# Samuel Lawrence Foundation Comment

## Licensing Requirements for Microreactors and Other Reactors with Comparable Risk Profiles

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*Submitted via www.regulations.gov*

**U.S. Nuclear Regulatory Commission**

**11555 Rockville Pike,**

**Rockville, MD 20852**

**Re: Formal Administrative Comment**

The Samuel Lawrence Foundation ("SLF") respectfully submits this formal comment in response to the Nuclear Regulatory Commission's ("NRC") Federal Register notice of May 1st, 2026, seeking to reform "Licensing Requirements for Microreactors and Other Reactors with Comparable Risk Profiles." We submit these comments pursuant to the invitation for comment stated in the notice and look forward to working with the NRC to ensure that nuclear licensing guidelines are efficient, effective, and safe.

SLF agrees with the overall need for reforms that does not unduly burden applicants. We applaud the emphasis on nuclear material and harm scenarios rather than energy output, however, the speed at which so many intricate changes are being made simultaneously decreases the odds that potential harm is adequately captured in the licenses.

For example, even pro-nuclear entities, like the Nuclear Innovation Alliance, that are in favor of many of these reforms are requesting more time because it is of paramount importance to state and local communities that this safeguard is done right. We agree that compounding delays are part of the paradigm everyone would like to avoid, yet surely, the NRC would have a greater chance to create an efficient and well-calibrated rule for microreactors by giving respondents 45 more days to weigh in. This rule proposes many simultaneous changes, which without adequate public and expert input, do little to instill confidence in industry and communities alike. We look forward to engaging with the NRC and crafting a safe and reliable licensing framework.

## 1. Passive Safety Features Are Not Always Inherently Safe

While passive designs can reduce active component failure risks, they increase dependence on the long-term integrity of materials, welds, and structural elements exposed to blistering temperature, constant radiation, and then whatever the environment throws at them. The proposed rule provides limited requirements for ongoing material specification or monitoring beyond design approval.

This creates enormous vulnerability. Any degradation in material performance over the reactor's lifetime could compromise the fail-safe assumptions that underpin the entire licensing basis. Unlike traditional reactors with active systems and redundant monitoring, microreactors will likely have fewer opportunities to detect material issues.

Although the term 'inherent safety' is not defined within the proposed rule, an inherently safe reactor presumably does not rely on human action and programmatic controls. Remote operation of reactors can be done, but the section handling this topic is not ideal, especially if a manufacturer has multiple designs or amends the design of their reactor. The proposed rule does not appear to contemplate how changes in design would be managed in remote operation of, possibly, hundreds of reactors. Remote operation facilities would have to have safety, physical and cyber security features, and uninterruptable digital connections to every reactor that is beyond any civilian operator at the moment.

An inherently safe reactor's safety function should not merely prevent or mitigate events but should ensure designs do not risk public health and safety. Safe shutdown should be defined precisely since can be interpreted differently across reactor technologies and licensing frameworks. For microreactors, the important licensing question is how the design maintains the safety functions to maintain subcriticality.

## 2. The Provisions in Quality Assurance (QA), Do Not Provide Assurance

Under the proposed rule, microreactors can do away with Appendix B (QA standard used for commercial nuclear plants for decades) and instead use ANSI/ANS-15.8 — the much less rigorous QA standard written for research reactors. The research reactor standard being substituted here is far more open-ended. While the less rigorous approach makes sense for low-power research reactors with extremely small radioactive inventories, it is much harder to justify its applicability for commercial power reactors, including microreactors that contain significant radioactive material, especially when deployed at scale. The proposed rule significantly reduces the amount of documentation and NRC oversight required for safety-related components compared to Appendix B.

Appendix B is very detailed and prescriptive. ANS 15.8 describes design, construction, and modifications concepts that follow the same basic topics as Appendix B. 15.8 says that microreactors "do not necessitate the establishment of a separate program…" but there is a tangible need for assessments, audits, and documentation during the microreactor operational phase.

