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HEARING  
ON  
NATIONAL DEFENSE AUTHORIZATION ACT  
FOR FISCAL YEAR 2021  
AND  
OVERSIGHT OF PREVIOUSLY AUTHORIZED  
PROGRAMS  
BEFORE THE  
COMMITTEE ON ARMED SERVICES  
HOUSE OF REPRESENTATIVES  
ONE HUNDRED SIXTEENTH CONGRESS  
SECOND SESSION  
SUBCOMMITTEE ON STRATEGIC FORCES HEARING  
ON  
**FISCAL YEAR 2021 BUDGET REQUEST  
FOR NUCLEAR FORCES AND ATOMIC  
ENERGY DEFENSE ACTIVITIES**

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## **FISCAL YEAR 2021 BUDGET REQUEST FOR NUCLEAR FORCES AND ATOMIC ENERGY DEFENSE ACTIVITIES**

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HOUSE OF REPRESENTATIVES,  
COMMITTEE ON ARMED SERVICES,  
SUBCOMMITTEE ON STRATEGIC FORCES,  
*Washington, DC, Tuesday, March 3, 2020.*

The subcommittee met, pursuant to call, at 2:29 p.m., in room 2212, Rayburn House Office Building, Hon. Jim Cooper (chairman of the subcommittee) presiding.

### **OPENING STATEMENT OF HON. JIM COOPER, A REPRESENTA- TIVE FROM TENNESSEE, CHAIRMAN, SUBCOMMITTEE ON STRATEGIC FORCES**

Mr. COOPER. The subcommittee will come to order.

We would like to welcome the distinguished guest witnesses we have today: The Honorable Lisa Gordon-Hagerty; Victorino Mercado, Performing the Duties of Assistant Secretary of Defense—that has to be the longest title I have ever seen; Vice Admiral Johnny Wolfe; Lieutenant General Richard Clark; and Allison Bawden of the GAO [Government Accountability Office].

This subcommittee hearing has to be on one of the most important, most complicated topics of any subcommittee hearing. So I hope that all members will try to stick to the 5-minute rule so that we can have plenty of time in closed session following the public hearing. I am planning on deferring my time to the closed session.

As I mentioned in last week's subcommittee hearing, the main issues seem to be budgetary, and we have that high-class problem of unexpected largesse from the administration, a nearly \$3 billion increase for NNSA [National Nuclear Security Administration] over fiscal year 2020. Although we appreciate the nearly 20 percent increase, the burden of proof is on the Administrator to justify the amounts, particularly in view of the NNSA's \$8 billion in uncosted funds.

Now let me recognize the ranking member for his opening statement.

[The prepared statement of Mr. Cooper can be found in the Appendix on page 31.]

### **STATEMENT OF HON. MICHAEL R. TURNER, A REPRESENTA- TIVE FROM OHIO, RANKING MEMBER, SUBCOMMITTEE ON STRATEGIC FORCES**

Mr. TURNER. Thank you, Mr. Chairman. I would also like to extend a warm welcome to all of our witnesses today. We do have a very large panel, but you all contribute to our work here on the House

Armed Services Committee in unique and meaningful ways, and I appreciate your expertise that you bring to the table.

The budget request for the entire nuclear enterprise across both the Department of Energy [DOE] and the Department of Defense [DOD] for fiscal year 2021 is approximately \$49 billion. This request includes consistent predicted cost growth for nuclear modernization programs within the DOD, nuclear weapons stockpile surveillance within the DOE, and the nuclear command and control systems across the government.

As we have continued to hear from DOD leadership, supporting our nuclear modernization efforts remains the number one priority of the Department of Defense. In partnership with the National Nuclear Security Administration, the United States will continue to provide a safe, secure, and reliable nuclear deterrent.

The DOD budget request for fiscal year 2021 invests approximately \$17.7 billion to support modernization of all three legs of the nuclear triad. This year's budget request for the Ground Based Strategic Deterrent is \$1.5 billion. That money will ensure that the replacement for our only ground-based intercontinental ballistic system, which has seen continuous service for 60 years, will be able to enter its next phase of use and development.

There is no margin for slip in this program. We must continue to support it while ensuring the best value for our government. The budget request also supports the B-21 bomber at \$2.18 billion and Long Range Standoff weapon, LRSO, at \$744 million. The LRSO is meant to replace our aging air-launched cruise missile, which entered service 40 years ago.

