

August 31, 2022

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

Subject: Comment on Part 53 [Regulation Identifier Number RIN-3150-AK31; Docket ID NRC-2019-0062]

Dear Mr. Regan,

This letter provides the perspective of the Breakthrough Institute on several sections of the current draft of Part 53 rulemaking. We appreciate this opportunity to provide feedback on how to make this pre-draft rule responsive to the mandate of NEIMA and the public interest.

The Breakthrough Institute 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 and licensing of advanced nuclear reactors to enable the commercialization of innovative and economically viable emerging nuclear technologies, which we believe represent critical pathways to climate mitigation and deep decarbonization. The Breakthrough Institute does not receive funding from industry.

## **1 THE MANDATE OF NEIMA**

NEIMA calls for a technology-inclusive, risk-informed, and performance-based licensing framework to enable the innovation and commercialization of advanced reactors. NEIMA presents a once-in-a-generation opportunity to design a licensing framework from a blank sheet of paper.

To meet the mandate of NEIMA, Part 53 needs to provide an optional alternative licensing pathway that discards many of the existing barriers and allows for innovation and commercialization of advanced reactors. That is not the same as simply providing a new licensing framework. Part 53, as currently drafted<sup>1</sup>, largely provides a licensing framework. It does not, however, provide one that allows for innovation and commercialization by eliminating unnecessary barriers, increasing efficiency, reducing timelines, and dispelling with regulatory ossification because “it has served us well for decades.”

It is in the public interest to develop a licensing framework that provides reasonable assurance of adequate protection in an innovative, efficient, and predictable manner. The framework should be designed to enable the licensing of not just one or two reactors a year but potentially dozens. To reach decarbonization goals, reduce environmental impacts, and save public lives by reducing pollution nuclear energy is necessary. This conclusion is supported by most energy systems research, including DOE, NREL, EPRI, and the Breakthrough Institute’s research<sup>2</sup>. We find that the United States needs to deploy between 190 GWe and 470 GWe of new nuclear energy by deploying 500-3,400 reactors just to meet electricity sector decarbonization goals.

## 2 QUANTITATIVE HEALTH OBJECTIVES (QHOS)

On July 21, 2022, NRC staff briefed Commissioners and stated, “QHOS have served us well for decades.” However, this assertion does not support the inclusion of QHOS in Part 53 because for decades, QHOS have not been codified in regulation. The Commission has reaffirmed on multiple occasions that the Safety Goals should remain high-level guidance on acceptable societal risk and should be used to provide guidance to the NRC staff on how new regulations should be considered.<sup>3</sup> The quantitative health objectives

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<sup>1</sup> NRC Accession number [ML20289A534](#)

<sup>2</sup> Advancing Nuclear Energy. 2022, The Breakthrough Institute.  
<https://thebreakthrough.org/articles/advancing-nuclear-energy-report>

<sup>3</sup> [SECY-00-0077](#)

(QHO) are derived from the Safety Goals and establish the acceptable level of radiological risk to the public. The QHOs are considered goals and not limits.

ACRS has expressed support for the use of surrogate risk metrics – equivalent to the Core Damage Frequency used for existing reactors. We do not oppose this approach in general. However, it will likely reduce the efficiency of the licensing process because a surrogate metric would have to be developed and endorsed by the NRC prior to an application. Otherwise, it would hold up the acceptance and review of that application. Ultimately it will likely increase review time and reduce regulatory predictability.

In a prior comment and whitepaper<sup>4</sup>, I discussed how the QHOs are not valid performance metrics for making regulatory decisions and provided a technical basis for that assertion. In a presentation to the NRC at a stakeholder meeting,<sup>5</sup> the whitepaper was discussed along with a discussion of the specific parts of the rule text that were still problematic.

In our opinion, the QHOs should be maintained as policy and should not be included in this rule. Using the QHOs directly in the rule elevates policy goal to rule and creates a new level of performance for licensing that has not been included in other rules. The introduction of the QHOs as a licensing requirement increases the burden and the level of proof needed for licensing. Existing technologies can and do already meet this policy goal, as shown in multiple studies, including the State-of-the-Art Reactor Consequence Analysis (SOARCA) project. Advanced reactor technologies in development are likely to be even safer than existing reactors. The addition of QHOs as a licensing requirement without it being necessary to ensure adequate protection for the public reduces the efficiency of the licensing process and increases the operational burden without providing increased safety to the public.

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<sup>4</sup> NRC Accession number [ML22038A112](#)

<sup>5</sup> NRC Accession number [ML22087A451](#)

### **3 ALARA**

NRC staff has said that they envision an ALARA program that would operate as it does with currently operating reactors. If this is the case, it is unclear why the staff does not simply cross-reference existing sections of other regulations for ALARA as they have done elsewhere in Part 53. This change would reduce staff work, maintain the same level of public safety, and achieve stakeholder alignment. It is unclear why the NRC staff believes that codifying ALARA in Part 53 is appropriate or necessary.

