Commissioner Stephen G. Burns Remarks
Advanced Reactors Summit V
Texas A & M University, College Station, Texas
February 21, 2018

Thank you for the opportunity to speak today about the NRC, advanced reactor applications and the potential future of nuclear power regulation. I am pleased to be filling the shoes of Chairman Kristine Svinicki, who asked that I represent the agency at today's summit.

Before I begin, and certainly before I begin looking toward the future, I'd like to tell you a story. Back in November 1971, I was an 18-year-old college freshman from Virginia, settling into academic life in upstate New York. If you remember your freshman year, you know there are a lot of adjustments to make, and most students are focused on dealing with new teachers, a new campus, and new friends. And I was. But I was also determined to cast my vote in the first election for which I was eligible, right after the 26th amendment to the Constitution gave 18 year olds the right to vote, and so I went to the university registrar's office to fill out my absentee ballot.

I intended to vote a straight Republican ticket to support that party's push under Governor Linwood Holton to shed Virginia's legacy of segregation, but I accidentally selected two candidates on my ballot for the House of Delegates for whom I did not intend to vote. I carefully crossed out those names and wrote in "do not desire to vote for these two" on the ballot. All good as far as I was concerned. Unfortunately, others thought otherwise and my "defaced" ballot was rejected, which, unbelievably enough, led to a tie for that house seat. As an aside – yes, every vote *does* count. In the case of a tie, according to Virginia law, the winner is left to chance and literally drawn from a hat, well, in this case, a silver cup. By the way, my candidate won. It's a fun story, recently recounted by the Washington Post.

But why is it relevant now?

Fast forward to late 2017. Forty-six years after my voting snafu, Virginia faced exactly the same unlikely predicament involving a disputed ballot, a tied race and a tie-breaking lucky draw to settle a state House race. The Washington Post told this story for the same reason I am recalling it now. Because we often think that what we're facing today – in politics, in industries, in academia, in regulatory space – is completely novel, something never seen before. And it's just not true. There is an NRC press release with the headline "Nuclear Regulatory Commission Directs Staff to Take Experimental Steps to Improve Licensing Process." Nothing particularly surprising there. But note -- it's dated October 20, 1978, two months after I began my career at the NRC.

So while some of the technology and processes behind advanced reactors might be new and novel, the challenge of appropriately regulating new technology is not so much.
Indeed, it's a challenge the NRC has faced – largely successfully – before, and one we are equipped to face again. The NRC is an adaptable organization. The NRC has been responsive to change in the past. We don't simply sit around and wait for change to come to us. We've taken and are taking the initiative to make ourselves and our regulatory regime better. Today, we are doing what we can to prepare staff and prepare our processes for what changes might – emphasis on might – be coming toward us.

I recently wrote an article for the OECD's *Nuclear Law Bulletin* entitled "Reformed and Reforming: Adapting the Licensing Process to Meet New Challenges." Permit me to raise some of the same points here that I do in that article.

First, it is worth noting that the NRC has had at least some engagement over its history with advanced non-light water reactor (non-LWR) concepts and has undertaken activities to strengthen its capability and framework for dealing with advanced reactors. The AEC reviewed and licensed non-LWR designs, and the NRC also conducted some conceptual design and pre-application reviews in the 1980s through the 2000s. Under the Energy Policy Act of 2005, the NRC and the Department of Energy co-operated on research and pre-application activities related to the Next Generation Nuclear Plant project, an effort focused on a reactor employing high-temperature gas technology.

In 2008, the NRC revised its 1985 policy statement on advanced reactor licensing, in which we stated that the NRC encourages early interaction by designers, vendors and potential licensees to identify unique safety, security and regulatory issues, and to enhance the stability and predictability of licensing and regulation of advanced reactors. More recently, in response to direction in the 2012 appropriations act, the NRC submitted a report to Congress on advanced reactor licensing that addressed the agency's approach. That report outlined steps the NRC was taking to prepare for potential advanced reactor reviews. Building off this report and engagement with stakeholders, in late 2016, the NRC issued a vision and strategy statement and developed implementation action plans to address near-term as well as medium- and long-term actions to achieve its objectives.