This year's budget request supports the Navy's strategic deterrence requirements with the *Columbia*-class submarine, the Trident D5 modernization, and the initiation of the work for the Mark 7 reentry vehicle, which will receive the W93 warhead.

The National Nuclear Security Administration also has a robust and necessary \$19.7 billion budget request for fiscal year 2021. That includes \$15.6 billion in their weapons activities programs to support the life extension and modifications to existing warheads, stockpile surveillance, and investment in strategic materials like plutonium and uranium enrichment.

NNSA is an essential partner in the nuclear enterprise, and while we have started to improve upon the decrepit infrastructure, we have a long way to go. Additionally, the W93 is a critical program of record to the NNSA. I look forward to today's testimony on the requirements and path ahead for this warhead.

Last week we heard from Admiral Richard, the commander of Strategic Command, about the military requirements for nuclear modernization and the consequences of delay or failure. I appreciate his candidness when he said that we are approaching irreversible points of no return with regard to our nuclear modernization. He testified that we are approaching a point where, if we do not support these nuclear modernization efforts, that we will be starting down a path of unilateral nuclear disarmament.

While we debate whether or not we will support the budget request for nuclear modernization of our existing stockpile, Russia and China continue to increase their nuclear arsenals at an alarming rate. Russia continues to increase the number and type of nu-

clear delivery systems, and specifically, they will continue to develop and field new non-treaty-accountable systems that indicate a more aggressive deployment strategy.

Russia remains in violation of their obligations under the Open Skies Treaty and continues to exploit the loopholes in the New START [Strategic Arms Reduction] Treaty to their advantage, after, of course, having violated the INF [Intermediate-Range Nuclear Forces] Treaty. China will find its own nuclear triad—excuse me, China will field its own nuclear triad in the next decade with the development of a nuclear-capable strategic bomber, road-mobile ICBMs [intercontinental ballistic missiles], and sub-launched ballistic missiles.

China also continues to build and employ new intermediate-range ballistic missiles, outpacing the United States. China has never been subject to the limits in transparency required by an arms control treaty, and it is unclear how to incentivize them to join such a regime.

This year's budget request for nuclear modernization is just enough and just in time. None of these programs have any margin. Any attempt to delay, defund, or otherwise deprioritize our nuclear enterprise will leave us less safe in an era of near-peer strategic competition.

And I want to thank our Administrator for both your integrity and commitment and also your advocacy during this budgetary process. And to all the witnesses, I want to thank you again for being here today, and we look forward to their testimony. I yield back.

Mr. COOPER. I thank the gentleman. Now let's hear from the witnesses.

Ms. Gordon-Hagerty.

**STATEMENT OF HON. LISA E. GORDON-HAGERTY, ADMINISTRATOR, NATIONAL NUCLEAR SECURITY ADMINISTRATION**

Ms. GORDON-HAGERTY. Chairman Cooper, Ranking Member Turner, and members of the subcommittee, thank you for the opportunity to present the President's fiscal year 2021 budget request for the Department of Energy's National Nuclear Security Administration.

As always, it is a privilege to testify before you today representing the extraordinary men and women that make up the DOE NNSA enterprise. We are grateful for your demonstrated strong bipartisan support for the NNSA's national security missions and the people who execute them every day.

Chairman Cooper, a written statement has been provided to the subcommittee, and I respectfully request it be submitted for the record.

Mr. COOPER. Without objection, so ordered.

Ms. GORDON-HAGERTY. Thank you.

2020 marks the 20th anniversary of the NNSA's establishment by Congress. Although, of course, our heritage goes back much further to the Manhattan Project and to the Atomic Energy Commission. And, as has always been the case, the effectiveness and credibility of America's nuclear weapons capability reassures our friends and allies and serves as the ultimate deterrent against a nuclear

attack by those who wish to harm us. In this regard, NNSA is unique in our responsibilities to support our Nation's nuclear security missions.

The \$19.8 billion fiscal year 2021 budget request for NNSA reflects President Trump's strong commitment to ensuring America has a safe, secure, and effective nuclear deterrent for many decades to come. This funding also affirms the administration's continued work to reduce threats posed by nuclear proliferation and nuclear terrorism as well as to provide militarily effective nuclear propulsion for the United States Navy fleet of aircraft carriers and submarines.

