UNITED STATES NUCLEAR INFRASTRUCTURE COUNCIL
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Hearing on Enabling Advanced Reactors and a Legislative Hearing on S. 2795, "The Nuclear Energy Innovation and Modernization Act

The Honorable Jeffrey S. Merrifield Commissioner, U.S. Nuclear Regulatory Commission (1998-2007)
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Chairman Capito, Ranking Member Carper and members of the Subcommittee, it is indeed a pleasure to be here today before a Committee on which I used to work as a counsel, and one on which I had the opportunity to testify on many occasions during the time I served as a Commissioner of the U.S. Nuclear Regulatory Commission (NRC). I am appearing here today in my role as Chairman of the U.S. Nuclear Infrastructure Council (NIC) Advanced Reactors Task Force, although my full time occupation is as a Partner in the nuclear energy practice group of Pillsbury Winthrop Shaw Pittman.

Before I begin my testimony, I want to make it clear that, while I am testifying on behalf of NIC, the views I am presenting do not necessarily reflect all of the members of NIC, nor those of the law firm on which I am a partner. Further, I would provide the disclaimer that our firm represents a diversity of nuclear suppliers and utilities, and I personally serve as outside counsel for two Advanced Reactor developers.

Today my testimony will reflect on the Agency at which I had the pleasure of serving and the provisions included in S. 2795 regarding how the NRC conducts its business. I will also discuss the status of Advanced Reactors including NIC's views regarding the proposed legislation as it relates to Advanced Reactors. In the main, we applaud the Subcommittee's focus and support S. 2795's measures to limit the overhead of the NRC along with caps on the growth of Agency fees -- as well as urgently needed reform to enable the development and deployment of Advanced Reactor technologies. For its part, NIC issued a Framework for Advanced Reactor Licensing Modernization White Paper on February 22, 2016, which envisioned many of the elements contained in this legislation as they relate to Advanced Reactors. There are a few additional areas that the bill did not address which we believe would further strengthen the legislation. While I will outline these later in my testimony, I want to assure the Subcommittee we stand committed to work with the Committee and its staff to move this legislation forward.

NRC Fee Policies and Overhead

When I first became a Commissioner in 1998, the Agency, much as the case today, was hearing calls that a number of nuclear reactors may shut down in the near future and Congress was "encouraging" the Agency to reduce the size of its budget and staff. Indeed, the current Chairman of this Committee – Senator Inhofe – led the way in efforts to oversee the Agency and assure that the Commissioners were working diligently to "right size" its staff consistent with the NRC's mission of protecting people and the environment while also increasing the efficiency of inspection and licensing activities. In 1998, the Agency had approximately 3,400 employees and within the next few years we were able to reduce that down to about 2,800 – principally through attrition.

As we know, in the early 2000's the size of the NRC began to expand, and with the subsequent events of September 11 and Fukushima, the Agency has not had the opportunity since the late 1990's to fully reassess the size of its staff or budget. I applaud the Agency for undertaking Project AIM 2020 and believe it will contribute to meaningful reductions in the size of the NRC.

That said, I understand and sympathize with the concerns previously voiced by members of this Committee regarding the size of the Agency, the decrease in efficiency of the Agency's licensing actions and a view that the overhead activities at the Agency have grown to a level which is not commensurate with the number of licensees currently under the purview of the NRC. As it relates to the size of the Agency, it is my view that this Committee is appropriately focused on further encouraging the NRC to "right size" its staffing below the level initially envisioned in Project AIM. Consistent with the activities taken by the Commission in the late 1990's, I believe that it is possible to appropriately reduce the size of the NRC while at the same time effectively maintaining safety, inspection activities and improving the timeliness of licensing actions.

I commend the Committee for continuing to encourage the Agency to focus on providing more timely and risk informed decision-making. Consistent with this focus, I support the provisions in S. 2795 which would seek to limit the overhead of the NRC and place appropriate caps on the growth of Agency fees. Frankly, as was the case when I appeared before this Committee over 15 years ago, I believe the amount of fees placed on individual licensees is not appropriate and should not cover inherent government functions and overhead. At that time, this Committee supported an increase in the ratio of fee based to non-fee based costs from 95/5 to the current level of 90/10. While S. 2795 eliminates the specific ratio, I believe it is intended to achieve the same goal, which is to appropriately balance the important non-user fee activities – which should be borne by general revenues – and those user-specific activities that should be borne by licensees. As it did in the late 1990's and early 2000's, I believe that the Commission and its staff, ably administered by the Executive Director of Operations, Victor McCree, can rise to meet the efficiency challenge envisioned in S. 2795.

Further, and consistent with my earlier testimony, I believe that this Committee, and Congress, should review and reassess the amount of money dedicated to nuclear energy research,

development and deployment. As a country, we continue to invest huge sums of government funding toward renewable technologies. Given the enormous amounts of clean, carbon free energy provided by nuclear energy, Advanced Nuclear Reactor technologies deserve equal treatment at a minimum.