The perceived need to further reform the regulatory process and pave the way for a new generation of reactors has gained traction in the Congress. Several bills were introduced in both houses in the 114th Congress and progressed through the legislative process, though none were enacted. Similar bills were re-introduced in the current 115th Congress, which could compel the NRC to examine its licensing review process, modify existing fee requirements, and provide DOE support to advanced reactors through cost-sharing initiatives, and access to the national laboratories and other department resources. But, frankly, the industry does not need to put all its eggs in the congressional basket, at least from a regulatory standpoint.

The NRC has the existing statutory authority to adjust its processes and adapt its regulatory framework, should that have merit, to address the perceived gaps and hurdles posed by the existing licensing system. This is not to say that legislation is objectionable. It might well help the NRC meet the demands of reviewing innovative designs. But the passage of legislation is far from certain. Indeed, the NRC's experience with Part 52 provides a cautionary tale, because it was ultimately the NRC's own initiative – and not legislation – that led to the adoption of the revised licensing process in the late 1980s.

Advocates point to other regulatory regimes – both domestic and international – as potential models for the NRC in terms of a more staged approach to regulatory determinations. For example, both the Federal Aviation Administration and the Food and Drug Administration have phased regulatory review processes to evaluate introduction of new aircraft technologies or new drugs. The Canadian Nuclear Safety Commission's (CNSC) Vendor Design Review (VDR) is also often held up as a desirable model. The VDR is an optional process offered by the CNSC for vendors to obtain an assessment of the overall acceptability, at a high level, of a reactor design; it does not constitute a design certification, nor does it constitute a license, nor is it binding on the CNSC.

The NRC's processes for reviewing designs achieve similar objectives in terms of determining the licensability of a reactor design with the *additional* potential outcome of issuing a design certification that has binding legal status when referenced in a site-specific license application. The NRC can look to its northern neighbor as a model for parts of the review process – and we have been in dialogue with the CNSC -- but we have already demonstrated responsiveness to the calls for adaptations in structuring our review process. In essence, we've indicated that we are prepared to consider step-wise reviews of important components of a design including standard design approvals that can approve portions of a design and provide a developer confidence that its product is on the right track short of design certification. Moreover, these adaptations would not require changes to the NRC's rules under 10 CFR Part 52. The option also remains to obtain approval of a preliminary design by seeking a construction permit under 10 CFR Part 50.

In fact, the NRC is prepared to engage in pre-application interactions with potential applicants at various levels of development of a design or a proposal to construct a design at a particular site. After publishing a draft for comment in late 2016, the NRC staff recently issued its Regulatory Review Roadmap in December 2017. The roadmap illustrates how early interactions can align with the current licensing process. The roadmap identifies milestones that provide NRC views on the licensability of a design at various phases of development.

The roadmap also identifies various mechanisms for engagement at different levels of development in the design process, from early consideration of fundamental design aspects and basic safety features through a "conceptual design approval" or "preliminary design approval," to the more developed and conclusive determinations reflected in a topical report or standard design approval. As the staff engages the industry on advanced designs, I encourage our staff to work with developers to establish clear objectives and expected outcomes for prelicensing interactions to enhance the transparency of interactions on new designs. The staff has encouraged developers to prepare regulatory engagement plans to set clear objectives and common expectations.

The scope and process for a standard design approval is spelled out in 10 CFR Part 52, Subpart E. A standard design approval may cover the entire final design or "major portions" thereof. This latter category has attracted attention as a possible tool for moving advanced design reviews forward by focusing on aspects of plant design without requiring the entire design. Although a standard design approval provides conclusive NRC staff findings on the reviewed design or its identified portions, it is not binding in the same sense as a design certification. Nonetheless, the outcome is persuasive and can be referenced in other licensing applications for a specific site as well as ultimately in a design certification. In this respect, the NRC's standard design approval is comparable to Canada's approach.

