

**U.S. House of Representatives' Subcommittee on Energy and Power
Hearing on "DOE Modernization: Legislation Addressing Development,
Regulation, and Competitiveness of Advanced Nuclear Energy Technologies"**

**The Honorable Jeffrey S. Merrifield Commissioner, U.S. Nuclear Regulatory Commission
(1998-2007)**

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Chairman Upton, Ranking Member Rush and members of the Subcommittee, it is indeed a pleasure to testify before a Committee that I had the opportunity to testify previously 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 Senior Advisor to ClearPath Action, although my full time occupation is as a Partner in the nuclear energy practice group of Pillsbury Law Firm.

Founded by businessman Jay Faison, ClearPath Action's mission is to accelerate conservative clean energy solutions. To advance the mission, ClearPath Action develops cutting-edge policy and messaging and works with policymakers and industry.

My testimony today will focus on the future of the U.S. nuclear program, opportunities for growth and export of U.S. nuclear technologies and areas where support from the Congress and the Trump Administration would be helpful in spurring these positive developments. I will also provide comments on the four legislative measures that are the subject of this hearing.

Today, there are approximately 450 nuclear power plants worldwide that operate in 30 countries and there are approximately 60 additional plants that are under construction in 17 countries. These plants produce 11% of the total world power generation and 35% of the world's carbon free generation. In the United States, we have 99 nuclear units, and collectively these plants produce 20% of our total power, 60% of the U.S. carbon free generation and operate over 92% of the time. This is an extraordinary record of accomplishment of providing safe, clean, reliable and resilient power.

During my time at the NRC and in positions I have held since then, I have had the opportunity to visit every nuclear plant in the United States and over half of the nuclear plants in the world. I have been impressed by the commitment to excellence in nuclear power operations that I have seen at the plants I have visited. Yet, I have also been disappointed by the lack of appreciation that many in government, the public and the media have for the vital role that these nuclear units serve in ensuring our nation's energy security, sustainable economic growth and clean energy supply.

Over the last several decades, at both the state and federal level, significant incentives, grants

and portfolio standards have been established to support renewable power programs, namely wind and solar. While that has helped to diversify our nation's energy portfolio with additional carbon free generation, these policies gave short shrift to the clean energy benefits of nuclear power. I commend this Committee as well as the Trump Administration for recognizing the need for our nation to have a balanced energy portfolio and that the clean and reliable power that nuclear energy provides to our nation deserves equal standing and support.

Status of Nuclear Power Construction and Advanced Reactors

While it was just over a year ago, in March of 2017, that Westinghouse Corporation declared bankruptcy, today things look far different. Just a few weeks ago, China announced that Sanmen Unit 1, which is a Westinghouse AP1000 unit, would begin loading fuel as a prelude to initiating operations in the next few months. This was a major milestone, and China may have as many as three AP1000's, two at Sanmen and one at Haiyang, that could begin operations in 2018. While construction was, unfortunately, halted at two Westinghouse units in South Carolina, Southern Company is continuing positive momentum in its efforts to complete two new AP1000 Units in Georgia at the Vogtle site. All of this positive progress is reinforced by a recent decision of the Bankruptcy Court to allow the sale of Westinghouse to Brookfield for \$4.6 billion.

Yet, when one looks worldwide, China, India, Russia and Korea continue to lead the United States in the deployment of large 1000+ megawatt nuclear units, despite the U.S. possessing the leading Generation III+ technologies. While there are a number of opportunities on the horizon for U.S. nuclear suppliers in Saudi Arabia, India, Poland and Jordan among others, continued support of the U.S. Government, including appropriate support of the ExIm Bank will be needed to level the playing field for these efforts.