Status of Advanced Reactors

Over the last year, NIC has identified a confluence of environmental, energy security and competitiveness considerations that are accelerating the need for the expedited development of Advanced Nuclear Reactors in the United States and worldwide. These Advanced Reactors can be used globally to provide economical, carbon-free electricity and industrial heat generation while providing a new option for the looming replacement of America's nuclear energy fleet as existing nuclear reactors reach the end of their licensing life beginning as early as 2030.

Ranging widely in size from micro-reactors of a few megawatts electric (MWe) to large gigawatt ("GW") -size reactors of 1000 MWe, these non-light water Advanced Reactors embrace enhanced passive safety features as well as the prospect for improved nuclear energy economics and competitiveness with other energy sources including natural gas for baseload supply. These Advanced Reactors also bring with them significant interest from the financial community which is seeking gateway technologies to invest in this arena. In addition to funding and infrastructure, a modern licensing framework is needed to enable development and deployment of Advanced Reactor technology in the U.S. and to extend U.S. nuclear energy technology leadership that has featured progressive light water reactor designs including passive Generation III+ designs currently being deployed in Georgia and South Carolina as well as small, modular, light water nuclear reactors now headed toward deployment.

U.S. Nuclear Energy in Context

Today, U.S. nuclear energy plants provide almost 20 percent of the nation's electricity and over 60 percent of America's carbon emissions-free electricity. The U.S. fleet is comprised of 99 units that are based and adapted on light-water reactor ("LWR") technology directly developed by the U.S. Navy propulsion program. Utilities and the nuclear industry have improved upon and optimized the LWR technology and the current fleet is now operating at world-class high levels of safety and reliability. The U.S. fleet turned in another record setting year of world class operating performance, achieving a fleet-wide capacity factor of 91.9 percent in 2015.

However, the existing U.S. nuclear energy fleet is among the oldest in the world with over a third of the current plants being over 40 years old. Many of the reactors could be retired beginning around the 2030 timeframe, although there is a strong basis for extending their life to 80 years through a second license renewal.

With the worldwide impetus to reduce global carbon emissions -- along with a significant increase in electricity demand -- the U.S has a compelling need to develop and deploy the next generation of Advanced Reactors. Deployment of this new generation of reactors will require a new model, one that is more dynamic and capable of forming private-public partnerships in

support of private-sector-led innovation driven initially by private-sector investment. Already in the U.S., there are a number of Advanced Reactors that have progressed to the design and engineering stage and are supported by meaningful investments from the private sector.

While there is wide recognition regarding global climate change and the vital role that nuclear energy plays in meeting carbon reduction targets, the current level of government investment in nuclear technologies is markedly insufficient. According to the Energy Information Agency, with tax incentives, the U.S. government "spent" over $15 billion on renewable and biomass programs in 2015 – but "spent" $1.66 billion for nuclear energy in the same period.

Additionally, the current framework of U.S. government policy, legislation, regulation, research and development support, and fee-based licensing is more aligned with the past than what is needed for the future to commercialize a new generation of Advanced Reactors.

This is particularly true of the NRC licensing process, which presents one of the largest risk factors confronting private developers of Advanced Reactors. It does not easily accommodate a staged investment approach as the technology development and licensing risks are addressed and resolved.

Revitalizing the U.S. Advanced Reactor Development Mission

Currently, the DOE and NRC share responsibilities for supporting and overseeing the U.S. nuclear energy program under the Atomic Energy Act ("AEA") and the Energy Reorganization Act ("ERA"). This latter Congressional Act assigned the promotional and development responsibilities to the U.S. Department of Energy (DOE – the successor agency to the Energy Research and Development Agency ("ERDA"). A companion agency, the NRC, was assigned the responsibilities for assuring public health and safety and carrying out the regulatory and licensing program.

Over the course of time, DOE increasingly focused on basic and applied research, while the NRC moved to focus exclusively on its primary mission of safety oversight and regulation. Today this framework is struggling to foster the private capital formation required to advance promising private-sector nuclear innovation, as those companies are isolated from the types of support that has been offered historically and, in a contemporary setting, support that is offered to other innovative but non-nuclear energy technology companies.

If the U.S. is to be successful in developing and deploying a new Advanced Reactor fleet as early as 2030, Congress should consider significant policy changes. It should provide additional resources to both agencies as well as direct them to focus and mobilize their resources and expertise on the goal of expanding nuclear energy options with Advanced Reactors.

Both the DOE and NRC must be proactive in developing their capabilities and engaging with the Advanced Reactor community. Today, the NRC interprets its mission as an exclusive safety mission with a caveat that that its processes and activities must not place an undue burden on the industry. The NRC typically awaits applications and only reviews design certification applications that are full and complete. While the NRC has long recognized that its paramount

goal is to ensure public health and safety, the ERA also requires that the Agency enable the use of nuclear technologies for safe, beneficial uses. The unique features being trail blazed by Advanced Reactors justify an updated and modernized NRC design review and licensing process which is consistent with S. 2795.

Congress should reinforce and support the NRC's efforts to enable the use of Advanced Reactors by setting appropriate deadlines for design reviews and licensing activities, engaging in appropriate oversight of the NRC's review of these technologies and providing sufficient funding to allow the agency to execute accordingly.