The forward states that "the reliability of most of the parts used in a research reactor is not relevant to the health and safety of the public since failure of the item generally shuts the system down and little else occurs. Second, the typical research reactor operates on a limited budget with its continued existence dependent upon maintaining a low-cost, reliable operation." But with novel and unknown configurations of microreactors being tested for the first time, these two characteristics have no guarantee to be true, especially at first.

This implementation would allow developers to propose their own QA program, creating inconsistent QA requirements for different approaches and undermine the effectiveness of NUPIC and NIAC audits. The language would allow QA to be addressed *after* a license has been issued. 50.34(a)(7) specifically states that "the description of the quality assurance program for a nuclear power plant or a fuel reprocessing plant shall include a discussion of ***how*** the applicable requirements of appendix B ***will*** be satisfied." [Emphasis added]

The primary objective of a safety regime is to demonstrate with reasonable assurance that equipment important to safety can perform its safety functions without experiencing common-cause failures before, during, and after critical events. Any industry-recognized QA program will not be equivalent to Appendix B, and it will in no way ensure that safety-related equipment will perform its intended safety function prior to, during, or after a design basis event or accident. This is a significant reduction in the plant's ability to have equipment perform reliably in a harsh environment or during a seismic event.

The definition of "critical characteristics" and "dedication" are defined in the rule as important design, material, and performance characteristics that, once verified, provide reasonable assurance the item will perform its intended safety function. A qualification path that is more reliant on dedication would create an almost certain reduction in the quality and reliability of components that will be installed in nuclear power plants and relied upon to ensure the health and safety of the public.

The proposed definitions in section § 57.357.3 apply the term 'design basis accident' rather than 'design basis event'. Design basis accident omits the requirement to perform seismic qualification of safety-related structures, systems, and components

(SSCs). Seismic events are not design basis accidents and fall under the category of design basis events.

The guidance leaves vague what should be a comprehensive methodology for establishing the full event population used to identify design-basis accidents and other associated source terms. Some methodologies, like LMP, allow a limited set of SSCs to be classified as safety related and credited for design-basis accidents, while also requiring special treatment for SSCs associated with beyond design-basis accidents. Misalignment between risk significance and safety-related classification can create performance challenges.

NRC should instead insist on a structured, transparent methodology for nearly every foundational term like “credible” and “maximum.” Otherwise, different applicants may reasonably develop substantially different interpretations of what events are credible, and how event probability analysis should be performed. This creates a meaningful risk that different developers could receive materially different regulatory outcomes despite having comparable reactor risk profiles and comparable overall plant safety.

**3. A Threshold Question**

The proposed rule provides two eligibility criteria:

1 rem Total Effective Dose Equivalent (TEDE) exposure to a person in the unrestricted area for the duration of an accident; or total inventory of plutonium, thorium, and uranium is 10 tons or less.

Those two criteria are somewhat arbitrary as a safety classification. Radiation exposure of “a person in the unrestricted area” and “the duration of the accident” is so amorphous as to be undefined. It also says nothing about the risk to the public or environment. 9 tons of plutonium hardly seems like a trifling amount. Mass is not an adequate metric. The NRC should consider alternatives better correlated to radiological consequences like a simple fission-product inventory metric, such as Cs-137 inventory combined with inherent or passive decay heat removal capability. The rule also treats multiple reactors strung together as isolated and distinct incidences, even if one reactor being compromised could cause a cascade akin to the radionucleotide release of a much larger reactor.

**4. Closing Remarks**

Licensing should create a transparent, consistent level of safety the public can trust. Neither the public, nor the industry, profit from guidelines that leave so much ambiguity and lack foundationally agreed upon terms because they were created and promulgated too quickly. Taking more time here will save time later. We again implore the NRC to extend the comment period 45 days to let industry, experts, and all stakeholders to have their say.

The advanced reactor types covered here have never been built and are almost assuredly less efficient than large scale systems. That lower efficiency means that these reactors will produce more radioactive waste per unit of electricity than current reactor designs, and with novel, more isolated waste streams to clean up after. SLF looks forward to working with NRC, and urges the prioritization of guidance needed for potential Nuclear Fuel Innovation Campuses, so we can find a solution to all spent nuclear fuel once and for all.

Respectfully submitted,

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