An area of future growth for the U.S. nuclear industry is the continued development of advanced nuclear reactors. These designs, which utilize high-temperature gas, molten salt and liquid metal among others designs, range in size from micro-reactors of a few megawatts to large gigawatt size reactors. While there is a diversity of sizes and cooling methods among these designs, they generally possess enhanced safety features as well as improved economics when compared to existing reactors. Given those capabilities, these advanced reactors not only provide an opportunity to replace some of the nuclear units that will be retiring in the U.S. over the next 20+ years, but their enhanced safety profile could allow them to be deployed at a wider range of sites and applications than the current U.S. nuclear fleet.

Need for High Assay Low Enriched Uranium

While the pending development of advanced reactors brings with it the potential for improved economics, lowered operating costs, higher utilization factors, enhanced safety margins and greater modularity, the fuels used to operate these reactors will be of a much greater variety in their form and composition. Additionally, many, but not all of these advanced designs, will utilize higher enrichments of fuel (between 8% and 19.75%) than the current light water reactor ("LWR") fleet (typically 4%-5%).

As I stated in a report I wrote on this subject back in February, “To fully document the potential for the advanced reactor designs, Third Way, which is a Washington, D.C. based think tank, issued a report on May 18, 2017, that indicated that there are currently 56 advanced nuclear concepts in North America under development with large numbers also underway outside the U.S.¹ From information that the authors (Pillsbury) gathered, the vast majority of these reactor designs are planning to utilize higher enrichments of fuel, and some of these designs are proposed to come to the U.S. market in the mid to late 2020s. Further, a March 2017 survey of 18 leading U.S.-based advanced reactors developers found that 67% of the companies said that an “assured supply of High Assay LEU” was either urgent or important, with squarely 50% of the overall respondents saying it was “urgent.”² As the development of a fuel supply and regulatory approval can take multiple years, work must begin immediately to ensure sufficient supply of HA-LEU.

As the infrastructure for the production of civilian nuclear fuel, as well as the regulatory processes overseeing its production and use, have all been based on the existing LWR market, virtually every element of the nuclear fuel cycle³ has been tailored precisely for these reactors. As development and future deployment of many of the current advanced reactor designs requires utilizing fuel with higher enrichments of uranium, appropriate sources of this material will need to be identified or created, as no commercial, domestic source currently exists. This includes the means to enrich, transport, manufacture, store and dispose of this fuel. For its part, the NRC will also need to tailor its regulatory framework to meet this need.

Unfortunately, the Department of Energy (“DOE”), which has been the traditional supplier of these enriched levels of material, does not currently possess the high assay enriched uranium or enrichment capabilities that is needed for advanced reactors as the current inventory is dedicated to other needs such as research reactors and the Navy propulsion program. Our understanding is that DOE has identified some materials that could be modified to meet these needs and the recent Energy and Water Appropriations Bill that was recently marked out of Subcommittee provides helpful funding to initiate DOE’s efforts.

The draft legislation that has been sponsored by Representative Flores, entitled, the “Advanced Nuclear Fuel Availability Act” is a positive step in the right direction to address the need for high assay low enriched uranium otherwise known as HA-LEU. This draft legislation quite rightly recognizes the importance of HA-LEU in the development of advanced reactors and focuses on key issues such as the need to have DOE create an inventory of this material, the need for criticality information to develop and license transportation packages, and the need for the NRC to develop an appropriate and timely licensing framework. For these reasons, ClearPath strongly supports this legislation.

We would note that Section 2 (B)(7) requires that DOE develop a program for full cost recovery of providing this HA-LEU. While we understand the fiscal discipline intended by this provision,

¹ <http://www.thirdway.org/infographic/the-global-race-for-advanced-nuclear>

² Advanced Fuels – Looming Crisis in Fueling Advanced and Innovative Nuclear Reactor Technologies, Clearpath/Nuclear Infrastructure Council White Paper on High Assay Low Enriched Uranium, p.2.

³ The nuclear fuel cycle includes all the steps needed to mine, process, enrich, manufacture, use, store and permanently dispose of radioactive materials, including U-235 based fuels that are used for civilian and naval power and propulsion purposes.

and support the concept that this program should ultimately be self-sustaining, we are concerned that imposing the initial DOE startup costs on a group of developers in the early stages of this effort could be prohibitive and counter-productive to jump-starting this effort. We would be happy to work with the Committee to identify options for modifying this language.

