Chair Christopher T. Hanson
U.S. Nuclear Regulatory Commission
Remarks for the ANS Utility Working Conference
Florida
August 5, 2024

Introduction

Good morning, everyone. Thanks to ANS for hosting this event, and especially to Craig for inviting me to speak. My first speech as an NRC Commissioner was at this forum four years ago. In the middle of a pandemic, I logged on remotely, introduced myself, and shared how I might approach my new role. The agency was responding to Covid and implementing innovative approaches to accomplish our mission while making sure our staff, licensees, and other stakeholders remained safe. We were engaging in pre-application with just a handful of advanced reactor developers, and the Commission was deliberating on a rulemaking plan for a new risk-informed performance-based regulatory framework. We had also recently created a new Division of Advanced Reactors within NRR to increase focus on advanced reactor readiness and staff capacity to support advanced reactor licensing, setting in motion many of the regulatory initiatives bearing fruit today.

A lot has happened since, but I'm really happy to be able to connect with you once again at this conference, in-person this time. And for what it's worth, I'm speaking for myself this morning rather than on behalf of the Commission.

I appreciate the theme of this plenary, which is: Understanding the Forces Driving and Impacting the Advancement of Our Clean Nuclear Energy Future.

Our fundamental mission at the NRC will always remain the same—that is, to license and regulate the Nation's civilian use of radioactive materials to provide reasonable assurance of adequate protection of public health and safety, to promote common defense and security, and protect the environment. I'm also confident the NRC, as the nation's nuclear safety regulator, will play a key role in the future of nuclear energy, both here in the United States and abroad.

But how we achieve reasonable assurance must evolve to address the current environment. I don't need to remind this audience of the current nuclear landscape. Congress, the administration, and industry continue to invest heavily in the nuclear sector, and momentum and interest continue to grow. We are acutely aware of the context.

The Administration is trying to combat the climate crisis. President Biden has set an ambitious U.S. goal of achieving a carbon pollution-free power sector by 2035 and net zero emissions economy by no later than 2050. The world understands the importance of carbon-free energy to the future. At the Conference of the Parties 28 in Dubai last year, 22 global

leaders, including the United States, signed a declaration to triple nuclear energy by 2050. Alongside climate change—energy independence, national security, human health, and economic development are all drivers for increased global interest. The nuclear industry is evolving at a fast pace to meet this demand and we are seeing significant interest and investment, particularly in small and advanced reactors. And even large reactors are back in talks once again.

The ADVANCE Act is the most recent example of strong bipartisan support. I appreciate Congress for its vote of confidence in the agency's ability to accomplish our mission in this dynamic environment. And while a cultural shift—focusing on efficiency through risk-informing and continuous learning—was already underway at the NRC, the ADVANCE Act will help drive that efficiency mandate forward and provide us with additional tools for execution. The IRS and Treasury put out final rules implementing new credit provisions of the Inflation Reduction Act. We expect to see an increase in license amendment requests and power uprate applications as a result.

While the NRC doesn't promote new technologies, we cannot be an impediment to innovation and adoption of new technologies. At the same time, a strong and independent regulator is vital to a thriving industry and ensuring public trust. To that end, we continue to improve our regulatory approaches and processes to be more efficient, technology-inclusive, risk-informed, and performance-based—while continuing to operate in a manner that instills public confidence. We have adapted and are continuing to adapt, to the evolving operating reactor landscape.

Operating Fleet

Even just 5 years ago, it appeared that the number of operating plants would continue to decline, but the tide turned, and today we are holding at 94 operating reactors. Two AP1000 units at Vogtle have now entered commercial operation, for the first time the NRC is evaluating a request to return a previously shutdown reactor – Palisades – to operation, and there are preliminary discussions about others considering restart. The future of nuclear depends on the safe and reliable operation of the current fleet. And to that point, I want to recognize the nuclear industry for its sustained, strong safety performance. As of today, 89 out of 94 operating reactors are performing in the highest performance category of the Reactor Oversight Process (ROP) and no reactors are in Column 3 or higher.

