MARCUS R. NICHOL
Senior Director, New Reactors

1201 F Street, NW, Suite 1100
Washington, DC 20004
P: 202.739.8131
mrn@nei.org
nei.org

NUCLEAR ENERGY INSTITUTE

June 7, 2022

Mr. Robert M. Taylor
Deputy Director, Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: NEI Input on Regulatory Priorities for New and Advanced Reactors

Project Number: 689

Dear Mr. Taylor:

The Nuclear Energy Institute (NEI)[1] and its members appreciate the Nuclear Regulatory Commission's (NRC) efforts to establish a modern and efficient regulatory framework for new and advanced reactors consistent with the 2019 Nuclear Energy Innovation and Modernization Act (NEIMA). We also appreciate that the NRC has been informing the prioritization of its work through solicitation of stakeholder input, including the industry's plans to develop advanced technologies and license new power reactors. The purpose of this letter is to provide an update to industry's regulatory priorities that will lead to a more modern and efficient regulatory framework for new and advanced reactors.

Since we last provided the industry's regulatory priorities in December 2020,[2] there has been a significant increase in the volume and urgency of anticipated near-term advanced reactor deployments in the U.S. This continuing increase in demand for advanced reactors is being driven by a recognition that the U.S. needs more nuclear energy to achieve our climate, energy, environmental, economic, and national security goals. An example of this increasing demand is reflected in the recent report[3] by Idaho National Laboratory (INL) that concluded the U.S. will need 162 GW of new nuclear generation by 2050 in order to meet zero-carbon emissions goals. Furthermore, since a good portion of this demand is likely to rely upon small modular

[1] The Nuclear Energy Institute (NEI) is responsible for establishing unified policy on behalf of its members relating to matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include entities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect and engineering firms, fuel cycle facilities, nuclear materials licensees, and other organizations involved in the nuclear energy industry.
[2] ML20353A393
[3] Estimated HALEU Requirements for Advanced Reactors to Support a Net-Zero Emissions Economy by 2050, INL/EXT-21-64913

reactors (SMRs) – both light-water and non-light-water technologies – the number of applications could easily reach many hundreds. The INL analysis also generally aligns with a recent NEI survey conducted of Nuclear Strategic Issues Advisory Committee (NSIAC) members on the role of new nuclear in meeting their companies' decarbonization goals. This survey indicates deployment of advanced reactors is expected to accelerate quickly and by 2040 reach roughly 22 plants coming on-line each year. This does not account for micro-reactors or the use of advanced reactors for process heat or hydrogen production, so it is likely that the actual number of advanced reactors deployed each year will be much higher. In addition, over just the past year, we continue to see the demand for new nuclear in the near-term growing, and it is not just coming from utilities. For example, in the last few months both Dow Chemical and NuCor Steel have publicly announced interest in nuclear as a source of carbon-free energy. This could further increase demand for new nuclear making the applications and deployments occur sooner and in greater numbers. On top of the growing customer demand, states are encouraging new nuclear through policy actions as part of their efforts to decarbonize and ensure reliability. Since the beginning of the year, eight states (AK, CT, IN, NE, NH, VA, WV and WY) have enacted policies to enable new nuclear projects and several additional states are considering their own enabling policies.

According to the advanced reactor demand forming in the market, the NRC could receive 12 or more applications per year as early as 2025, and by 2030 the NRC could consistently have over 60 applications in the regulatory process. This is based on the current NRC generic review schedules, which imply that an advanced reactor project will be engaged in the regulatory process for about five years, or more, when considering the pre-application, acceptance, review, approval and issuance activities. The NRC may not be fully aware of this rapidly growing demand for advanced reactors since much of it is in the formation phase and not publicly available information. We understand that unforeseen events could impede the demand turning into firm orders, even though demand is increasingly in the near-term and it continues to rise in urgency. However, it is imperative that the NRC move quickly to position itself for this growing demand, since it implies that the volume of advanced reactor applications submitted to the NRC will be much larger and sooner than most people had been expecting.

One particularly challenging aspect of the demand is that it is driven by factors unlike any seen before. In the past, new builds were driven by electricity load growth. In this case, the demand is increased by the necessity to convert and decarbonize not just the electrical grid, but the entire economy. As the only dispatchable, firm carbon-free source of energy available today at scale, nuclear power has an important role to play in providing reliable and resilient carbon-free energy for the country. This means that many entities will be simultaneously pursuing nuclear at a scale not previously contemplated.

We believe that the NRC will need to make transformational changes to approve safe designs more efficiently, in order to enable advanced reactor deployment at pace to keep up with demand so the U.S. can meet our climate, energy, environmental, economic, and national security goals. The NRC cannot meet the challenges of the forming market demand by increasing staff alone. Proposals have been made to the NRC to streamline the review process in ways that would achieve generic schedules that are half of those

published by the NRC today, without compromising the rigor of safety in the NRC review. If the NRC could reduce review schedules by half, this would increase throughput and reduce the number of applications in the regulatory process at any one time. This would enable the NRC to execute their mission during large scale advanced reactor deployment to support the U.S. demand. Further efficiencies to achieve a 12-month or shorter application review schedule (from docketing to issuing a license), for designs that the NRC has already approved in prior applications, should also be pursued.