The appropriateness of current regulatory standards and the need to make changes to address advanced reactor technologies is an important issue -- and one that may well warrant regulatory changes in the long term. In simplest terms, the technical standards applicable to plant licensing have been drawn largely from experiences with light water reactor technology. Although the existing licensing process can adapt to differences in technologies, some are concerned that case-by-case exemptions from requirements can be expensive and take more time. They may even foster the negative perception that an applicant is seeking to avoid robust safety standards. Nonetheless, at least in the near term, case-by-case assessment of the particular relevance of generic technical standards and requirements to the technology being put forward in an application will be necessary.

The NRC is also being called on to update our framework to be more technology-neutral and inclusive, risk-informed and performance-based. We've said we will do so in our vision and strategy for non-LWRs and the related implementation plans. Although significant efforts are underway to improve or establish guidance to address the new technologies, a determination whether to develop a new non-light water reactor regulatory framework would be made based on interactions with industry and experience in the next few years as well as broader lessons from research and industry code and standards development.

In 2010, the NRC staff informed the Commission of a number of policy, licensing, and technical issues that might warrant further Commission engagement as the staff prepared for reviews of Small Modular Reactor (SMR) designs. The staff's paper is also relevant to advanced reactor technologies. Generally, it discussed such issues as accident source terms, site suitability, emergency planning, security and safeguards requirements; and the application of defense-in depth. Further steps have been taken to address these issues. For example, the NRC recently solicited comments on its regulatory basis for emergency preparedness for SMRs and non-LWRs, a first step towards publishing a proposed rule expected in early 2019.

Another significant step is the NRC's recent publication of a draft regulatory guide for developing principal design criteria for non-LWRs. In 2013, the NRC, with DOE, initiated a joint effort to address the licensing framework for advanced non-LWR technologies. The NRC and the DOE agreed to focus on the general design criteria in Appendix A to 10 CFR Part 50 in relation to advanced designs. The efforts resulted in a DOE report, based on work undertaken by the Idaho National Laboratory that was submitted to the NRC in late 2014. This ultimately led to the NRC's 2017 issuance of a draft regulatory guide for comment. The proposed criteria are intended to be technology neutral. The NRC has reviewed public comments and is engaging the Advisory Committee on Reactor Safeguards before issuing a final version of the Regulatory Guide.

The industry has been active as well. Case in point – the effort, led by Southern Company, called the Licensing Technical Requirements Modernization Project. It identifies changes the industry believes will facilitate appropriate adjustments to the regulatory process. Initial submittals to the NRC through this project involve the selection of licensing basis events, the approach to probabilistic risk assessment, safety system classification, and defense-in-depth. The NRC is engaging with the industry on these reports. Other efforts may contribute to the evolution of the regulatory framework to support SMRs and advanced non-LWR licensing. Although the NRC decided not to pursue a broad policy statement on risk management, it intends to make risk-informed regulatory improvements through its existing regulatory framework.

The Commission has also approved undertaking revisions in the next few years to Part 50 regulations for new power reactor applications to more closely align with Part 52, and also to revise Part 52 and supporting regulations to implement further lessons learned from experience from new licensing activities. As the NRC interacts with designers and those interested in siting new installations, one can expect further refinements in the approaches to bringing designs through the licensing process and to updating the licensing standards that will apply to such technologies. Continued engagement in the international community will also benefit the development and refinement of regulatory approaches and standards applicable to newer technologies.

The title of my *Nuclear Law Bulletin* article deliberately used “reformed” and “reforming.” Although generally used in an ecclesiastical context (and for those of you who marked the 500th anniversary of the Reformation this past October, you will know what I mean), the words underscore my view of the historic and ongoing approach the NRC has taken to meet the challenges put before it: the NRC continues to examine itself, its processes and approaches, to adapt them when necessary, and to reflect in good faith on experience gained and then reform yet again when needed to meet new challenges. *Propellente reformata, semper reformanda*: the agency is reformed, and is always being reformed.

As we look to the future of new technologies and consider future reforms, let us not ignore the successes and lessons learned of the past. As people and as parts of our respective institutions, we are the product of our histories, bringing what we have learned in the past to inform our present and to shape our future. That is true even for this former college freshman with a dicey voting record.