We regularly use operating experience and incorporate stakeholder feedback into NRC's oversight program to ensure continuous improvement. For example, in 2023, we implemented the new quadrennial engineering inspection cycle, which reduced inspection hours while maintaining our same safety focus. We revised the reactor assessment process on treatment of greater-than-green findings and performance indicators to improve consistency and clarity. On the Emergency Planning Significance Determination Process, the staff is implementing the Commission direction to align the significance of inspection findings with the associated risk from the applicable emergency preparedness planning standards, further risk-informing the process.

In the area of physical security, the Commission recently approved revising the security oversight framework to include one NRC-conducted force-on-force exercise and an enhanced NRC inspection of a licensee-conducted force-on-force exercise. The Commission also approved the site-specific security bounding time concept to allow more realism in protective strategies. In light of the ADVANCE Act, we'll be looking to further enhance our already robust reactor oversight program without compromising safety. On the licensing side, the IRA production tax credits and other policy measures are incentivizing licensees to make investments for the long term, including plant life extensions, power uprates, new fuel designs and digital upgrades, all of which have to go through the NRC.

We've streamlined subsequent license renewal reviews by leveraging risk-insights, prior safety and environmental conclusions, and standardized programs, and by focusing NRC and industry resources on the most safety significant aspects of long-term operations. In fact, recent license renewal reviews are on track to be completed with 20 to 40 percent fewer review hours compared to past reviews and well ahead of schedule. On the environmental side, the Commission recently finalized its rulemaking on the License Renewal Generic Environmental Impact Statement, which allows the NRC staff and licensees to focus solely on site-specific impacts for the facilities.

According to NEI, over 50 percent of sites are planning for power uprates in the coming years. Over the past 20 years, we approved uprates that have given the nation's electricity grid an additional 6 GWe. We have a coordinated effort to streamline our power uprate process in anticipation of the large volume of applications. As with plant life extensions, we are leveraging past experiences and advances in risk assessments to implement a graded approach. We're focused on gaining review efficiencies for concurrent changes such as increased enrichment, higher burnup, and accident tolerant fuel, recognizing the significant overlap in design and safety analysis in these areas. We continue to engage our stakeholders to ensure we have the appropriate guidance in place.

In parallel, we're modernizing our regulations in this area with a rulemaking on increased enrichment of conventional and accident tolerant fuel for light water reactors. This broad rulemaking addresses regulatory requirements related to the control room dose criteria, criticality accidents, ECCS performance, and other issues. We have an opportunity in this rulemaking to risk-inform an area that has traditionally been deterministic.

Advanced Reactor Landscape

Meanwhile, advanced reactor activities continue to ramp up.

We're now engaged with 17 advanced reactor developers and potential applicants at various stages of the licensing process. As we speak, we are reviewing applications for three construction permits; a standard design approval; and a fuel fabrication facility license. Over 15 entities are actively engaged in pre-application activities. We have completed nearly a hundred topical reports and white papers since 2018, and we have over 50 under evaluation right now. We're seeing significant interest in micro-reactors, which may produce power up to several tens of megawatts. Deployment models for some micro-reactors include fabricating and fueling

complete reactors in a factory, removing and replacing the entire reactor at a nuclear power plant site, transportation of fueled reactors, and operation without reactor operators. Also, there is interest in new research and test reactor facilities, which could be used to demonstrate technology feasibility and expand university research, training, and education programs.

Over the next three years, we're potentially looking at more than 30 applications for a variety of approvals—spanning early site permits, construction permits, standard design approvals, design certifications, manufacturing license, operating licenses, and combined licenses.

Increasing Licensing Efficiency

Given this demand, "business as usual" cannot be the way forward.