Advanced Reactor Regulatory Capabilities

The NRC currently lacks sufficient capabilities for the licensing of non-light water reactors. In order to develop the appropriate regulatory basis to regulate Advanced Reactors, the NRC needs to better understand how these technologies work, how they can be regulated and how unnecessary regulatory conservatism can be avoided in the oversight of these designs. Because of the current funding formula wherein the NRC must recover 90 percent of its costs through fees, the resources for these activities must be borne principally by U.S. nuclear utilities – which are understandably concerned about the regulatory burden currently faced by the U.S. nuclear energy fleet in a highly competitive marketplace. Given that Advanced Reactor companies primarily rely on private funding, this NRC funding paradigm poses an extremely difficult challenge for this new industry's design advancement.

We believe the language in Section 7 will allow the Agency to conduct the activities needed to create a modern, risk informed, technology neutral framework which will enable the development of appropriate Advanced Reactor Regulations, without passing these regulatory development costs to the existing utilities or the Advanced Reactor developers who are not in a position to bear these costs. We believe this change is consistent with the approach proposed in the NIC Framework for Advanced Reactor Licensing Modernization White Paper issued in February.

Consistent with the above, there are two areas where we believe further enhancing of S. 2795 is warranted: 1) appropriate funding to reduce the licensing fees borne by Advanced Reactor developers; and 2) a specific pre-licensing design review program.

Graduated licensing fees commensurate with design review activities

While the NRC is not a promoter of nuclear technologies, it is appropriate for the Commission to engage in early and enhanced communications and dialog with Advanced Reactor developers to allow new market entrants to fully understand what is needed to successfully prepare and undertake design review and licensing. Currently, the NRC has very limited dialog with Advanced Reactor technology developers, and when it does, it must charge hourly review fees (approximately $270+ per hour/per NRC staff member) to these companies. As members of the Advanced Reactor community are early stage and entrepreneurially driven private companies, they lack the traditional resources to finance what can be very expensive regulatory fees.

NIC supports Section 9 of the bill, which creates a DOE licensing cost-share grant program. We believe this could be further enhanced by providing that the early stage engagement between an Advanced Reactor developer and the NRC be conducted at no-or-limited cost to the developer, with an appropriate cost share – perhaps 50/50 for latter stages of the licensing process. Collectively, this will allow the free market to pick winners and losers rather than the DOE and the NRC.

A graduated licensing model congruent with graduated private capital commitment

Additionally, in order to align with the staged private investment model of step-wise investment based on project de-risking, the NRC needs to develop a staged conceptual design review process for the review of Advanced Reactor designs similar to that developed by the Canadian Nuclear Safety Commission ("CNSC").

The CNSC process is robust and graduated. It requires vendors to reach discrete milestones that allow investors to assess the technology's licensablity and identify any potentially significant issues. It features an upfront Vendor Design Review to provide an early verdict on the licensing feasibility of potential designs for less than $5 million (US).

The early phases of this program would provide interim indications to allow the investment community to understand the licensablity of the design without having to wait until the end of the licensing process, which can take 8 to10 years. The current NRC process lacks transparency in cost and time, requiring potentially hundreds of millions in dollars of up-front investment while strongly discouraging private capital commitment.

The CNSC's graduated process has the potential to enhance the ability of Advanced Reactor designers to attract vital sources of capital because it allows them to build confidence along the way that the design has the potential to be licensed. In order to foster a new generation of Advanced Reactor technologies, this is precisely the type of phased design review and licensing process that needs to be adopted by the NRC.

While Section 7(b) calls for the NRC to "establish stages in the commercial Advanced Nuclear Reactor licensing process" – which we support and is generally consistent with the recommendations in the NIC White Paper – we believe the bill would be strengthened by incorporating specific language requiring that the NRC provide a pre-licensing design review. A clear articulation by the Commission about the areas where specific designs do and do not need additional work would enable Advanced Reactor developers and investors to have a clearer picture of where they stand in the NRC process and in meeting NRC safety requirements. In turn, this would give greater transparency about the licensibility, or lack of licensabilty of a given design, and would provide more efficient use of Agency and developer resources.

Conclusion

It is time to make dramatic changes to reform the NRC as well as modernize the licensing process to spur innovation and enable Advanced Reactor technologies to achieve the full measure of their promise and the success the nation needs for the future. While this will require a sustained focus and investment of resources by government in support of private stimulus and ingenuity, the return on investment will be pivotal in ensuring the U.S. maintains its technological leadership in nuclear energy's vital and carbon-free source of clean energy while providing jobs, economic competitiveness and energy security while improving our nation's environment and health.

Thank you very much for allowing me to testify today.

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The USNIC Advanced Reactors Task Force is a project of the U.S. Nuclear Infrastructure Council (www.usnic.org), the leading business consortium for new nuclear energy and promotion of the U.S. supply chain globally. The views above represent a consensus of the USNIC's Advanced Reactors Task Force and the Council, but do not necessarily represent the specific views of individual member companies and organizations.