Pilot Program for Micro Reactors

Consistent with our comments above, we would also support the draft legislation offered by Congressman Wilson to require the Department of Energy to prepare a report on the potential deployment of privately developed “micro-reactors” at Department of Defense and Department of Energy facilities. We believe that this legislation has the potential to provide an important kick-start for the prompt deployment of multiple advanced reactor designs and is consistent with previous efforts to support the development of clean energy technologies at federal facilities. That said, there is one area we would suggest for strengthening the legislation.

In previous work Pillsbury has done regarding the development of power projects on federal facilities, we have found the federal contracting framework to be both confusing and overly complicated. Further, we have sometimes found our federal counterparts to be less than enthusiastic and sometimes uncooperative in carrying out Congressional mandates to develop power generation at federal facilities. You may wish to consider a new section of the report that would authorize the Government Accountability Office to review existing federal power purchase and power siting agreements and make recommendations on how they may be streamlined in a way that would better meet the intentions that you so rightly support in this draft legislation.

NRC Fee Policies, Corporate Support Cost and Licensing

Two years ago, when I most recently testified in front of this Committee, I noted that “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.”

Since that time the NRC has continued to make progress in rightsizing its workforce and budget and has also demonstrated an improved ability to be more timely in processing licensing actions. To that extent, we would commend the Agency. Nonetheless, we believe the Commission could and should take further steps to streamline its services consistent with its mission to protect public health, safety and the environment.

ClearPath Action believes that H.R. 1320, the Nuclear Utilization and Keynote Energy Act, sponsored by Congressman Kinzinger and Congressman Doyle, which is focused on reducing the NRC’s corporate support costs and realigning the Agency’s fee structure, appears to be a common sense step to provide the Agency with a funding mechanism that aligns its mission and costs. Specifically, we would applaud section (3)(b)(1)(B)(iii) which provides an exclusion of fees for those costs associated with the development of the regulatory infrastructure for advanced nuclear reactor technologies. We believe this exclusion will allow the NRC to be

appropriately prepared to review these technologies, yet avoid placing the cost burden for these preparations on the nascent developers of these promising designs. We would also suggest that the Committee consider the potential to allow some of these off-the-fee-base funds be directed towards anticipatory regulatory research that would better position the NRC to efficiently and effectively oversee advanced nuclear technologies.

We commend the Committee for continuing to encourage the Agency to focus on providing more timely and risk informed decision-making. For the purposes of developing advanced reactors, having a timely and predictable licensing process is critical, and we urge this Committee to hold the Commission accountable in this area. Consistent with this focus, we support the provisions in Section 7 of the bill which would streamline the Agency's licensing and environmental review process. As a Commissioner, I led a task force that looked at many of these same issues, and I concur with the recommended changes that are included in the discussion draft.

Finally, I would like to comment on a number of the other reforms that are included in Congressman Kinzinger's discussion draft.

Foreign Licensing Restrictions, Mandatory Hearing and Informal Hearing Procedures

As it relates to the study included in Section 4 of H.R. 1320 that would eliminate the Foreign Licensing Restrictions of Sections 103(d) and 104(d) of the Atomic Energy Act, while I would preferred that Congress simply eliminate this provision as an antiquated artifact of the Cold War, I understand the rationale for commissioning a study and support it. When I was on the Commission during the early 2000s, I and my colleagues testified in favor of the elimination of this provision as today we live in a world in which the United States is but one of 30 countries that operate civilian nuclear reactors.

Currently, Section 103(d) contains a two-part test, the first of which prohibits the issuance of a license to an individual or company that is "owned, controlled or dominated by an alien, a foreign corporation or a foreign government." The second test allows the Commission to prohibit issuing a license if in its view, "the issuance of a license to such person would be inimical to the common defense and security or to the health and safety of the public." In my view, as long as the second test is maintained, the blanket prohibition on foreign ownership is unnecessary, stifles innovation and is inconsistent with free trade.

