Statement of Admiral James F. Caldwell
Deputy Administrator for Naval Reactors
National Nuclear Security Administration
U.S. Department of Energy
Before the
Senate Armed Services Committee
Subcommittee on Strategic Forces

May 19, 2021

Chairman King, Ranking Member Fischer, and distinguished members of the subcommittee, thank you for the opportunity to appear before you today. Your strong support for the work we do ensures our nuclear Navy has the ability to carry out vital missions around the world. This support of Congress is vitally important today as we continue to face renewed great power competition and a global pandemic.

Today's strategic environment is dynamic and increasingly complex. Near-peer rivals are pursuing military modernization programs aimed at achieving regional hegemony in the near-term, and eroding the post-WWII international order and United States' preeminence in the long-term. The maritime environment is becoming increasingly contested. To preserve freedom of the seas, deter conflict, defend allies, and protect our national interests, we must sustain and grow our naval capabilities.

Nuclear propulsion is a key enabler of naval power projection, providing unmatched mobility, flexibility, responsiveness, and endurance. These key attributes ensure our nuclear fleet can meet the demands of forward presence and crisis response worldwide. Today, over 40 percent of the Navy's major combatants are nuclear-powered (68 submarines and 11 aircraft carriers).[1] Advancements in nuclear propulsion are needed as the Navy innovates to maintain our competitive advantage. Naval Reactors' historical investment in advanced technologies has given the nation an enviable competitive edge in the maritime environment; further investments in advanced technologies are necessary to maintain this technological edge well into the future.

The Navy's highly capable nuclear-powered submarines and aircraft carriers have ensured our warfighting edge over potential adversaries for decades. Our ballistic missile submarines provide the most survivable leg of our nuclear triad, are essential to our ability to deter major warfare, and provide assurance to our allies. Our fast attack submarines operate undetected, safeguard vital commercial sea-lanes, and stand ready to protect American interests. Our aircraft carriers provide our nation the sustained ability to project combat power, deter conflict, and protect our interests around the world.

Last year, with Naval Reactors support, the Navy continued to meet its strategic deterrent mission and executed numerous missions in the undersea domain that directly impacted the national security of the United States. Our carriers executed the busiest year of deployments in nearly a decade to support vital U.S. military operations around the world.

[1] Major combatants, in this instance, include aircraft carriers, submarines, and surface combatants based on the "Active in Commission" column from the Naval Vessel Register.

In aircraft carrier shipbuilding, the USS GERALD R. FORD (CVN 78) made great progress since I last appeared before the committee. Last year, I had the privilege of visiting the FORD at sea and seeing first-hand the significant improvements over the NIMITZ Class, highly capable in its own right. The JOHN F. KENNEDY (CVN 79) was christened last year and the crew is testing the propulsion plant. Construction continues on ENTERPRISE (CVN 80), the first carrier in a two-ship buy that allows the Navy to realize important cost savings, maintain a constant, predictable workload within our industrial base, and continue to deliver the unmatched capabilities of the FORD Class to our Navy. The FORD Class incorporates the first newly-designed aircraft carrier propulsion plant in 40 years. These ships not only match the high speed of our NIMITZ-Class aircraft carriers but have room to grow, providing 25 percent more energy and three times the electrical generating capacity. Additionally, the propulsion plant design reduces maintenance by 30 percent and manpower by nearly 50 percent.

In ballistic missile submarine shipbuilding, lead ship construction for the COLUMBIA Class is underway, which will allow the Navy to continue seamless execution of this vital mission that began over six decades ago. The USS GEORGE WASHINGTON (SSBN 598) completed her first deterrent patrol sixty years ago. This year will mark the 40th anniversary of the commissioning of the USS OHIO (SSBN 726), the lead ship of today's ballistic missile submarine fleet that, along with three other submarines, was later converted to a guided missile submarine. This year will also mark twenty years since the inactivation of the USS KAMEHAMEHA (SSBN 642), the last of the "41 for Freedom." Looking forward, the COLUMBIA Class will be a bedrock of our national security posture for decades to come. The men and women of Naval Reactors and our industry partners are contributing to this mission by building a reactor plant with a life-of-ship core to serve in excess of 40 years, an accomplishment that builds on the military advantage of longer lived cores that enable the Navy to avoid mid-life refueling and reduce by two the number of COLUMBIA Class submarines needed to meet the strategic deterrence mission compared with the OHIO Class.

In attack submarine shipbuilding last year, the Navy saw the keel laid for the Pre-Commissioning Unit (PCU) IDAHO and commissioned the USS DELAWARE and the USS VERMONT. This brings a total of 19 VIRGINIA-Class submarines to our fleet, with VIRGINIAs now comprising over one third of our attack submarines. The Navy is also assessing improvements to capability and lethality for future VIRGINIA Class submarines; these improvements not only add capability to today's fleet, but will also allow the Navy to prove potential technologies that could influence the next-generation attack submarine. Naval Reactors is closely synchronized with the Navy on these efforts. In particular, our renewed focus and investments in advanced technologies will pave the way for improvements in speed, energy density, and stealth.