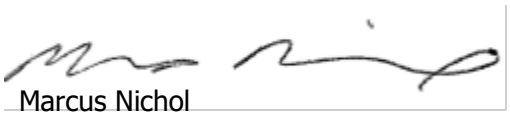
Through transformational improvements to regulatory efficiency beyond those that are being considered today the NRC will be able to meet the challenges of a large and urgent market demand for advanced reactors. Thus, we urge the NRC to focus on a mission of "approving safe designs as efficiently as possible" and on achieving the following key regulatory objectives:

1. Streamline regulatory processes to achieve much more timely and efficient application reviews, and oversight of new and advanced reactors.
2. Resolve key generic technical or policy topics well before new and advanced reactor applications are submitted for NRC review.
3. Revise or establish new regulations, as quickly as possible, to achieve a much more modern and efficient regulatory framework.

The attachment to this letter provides the industry's updated list of high priority regulatory topics based upon the above three regulatory objectives to improve the regulatory framework for new and advanced reactors. Please also note that these priorities are a snapshot in time and may evolve as new issues emerge. While many of our priorities are reflected in the NRC's list of advanced reactor regulatory activities and a summary of key policy and technical issues, summarized on the NRC website, there are some areas where our priorities differ.

If you have questions concerning our input, please contact me, or Kati Austgen at kra@nei.org.

Sincerely,



Marcus Nichol

c: Mr. Dan Dorman, NRR, NRC
Ms. Andrea Veil, NRR, NRC
Mr. Brian Smith, NRR/DNRL, NRC
Mr. Mohamed K. Shams, NRR/DANU, NRC
NRC Document Control Desk

Attachment – Industry Regulatory Priorities for New and Advanced Reactors

The following list of industry priorities for new and advanced reactors is a snapshot in time and is expected to evolve. These priority topics are both highly important to the industry to resolve, have an urgent need for resolution, and require NRC action to complete. Although not included in our high priority topics, we recognize that there are additional regulatory topics that should continue toward resolution (e.g., ISO-9001 as an alternative to NQA-1, risk-informed external hazards analysis, reactor oversight and inspection, and codes and standards).

	Topic	Desired Outcome
1	**NRC Review Efficiency** **a. Timeliness of NRC Reviews** – NRC review schedules for new reactor reviews are unduly long and create a significant impediment for the deployment of new and advanced reactors that are critical to achieving the nation's environmental, economic, and national security goals. **b. Content of Applications** – Current NRC guidance and expectations lead to applications that contain information that is not necessary to make a safety determination and increases the cost and time for the NRC review.	a. NRC implements efficiency improvements to their review processes that can achieve review schedules that better align with the needs of the nation and the regulated industry (e.g., less than 18 months), while continuing to ensure the same high level of nuclear safety, and the same high levels of review quality. b. The NRC guidance and expectations for application content right-sizes the level of detail in new reactor applications.
2	**Environmental Reviews** – Over time, agency implementation of the National Environmental Protection Act (NEPA) has become unjustifiably complex and time-intensive, with reviews frequently spanning several years or more and requiring massive resource expenditures. Thus, maintaining the status quo likely will hinder the timely licensing of the advanced reactors.	Streamline the NRC's implementation of NEPA to achieve efficient and timely environmental reviews (e.g., on the order of 12 months), consistent with the recommendations in the NEI 2020 white paper *Recommendations for Streamlining Environmental Reviews for Advanced Reactors*. • NRC generic environmental impact statement (GEIS) that minimizes the scope of site-specific environmental reviews • NRC guidance on the broader use of environmental assessments (EAs) and categorical exclusions • NRC allows existing environmental analyses to be incorporated into a project's EA or EIS • NRC clarity on an approach to use the applicant's environmental report (ER) as the draft EA or EIS • NRC elimination of unnecessary burden in alternative site analysis • NRC implementation of changes to increase efficiency of environmental reviews

	Topic	Desired Outcome
		• NRC elimination of duplicative adjudicatory hearings for NRC environmental reviews
3	**Physical Security** – The existing regulatory framework for physical security does not take into consideration the safety and security characteristics of small modular reactors (SMRs) and advanced reactors (ARs). These designs are disadvantaged, because they are not able to scale their security organization and response based on their ability to protect against radiological sabotage without the need to interdict and neutralize the threat.	NRC Final Rule - Alternative Physical Security Requirements for Advanced Reactors 10 CFR Part 73 is revised to include alternative security requirements appropriate for SMRs/ARs that provide "security-by-design," i.e., for which engineered features alone are capable of protecting against acts of radiological sabotage. These facilities would be required to detect, assess and communicate unauthorized access (or such attempts) to offsite responders.
4	**Emergency Preparedness (EPZ and Planning Standards)** – The existing regulatory framework for Emergency Preparedness (EP) does not take into consideration the innovative design features, smaller source terms, and safety characteristics of SMRs and ARs. These designs are disadvantaged, because they are not able to scale their emergency planning zone (EPZ) and emergency response based on their safety profile.	NRC Final Rule - EP for SMRs and Other New Technologies The EP regulatory framework for SMRs/ARs is technology-neutral, dose-based, and consequence-oriented, maintains effective defense-in-depth, and facilitates appropriate allocation of EP resources commensurate with the safety profile. Clarity is provided in the guidance related to event selection cutoff frequency (or clear guidance that will reliably lead to a reasonable cutoff frequency) for events to consider in the EPZ sizing.
5	**Near Term Risk-informed, Technology Inclusive Regulatory Guidance** – Current NRC format-and-content and standard review guidance for new reactors does not provide a risk-informed, technology-inclusive option for advanced reactor technologies.	Endorsement of Industry TICAP guidance and Issuance of NRC ARCAP guidance - Establishes guidelines for advanced reactors that are technology-inclusive, risk-informed and performance-based, and builds upon the methodology in NEI 18-04 that was endorsed by the NRC in RG 1.233.