### **4 FACILITY SAFETY PROGRAM (FSP)**

NRC staff has said that they believe this program will provide extra flexibility to the licensee. However, many stakeholders see the FSP as only a potential new burden, above and beyond what is required in the existing licensing frameworks. This seems to be an area where greater mutual understanding could lead to alignment. In prior meetings, to facilitate mutual understanding and reach stakeholder and NRC alignment, we requested that the staff provide an example of a case in which the FSP could provide such extra flexibility. The staff declined to provide an example. This does not lead to achieving alignment as the Commission directed in the SRM approving the 9-month extension to the Part 53 rulemaking.

### **5 ALTERNATIVE EVALUATION FOR RISK INSIGHTS (AERI)**

AERI is contained in a regulatory guidance draft that was published in conjunction with Part 53 Framework B. The AERI approach is intended to eliminate the need to use a PRA and is not wholly without merit. As currently drafted AERI is Excessively conservative in terms of bounding event selection and event frequency. While the NRC staff's assumption successfully removes the need for a PRA, it does so at the expense of logic.

The design of AERI is designed specifically to preclude, and thereby constrained by, a PRA "mindset." However, PRA is just one tool for risk analysis and it is not appropriate for all applications (or applicants). The basic concept of a Maximum Credible Accident

approach has been discussed in many venues and on many occasions. AERI attempts to make such an approach, but by starting from the question “how do you eliminate the need for a PRA” instead of “how do you make a safety case without a PRA” it limits regulatory innovation and does not result in a performance-based outcome.

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. The 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.

Realistic constraints and bounding event frequencies are typically inputs to PRA, not outcomes. All event sequences are contained in a larger set of possible events. The analysis must be grounded in what is possible or feasible. However, it is not feasible to have a bounding event at a reactor, rebuild the reactor, and resume operation every year.

Furthermore, this frequency assumption contravenes NRC policy and practice. If a reactor experienced a bounding event, 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 assume that a reactor would restart every year after annual bounding events. If a reactor had a bounding event, the NRC would likely never let it operate again, let alone if it experienced a bounding event every year.

There is history to support this observation. The undamaged unit at Three Mile Island (TMI), which was not part of the accident, was not approved to restart for several years. The reactor at Davis-Besse that experienced corrosion to the reactor head required regulatory approval to restart, despite not experiencing a level 3 PRA event, let alone a bounding event.

A more comprehensive view of risk must be used to ensure analysis is bounded by that which is possible and provides a scientifically defensible regulatory basis. As currently, draft AERI is a maximum of maximums which is not physically or legally

possible. Providing this guidance as an acceptable approach to establish reasonable assurance of adequate protection of public health and safety is troubling.

## 6 TECHNOLOGY-INCLUSIVE

The majority of the current Part 53 draft is technology-inclusive. There are, however, several exceptions. One example is the AERI guidance, which could limit technologies that are typically larger from meeting the entry conditions to AERI even if these designs meet the standards for reasonable assurance of adequate protection to the public. While AERI is guidance, it has been presented by the staff as an integral part of Framework B.

The potential to license mobile reactors is another major shortcoming of the current draft language. Mobile reactors could include reactors that are operated at a single site but transported to the operational site already fueled, or reactors that could be operated in one location, shutdown, and relocated to another site. The NRC is aware of multiple designs that meet each definition. Both stakeholders and ACRS have asked the NRC staff how they will address this issue. Despite replying on many occasions that the staff is looking at that the issue and will provide a solution, it has not materialized. It is possible that the staff will provide suitable language in a future draft, but as of the end of the public comment period, it is unavailable, and Part 53 is not technology-inclusive.

## 7 CONCLUSION

In closing, it is apparent that the NRC staff has put substantial work into drafting the Part 53 rule language. They should be commended for their effort on this difficult project.

During stakeholder engagement, the NRC staff asked for specific issues that could be addressed. The challenges that remain with Part 53, in the current publicly available draft, are not small non-conformances or typos. Those issues are still present in places, as might be expected with a very voluminous draft rule. However, stakeholders have not focused on the small issues to refine the rule language because major challenges remain



on key topics that have a total absence of NRC staff and stakeholder alignment. These issues were raised numerous times in numerous venues. It does not make sense to hone a rule that is not ready.

There are a few challenging areas that the NRC staff has assured stakeholders would be addressed. Draft rule language to address these issues has not been made public by the end of the open comment period. The NRC staff has stated that the Statement of Consideration and revised draft rule language will be finished before the October meeting with the Advisory Committee on Reactor Safeguards. Stakeholders are only allowed to make a comment at ACRS meetings, which does not provide an opportunity to engage and discuss with the NRC staff of ACRS members.

The public comment period has concluded. The NRC Commission approved the NRC Staff's request for an extension specifically to reach alignment with stakeholders. There is no alignment on several major issues. With no opportunity to review the full draft text and statement of considerations prior to the end of this comment period it is impossible to determine if the staff intend to resolve these issues.

The Commission should direct the staff to reach alignment with stakeholders on these major issues before sending the draft rule to the Commission. Further, the Breakthrough Institute requests that the comment period be extended at least two weeks after the upcoming ACRS meeting on October 5-7. By that time, the Statements of Consideration and updated rule language should be available for review. Otherwise, following the NRC staff proposed timeline, the public will not have another chance to comment on rule language until July 2023, almost a year from today.

Sincerely,

Dr. Adam Stein  
Director of Nuclear Energy Innovation  
The Breakthrough Institute