Naval Reactors Overview

This committee's support has enabled the safe operation of the nuclear fleet, substantial progress on our key projects, and our continued oversight and regulation of all areas across the Naval Nuclear Propulsion Program. Your support has also enabled significant progress on our three major projects – COLUMBIA-Class propulsion plant development, the refueling overhaul of a research and training reactor in New York, and the construction of the Naval Spent Fuel Handling Facility in Idaho. Finally, the committee's support ensures Naval Reactors can provide

around-the-clock support to the operational nuclear fleet, accelerate research and development efforts for future generations of nuclear powered warships, and make progress on both the recapitalization of our laboratory facilities and the environmental remediation of our legacy responsibilities.

Major Projects

COLUMBIA-Class Propulsion Plant

The COLUMBIA-Class ballistic missile submarine is the Navy's number one acquisition priority. Naval Reactors is supporting lead ship construction and is delivering the life-of-ship reactor core and the electric drive propulsion system for the COLUMBIA-Class program. Naval Reactors continues lead ship propulsion plant design and safety analysis work required to support lead ship reactor testing and delivery.

S8G Prototype Refueling Overhaul

We also continue to execute the refueling and overhaul of the New York land-based prototype, which will enable an additional 20 years of Naval Reactors' commitment to research, development, and training. The project has been steadily working through performance challenges associated with COVID-19 as well as the integration of workforces from multiple shipyards. We continue to provide strong oversight to improve cost and schedule performance. Progress to date includes the removal of all spent nuclear fuel, design, manufacture and installation of a new reactor core, construction of a new cooling tower, and installation of upgraded instrumentation and control systems. The new reactor for this prototype includes COLUMBIA-Class type fuel modules as part of testing and demonstrating the manufacturability necessary for production and delivery of the COLUMBIA-Class reactor core.

Spent Fuel Handling Recapitalization Project

Naval Reactors is constructing the Naval Spent Fuel Handling Facility, located on the Naval Reactors Facility in Idaho. The facility is critical to our mission to manage spent naval nuclear fuel and support aircraft carrier and submarine fleet requirements. As I testified last year, market conditions such as a shortage of skilled labor, high construction demand, and a remote location, coupled with price volatility for domestic construction materials such as structural steel resulted in higher than anticipated costs. Naval Reactors took a number of immediate actions to minimize impacts to cost and schedule such as deliverable reductions and phase-funding subcontracts when possible. The Program also rebaselined the project in FY 2020 and has continued to work closely with the National Nuclear Security Administration and the Department of Energy to ensure adequate resources are available for the project. More recently, the COVID-19 pandemic and the discovery of unexpected bedrock conditions beneath the facility's foundations have presented challenges that the Project is working through to ensure that the overall Project completion milestone remains achievable. We continue to provide robust oversight and management of this complex and large-scale infrastructure project. Strong support from Congress has enabled the project to make significant progress. To date, we poured approximately 100,000 cubic yards of concrete for excavation site backfill, representing

approximately one-third of the required foundation concrete volume, and started procurement of facility structural steel.

Technical Base Funding

In addition to our three priority projects, Naval Reactors maintains a high-performing technical base. The technical base is the set of fundamental skills and capabilities necessary to safely and effectively support the nuclear Navy. It includes a foundation of specialists in nuclear materials, nuclear physics, thermal-hydraulic testing, acoustics, electrical design, software development, system development, refueling, and other specialized skills, along with the associated facilities. The technical base is leveraged for our projects, but also performs independent work to support the operating fleet and ensure our technology advantage over our competitors. Specifically, the Program: 1) addresses emergent needs and challenges of our nuclear fleet, 2) executes nuclear reactor technology research and development that supports today's fleet and future capabilities and, 3) modernizes critical infrastructure and reduces the Program's legacy environmental liabilities. This base also supports the lean yet highly effective federal workforce that provides the oversight necessary to carry out this important technical work safely and efficiently. These activities are vital to our ability to provide 24-7 support to the nuclear-powered Navy.

Program Direction

Our small but highly skilled federal workforce is our most important resource. Our talented and diverse workforce strategically differentiates us within the current geopolitical environment. As such, I remain highly focused on attracting, developing, and retaining a talented and diverse workforce to oversee and manage the critical programmatic work. This past year also brought longstanding issues of racial injustice to the forefront of the national dialogue, which served to strengthen my efforts to engage the workforce at every level and ensure we are fostering an environment of promise of opportunity, respect, and empathy. These are core values and will receive my sustained attention.

Building platforms that have over forty years of expected life, requires staffing continuity to ensure the Nation has a workforce with the deep technical knowledge needed to support Naval Reactors' cradle to grave management of these robust systems. I must have sufficient Federal staffing to meet the demands of sustaining today's fleet and growing future capabilities. The cumulative effect of funding reductions in prior years, personnel costs growing above inflationary rates, and an increase in recent senior level retirements has impeded our ability to reach this goal and challenged our ability to maintain our staffing levels. It is imperative that we execute our staffing plan and avoid any critical gaps in our workforce. I commit to continue to communicate with the committee and your staff on our requirements and progress in reaching our staffing goals. I respectfully request Congress' support to allow me to recruit, select, develop, and retain the talented workforce that was started by Admiral Hyman Rickover many decades ago and that has proved to be crucial to the success of the Program.