Over the last several years, we have had a number of perfectly good operating nuclear reactors shut down because of economic challenges posed by the current market for electrical power, with recent news that First Energy has said it will shut down its 4 units at Beaver Valley, Davis Besse and Perry. I can say, unequivocally, that our law firm has been approached a number of times within the last few years by utilities located in Europe which would like to purchase U.S. nuclear reactors but could not do so because of this prohibition. Lifting the foreign ownership provision could potentially provide an opportunity to save these vital clean energy facilities through investment by friendly foreign utility partners. I would further note that in the United Kingdom, the nuclear fleet operated by British Energy was faced with similar financial hardships and the decision to allow the French company, EDF, to purchase these assets in 2008

allowed for the continued operation of this key element of the UK energy system.

As an NRC Commissioner, I led a task force that looked at how to make the NRC new reactor licensing process more efficient. Among the recommendations that were included in our report was a proposal to eliminate the mandatory hearing requirements related to the issuance of power reactor licenses under Part 50 and Part 52. We made this recommendation because the Administrative Procedure Act and the National Environmental Policy Act, combined with the very open and inclusive public comment process that has been established by the NRC, provides stakeholders with fulsome opportunities to comment on proposed new reactors. For this reason, we support the study included in Section 5.

Efforts to Streamline the Part 810 Export Licensing Process

In order to ensure that the United States continues to play a leading role in the export and development of nuclear projects worldwide, it is vital that the Federal Government promptly evaluates, and where appropriate, approves these transfers. Unlike 30 years ago, when the U.S. had a virtual monopoly in nuclear commerce, today, we are just but one of many highly competitive countries vying for a role in supporting the development and operation of nuclear power plants overseas.

We have reviewed the discussion draft submitted by Congressman Johnson which would facilitate the process by which the Secretary of Energy authorizes the transfer of certain civilian nuclear technology and assistance. We support the legislation and believe it takes an important step to further the efforts to streamline the process for some applications submitted under 10 CFR Part 810. That said, we remain concerned that the legislation only targets a limited portion of the nuclear technology export approvals process and does not go far enough to establish a truly expedited process. Specifically, we submit the following comments:

1. The legislation seeks to establish an expedited process for process of “low proliferation technologies” to be designated by the Secretary. We submit that “low proliferation technologies” should be defined as technologies for the development, construction and operation of commercial nuclear reactors other than reactors especially designed to use mixed-oxide fuel.
2. The expedited process proposed by the legislation for low proliferation technologies maintains the laborious interagency approval process. This involves a review by five different agencies and includes the State Department concurrence process, which requires obtaining assurances from foreign governments. We note that DOE and NNSA have already made a valiant effort to improve the Part 810 process, and any additional improvements would be significantly limited by maintain the interagency review process. Accordingly, we submit that the interagency review process for low proliferation technologies should be limited to DOE/NNSA approval. If government-to-government assurances are to be sought, there should be a streamlined State Department concurrence based on obtaining a generic set of assurances from foreign governments.

ClearPath Action supports efforts that would allow U.S. companies to swiftly obtain Part 810

approvals and have the ability to compete effectively in nuclear export markets. We support the Committee's efforts to assist in this regard.

Ensuring the Vitality of the Current and Future Nuclear Fleet

The companies and people who operate our nation's 99 nuclear power plants have done a tremendous service in providing clean, safe, reliable and resilient power. As a country, not only should we continue to support this key element of our carbon free generation, but we also need to adopt measures to promote the development of a new generation of advanced nuclear reactors that will allow U.S. companies to regain their leading role in the international nuclear export market. The host of legislation that this Committee is considering today is consistent with this vision, and ClearPath Action would commend them to you for adoption. We stand ready to work with the Committee to assure their prompt passage.

Thank you for allowing me to testify on this important subject.