	Topic	Desired Outcome
6	**Part 50/52 Lessons Learned Rulemaking** – Address lessons learned with the experience of the first applicants and licensees to use 10 CFR Part 52 and update 10 CFR Part 50 for technical consistency with Part 52.	NRC Final Rule incorporating Part 50/52 lessons learned - The Part 50 and 52 regulatory processes do not impose undue risks and delays in licensing and construction of new reactors. NRC includes key lessons learned identified by industry such as: • allowing changes to Tier 1 information during construction without prior staff approval • creation of a regulatory process to avoid delays in the issuance of combined licenses (COLs) due to errors noted in the referenced Design Certification • clarify the requirements that are not applicable to non-light-water reactors (non-LWRs) • ensure consistency in the treatment of non-applicable requirements in the Part 50 and Part 52 licensing processes
7	**10 CFR Part 53: Risk-informed, Technology Inclusive Regulatory Framework for Advanced Reactors Rulemaking** – The current regulatory framework for technical requirements is prescriptive and is inefficient for the regulation of advanced reactor technologies.	NRC Final Rule for Part 53 and associated guidance - A technology-inclusive, risk-informed and performance-based regulatory framework that is so efficient and adaptable that it is the preferred option for applicants to meet their needs for schedule, cost and predictability. Framework A is revised to remove, and Framework B avoids including, the significant increases in regulatory burden to achieve the same level of safety, which industry is concerned challenges the viability of Part 53.
8	**Annual Fees for Non-LWRs** – The NRC annual fee rule 10 CFR 171 does not explicitly address non-LWRs and would impose a disproportionate impact on very small reactors (e.g., micro-reactors).	Rulemaking that revises 10 CFR 171 to include non-LWRs - Revision of 10 CFR 171 to assess reasonable annual fees for non-LWRs, and that avoids disproportionate impacts on very small reactors.
9	**Siting** – The existing population related siting guidance is prescriptive and based upon large LWR technology.	NRC updated population related siting guidance (This is waiting for Commission Decision) - NRC guidance and expectations for population related siting of advanced reactors appropriately consider their smaller source terms and safety characteristics through the use of technology-inclusive, risk-informed, and performance-based criteria.

	Topic	Desired Outcome
10	**Advanced Manufacturing Technologies** – A lack of clarity on the NRC licensing and technical expectations for the use of advanced manufacturing components, particularly for pressure boundary parts, is a barrier to the adoption of these advanced manufacturing technologies.	NRC risk-informed guidance on licensing and technical considerations for advanced manufacturing technologies - Regulatory guidance and expectations that support timely and cost-effective implementation of advanced manufactured components by the nuclear industry.
11	**Fuel qualification** – Many advanced reactors are planning to use new fuel types that have not previously been used in commercial reactors in the U.S. Furthermore, the NRC's timeline for approving new fuels for large LWRs is not compatible with the industry's timelines for licensing advanced reactors.	NRC guidance on qualification of fuel for advanced reactors that allows for timely and efficient approvals, including completion of CNSC/NRC Joint TRISO Fuel Assessment Project. Fuel qualification requirements that vary depending on the role fuel performs regarding safety in a respective reactor design. NRC acceptance that ASME NQA-1 is not the only way to qualify fuel data as many testing facilities (e.g., DOE national laboratories) do not use ASME NQA-1 but use their own quality assurance program (e.g., QAPP) that satisfies the quality assurance requirements of Appendix B to 10 CFR Part 50.
12	**Operations** – The existing regulatory framework for all aspects of Operations does not take into consideration the features of SMRs and advanced reactors. Alternative approaches, which still maintain the level of protection to the public health provided by existing reactors, are needed so that the business case for new reactors is not disadvantaged.	Limit unnecessary burden on new reactors while maintaining safety. • NRC clarity/guidance for SMRs and advanced reactors on Operator Staffing, Organization, and Concept of Operations, Human Factors Engineering, and Operator Training programs • (Remote/Automatic) Alternative approaches to licensed operators for micro-reactors that demonstrate they do not require continuous monitoring by an operator or any safety actions by an operator. • Alternative approaches to traditional control rooms for micro-reactors that demonstrate they only need a few instruments and controls at the reactor or at a remote center that provides operational control of a fleet of micro-reactors.