As I said during my speech at NRC's Regulatory Information Conference earlier this year,

"Reflexively doing things the way we have always done them is not going to work. I expect every leader in the NRC to look closely at the "why" of our policies, processes, and procedures and then develop more efficient and effective ways to accomplish our safety mission while making room for the increased scope of work."

Risk-informed thinking needs to be baked into everything we do. To keep pace with the highly dynamic, innovative nuclear landscape in which the NRC operates, the agency must be prepared to regulate emerging technologies and address novel challenges—and we can do this by leveraging the vast licensing experience we've built over the last 50 years.

First example is Vogtle Units 3 and 4, where we learned about timely issuance of Combined Operating Licenses and the use of Part 52, evaluating design changes, focused construction oversight, and how to structure efficient reviews for Inspections, Tests, Analyses, and Acceptance Criteria.

From our work on NuScale—the first SMR design certification approved by the NRC—we learned about the importance of robust pre-application engagement in the form of white papers and technical reports and of hands-on project management and stable core-team staffing within the agency.

We took all of that experience and applied it to the Kairos Hermes test reactor. And we completed the safety and environmental reviews ahead of schedule and on-budget. Now, we've got the Hermes 2 application in-house and just a couple of weeks ago, the staff completed its safety evaluation report four months ahead of the 14-month schedule and the total resources expended are anticipated to be around 60 percent of the original estimate. In May, we accepted the construction permit application from Terra Power for its Natrium reactor—the first large scale Gen-IV commercial advanced reactor construction permit application for the NRC. This is also the first time an applicant is using a technology-inclusive, risk-informed, and performance-based methodology to support its licensing application. We announced an aggressive 27-month

review schedule in addition to the multiple concurrent topical report reviews.

But robust pre-application engagement is critical to lay the groundwork for a smooth and efficient license application review, enabling industry representatives to ask pertinent questions in advance to ensure an efficient and comprehensive review.

Using topical reports to resolve key issues before the application is submitted supports regulatory predictability and efficient reviews. I note that Kairos was particularly effective in this regard.

Advanced Reactor Regulatory Infrastructure

Clearly, having the right regulatory infrastructure is also critical. And we continue to place a high priority on developing policies, regulations, and guidance that are technology-inclusive, risk-informed, and performance-based. Over the last several years, the NRC has steadily worked with stakeholders to identify, develop, and implement policies, rulemakings, and guidance, key to efficient and effective licensing and regulation of new technologies.

For decades, we've been focused – successfully – on large light water reactors. Our approaches to these facilities have generally been technology-specific, deterministic, and prescriptive, although we've been making significant strides with operating reactor risk-informed initiatives.

But fundamentally, regulatory approaches were optimized for traditional reactors—safe, but relatively complex facilities with active safety systems. For advanced reactors, the designers' approaches to defense-in-depth will likely be significantly different and simpler. It may employ functional containment, a low-pressure design, inherently stable fuel forms, and passive safety features. Leaning into a future of advanced reactor applications on the near horizon, the Commission issued the Staff Requirements Memorandum for the proposed Part 53 advanced reactor rule earlier this year. This draft proposed rule marks a major evolution in risk-informed regulation. The proposed rule puts probabilistic risk assessment and risk insights in a leading role, balancing flexibility and predictability while assuring the safety of the public. The rule will give plant designers and plant operators flexibility in determining how their nuclear power plant will meet safety criteria.

Further, it affords designers and operators enhanced flexibility by enabling reactor designs with demonstrated safety to leverage safety margin in gaining operational flexibility in areas such as emergency preparedness, security, operator licensing, and change control. The staff is currently implementing the Commission direction and will publish the Part 53 proposed rule for public comment later this year. The final rule is currently expected to be published ahead of the December 2027 due date established by Congress.

The agency has made progress on many other fronts. Late last year we issued the final Emergency Preparedness Rule, which scales emergency planning requirements commensurate with radiological risk, source term, and potential hazards.