Research and Development

Our research and development strategy represents a renewed investment in cutting-edge technologies aimed at reversing an eroding capability gap with strategic adversaries like China

and Russia. Technology investment must be reinvigorated today to have new technologies ready for future classes of ships and to lower costs, reduce construction timelines, and improve the performance of today's fleet in light of increasing global competition. The teams of talented and dedicated people at our Naval Nuclear Laboratory sites – the Bettis Atomic Power Laboratory in Pittsburgh, the Knolls Atomic Power Laboratory and Kesselring Site in greater Albany, the Naval Reactors Facility in Idaho, and our Washington, DC headquarters – perform the research and development, analysis, engineering, and testing needed to support current and future Navy requirements.

Our first priority is always support of today's fleet. Our labs perform approximately 4,000 technical evaluations annually that enable Naval Reactors to thoroughly assess and respond to emergent issues, thereby keeping our ships mission-ready while ensuring nuclear safety. These efforts are essential to keep our ships at-sea, such as during the extended deployments of several nuclear aircraft carriers over the last year. Operating abroad for longer than planned, our carrier strike groups demonstrated the U.S. Navy's ability to respond to global events and the unparalleled capability nuclear propulsion brings to at-sea operations.

Historically, Naval Reactors also maintained a robust, technologically-advanced nuclear propulsion research and development program that has enabled substantial gains in warfighting capability and affordability, while providing the nation with safe, capable, and reliable nuclear propulsion. Over the past 10-15 years, Naval Reactors has made tradeoffs to support national priority projects, resulting in a reduced investment in mid- to long-term advanced technology development efforts. Today, we see our adversaries closing the capability gap the Navy has successfully dominated for decades. Looking forward, we must invest in advanced research and development to meet the increased threats from China and Russia.

We need advanced technology that can be leveraged for use in future nuclear powered warships the same way we were able to do for the COLUMBIA-Class. While researching and developing certain aspects of nuclear technology can take time, we are also leveraging the experience of industry and increasing the agility of our research and development program.

Naval Reactors is beginning to identify and develop new technologies aimed at delivering enhanced capabilities to the existing fleet, meeting aggressive performance and cost requirements for future ships, and maintaining the U.S. Navy's superiority over our competitors. We are actively pursuing advanced fuel systems, reactor core automated manufacturing and inspection, next-generation instrumentation and control architectures and sensors, and emerging technologies (e.g., advanced power conversion, artificial intelligence, data analytics, additive manufacturing, and advanced robotics). These advancements have the potential to deliver both greater capability and lower acquisition and lifecycle costs. I commit to communicate regularly with the committee and your staff on these advanced technology maturation efforts.

I want to assure the committee that our investments are supported by a comprehensive and rigorous planning effort we undertake with our partners at the Naval Nuclear Laboratory. Our annual work execution plans are derived from this comprehensive alignment, both of which I personally review and approve to ensure we are making the right investments and tradeoffs in all areas of our business. Tradeoffs over the last 10-15 years have hampered technology

development were unfortunately necessary, and I must now ensure strong investment in research and development efforts to advance capabilities into the future. This effort is vital for both existing and future nuclear propulsion capabilities.

Facilities and Infrastructure

Our laboratory facilities and infrastructure are critical in carrying out Naval Reactors' mission. The budget request supports recapitalizing our Naval Nuclear Laboratory facilities and infrastructure systems, many of which have supported the Program since its inception over 70 years ago. Without this recapitalization we will be unable to effectively support nuclear fleet operations and advanced research and development efforts at the level required by this complex technology. We are continuing our efforts in decontaminating and decommissioning (D&D) older facilities that have been in existence since the start of the Program in the early 1950s. We have approximately $8 billion in environmental liabilities requiring D&D efforts - about one-third of these facilities are no longer in use. We are increasing our emphasis on retirement of theses liabilities in an environmentally responsible and cost-effective manner to support best use of our funding. The Program is also leveraging the Department of Energy Office of Environmental Management (DOE-EM) experience in efficient, safe, and cost-effective remediation of environmental liabilities across the complex. I am pleased with the collaboration on this effort with my partners in DOE-EM.

Conclusion

The COVID-19 pandemic presents unique challenges. We have worked hard to keep our workforce safe while accomplishing our mission, and I am proud that the Program continues to rise to the challenge. We have learned a significant amount from this pandemic and will continue to apply those lessons learned in the future. I am continually impressed with how my workforce has responded to meet mission requirements with dedication, resiliency, and innovation.

Naval Reactors' mission is critical to our national security and contributes to the Navy's ability to maintain mastery of the undersea domain and sustain a formidable forward presence. Continued congressional support allows us to balance investments in today's fleet with the future fleet, expand the Navy's ability to project power and control the seas, and remain ready for the high-end fight. I appreciate the strong support this program receives from Congress to provide effective naval nuclear propulsion.