in satisfying NEIMA. The NRC staff is accountable to Congress and Society for fully realizing the transformational elements in SRM-SECY-1998-144.

To successfully comply with NEIMA, Part 53 rule must apply "risk insights, engineering analysis and judgment including the principle of defense-in-depth and the incorporation of safety margins, and performance history… to (1) focus attention on the most important activities, (2) establish objective criteria for evaluating performance, (3) develop measurable or calculable parameters for monitoring system and licensee performance, (4) provide flexibility to determine how to meet the established performance criteria in a way that will ***encourage and reward improved outcomes*** [emphasis added], and (5) focus on the results as the primary basis for regulatory decision-making."[4]

Regarding the fourth element of an RIPB approach, Commission policy "associates flexibility with the concept of incentives. It states that one of the attributes of a performance-based approach is that licensees have flexibility to determine how to meet the established performance criteria in ways that will 'encourage and reward improved outcomes.'"[5]

For an applicant to find practical utility in Part 53 and choose this licensing framework over existing pathways, the rule must provide incentives to develop innovative technologies and designs with safety margins suitable for flexibility in meeting regulatory requirements during plant operation. Safety margins will afford operational flexibility once a new plant is built and commissioned. This operational flexibility translates to fewer operational constraints and lower operational costs. These advantages and incentives will be a significant consideration in a

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

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

[5] NUREG/BR-0303, "Guidance for Performance-Based Regulation."

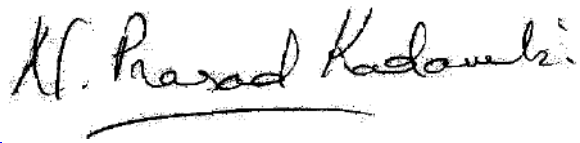
competitive global nuclear energy marketplace, key to securing national energy security, and vital to achieving net-zero carbon emissions by 2050.

On July 29, 2022, we co-presented a Community of Practice (CoP) webinar entitled "A Performance-Based Approach for 10 CFR Part 53," sponsored by the ANS's RP3C. In earnest hope of helping the NRC achieve success in its endeavor to satisfy the basic elements of transformation espoused by the Commission in 1999, and more recently by Congress in 2019, we respectfully submit this comment and incorporate by reference a recording[6] of the July 29, 2022, CoP webinar.

We believe that retention of high-level performance objectives in Part 53 is warranted. However, the prescriptive, risk-based and deterministic options under Frameworks A and B should not be codified in the rule, but rather relocated to guidance as acceptable approaches for meeting the new rule.

In closing, we appreciate this opportunity to comment on Part 53 and offer our assistance to NRC staff as it finalizes a rule package for the Commission's consideration. The NRC's success in this endeavor is of mutual interest to a wide range of stakeholders.

Sincerely,



Rani Franovich
Senior Policy Advisor, Climate and Energy
The Breakthrough Institute

N. Prasad Kadambi, PhD, PE
Director
Kadambi Engineering Consultants

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R. Taylor, NRR
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[6] https://www.youtube.com/watch?v=V-d_r__XBY0