We also updated our siting guidance to account for the safety features of new reactor designs. Instead of a one-size-fits-all standard of 20 miles, it specifies a dose-based performance criterion for determining the area within which population density should be evaluated.

In April of this year, the Commission issued its decision on a New Reactor Generic Environmental Impact Statement—which will significantly streamline environmental reviews for new and advanced reactors.

This past June, the Commission approved the proposed rule for advanced reactor physical security which would provide designers and licensees with flexibility to adopt alternative approaches to physical security for facilities meeting certain consequence-based eligibility criteria.

Our Advanced Reactor Content of Application Project, or ARCAP, is a significant accomplishment for the staff and the industry to help ensure licensing predictability for applicants applying the new Licensing Modernization Project methodology. The staff recently delivered an options paper to the Commission to provide near-term regulatory clarity related to fuel loading and operational testing of factory-fabricated micro-reactors.

With the current level of interest we see in the industry, the agency needs to be ready for "serial deployment" of microreactors and small modular reactors. We will likely see applications that either have significant similarities, build on one another iteratively, or even seek some form of joint review and approval. To address these future opportunities, the NRC has embarked on a new initiative focused on standardizing reviews and giving credit for applicants who standardize designs and licensing approaches and rely on prior NRC safety and environmental decisions.

Additionally, the NRC has a joint project with the Idaho National Laboratory to assess how small and advanced reactor construction costs intersect with our codes and standards so we can right-size both to better account for the enhanced safety of many designs.

The Commission also voted to significantly streamline mandatory hearings at the NRC by moving to a paper format for hearings under AEA Section 189a for construction permits, early site permits, and combined licenses for production and utilization facilities. This new process will take approximately 8 weeks as opposed to 4-6 months, and reduce staff effort by more than half, saving the agency and licensees significant resources. Iterative or "nth of a kind" hearings will be become more efficient under this process, as the Commission's review will focus on deltas from applications already reviewed.

Culture

Before closing, let me share a few thoughts on culture.

Throughout my tenure, I have discussed my vision for building an environment of high trust and high confidence. We are facing a lot of changes at the NRC that are influenced by technology, policy, and demographics.

As I stated earlier, the ADVANCE Act passage will help us accelerate cultural change at the NRC. We're already making changes to environmental reviews, physical security requirements, and the like. It's a mindset change focused on gaining efficiency through risk-informing our actions. That already enabled us to complete the final safety evaluation for Kairos' Hermes 2 four months ahead of schedule at about two-thirds of the anticipated cost.

One thing I admire about our people is their ability to take lessons learned and apply them to the next big challenge. You'll continue to see that over the next several years as we address these new technologies with a more risk-informed, performance-based licensing method and overall approach.

The NRC will celebrate its 50th anniversary in January 2025. The agency learned a lot over the last five decades to say the least. The agency has learned what is critical for safety and security. And that body of knowledge gives the agency confidence in its technical capabilities at all levels so that we can leverage our vast intellectual capital to make better, smarter, more efficient, and more durable regulatory decisions. As I frequently tell the NRC staff, we need to have confidence in our abilities and confidence in our ability to change.

Conclusion

We are prepared *now* to license advanced reactors. We continue to identify opportunities for streamlining our review processes to support efficient licensing of small modular and advanced reactors, and the operating reactor needs—assuring that every area in our regulatory purview is risk-informed and working together. We are evaluating the way we do business, looking for opportunities to leverage the knowledge the agency has gained in its nearly 50 years of public service to do things better. We are looking ahead, anticipating and paying attention to the world around us.

We are doing this by building confidence and trust inside the agency; by cultivating and safeguarding confidence and trust outside the agency; by maintaining our independence while reaching out and bringing in information and perspectives necessary for improvement; and finally, by building on all of this to apply risk insights clearly and reliably to every aspect of our mission to better maintain safety and security.

And I'll leave it there. Thank you for having me today. I look forward to your questions.