The weapons activities request of \$15.6 billion will allow us to modernize the Nation's nuclear weapons stockpile and infrastructure and meet national security requirements after several decades of neglect. It will modernize the stockpile with five weapons modernization programs, execute stockpile sustainment activities, and conduct annual assessment activities on all weapons systems.

With this request, we will continue the dismantlement and disposition of weapons and components from weapons retired from the stockpile and support production modernization activities for non-nuclear components and strategic materials, including a two-site plutonium pit strategy.

We will also continue to recapitalize NNSA's aging infrastructure, including the Y-12 Uranium Processing Facility, the NNS [Nevada National Security Site] U1a complex enhancements project, and the high-explosive science and engineering facility at Pantex.

As many of you have witnessed firsthand, our entire enterprise continues to age with much of our infrastructure operating far beyond its design life. With this increase, we will finally be able to modernize the infrastructure, which is old.

Our defense nuclear nonproliferation [DNN] budget request of \$2 billion dollars marks the third year in a row that the Trump administration has sought increased funding for NNSA's nonproliferation and counterterrorism activities and fully funds all DNN priority program requirements.

This reflects the administration's strong commitment to reducing global nuclear threats and to arms control efforts that advance U.S., allied, and partner security. It will enable us to continue to build domestic and international capacity to secure and, where possible, eliminate nuclear and radioactive materials and prevent nuclear smuggling.

Further, this request allows us to maintain a robust nuclear counterterrorism capability to respond to nuclear and radiological incidents, including nuclear forensics activities, to attribute the source of material used in a terrorist attack. We would advance our capabilities for detecting and monitoring foreign nuclear material and weapons production activities.

Equally important is the Naval Reactors' budget request of \$1.7 billion. It enables us to provide for the continued safe, reliable, and long-lived operation of the U.S. Navy's nuclear fleet, which account for more than 40 percent of the Navy's major vessels.



Finally, our Federal salaries and expenses budget request of \$454 million will allow us to recruit, train, and retain a highly skilled workforce of 1,858 Federal employees.

Mr. Chairman, it is true that our timeline for modernizing the nuclear stockpile and recapitalizing the necessary infrastructure is aggressive. In some cases, we are asking our sites and our partners to do in 10 years what would normally take 15 to 20 years.

But in the 2 years since being confirmed, I have seen firsthand the Nuclear Security Enterprise workforce passion and dedication and what we can accomplish. Consequently, while the schedule may be aggressive, I believe it is achievable. However, without doing so with consistent and sustained funding and, most importantly, our continued relationship with Congress, we will not achieve it.

At this time, I would like to personally thank Vice Admiral Johnny Wolfe, Lieutenant General Clark, and ASD [Assistant Secretary of Defense] Mercado, and all of our DOD colleagues for their professionalism, your collegiality, and for your service to our great Nation. And I also look forward to working with GAO on future matters of mutual interest.

Thank you again for the strong support of this subcommittee and for the opportunity to testify before you today. I stand ready to answer any questions you may have. Thank you.

[The prepared statement of Ms. Gordon-Hagerty can be found in the Appendix on page 32.]

Mr. COOPER. Thank you very much.

Mr. Mercado.

**STATEMENT OF VICTORINO G. MERCADO, PERFORMING THE DUTIES OF ASSISTANT SECRETARY OF DEFENSE FOR STRATEGY, PLANS, AND CAPABILITIES, U.S. DEPARTMENT OF DEFENSE**

Mr. MERCADO. Chairman Cooper, Ranking Member Turner, and distinguished members of the committee, thank you for the opportunity to testify today.

With your permission, I also have a longer statement for the record and will just make a few opening remarks.

Mr. COOPER. Without objection, so ordered. We will accept your written statement for the record.

Mr. MERCADO. Sir, today the United States faces an increasingly complex global security environment in which the central challenge to our prosperity and security is a reemergence of great power competition with China and Russia. This remains a central theme of our National Defense Strategy, which we are implementing. Moreover, regimes such as North Korea and Iran have mature and very capable ballistic missile programs with aspirations to be able to deliver nuclear weapons with these missiles.

The foundation for our success in great power competition with nuclear powers China and Russia and dealing effectively with North Korea and Iran is a safe, secure, survivable, flexible, and effective nuclear deterrent embodied by our nuclear triad. For this reason, nuclear deterrence is the Department's highest priority mission.

For this important mission, the U.S. seeks only what it needs to maintain a credible nuclear deterrent, in contrast to Russia, who maintains about 2,000 nonstrategic nuclear weapons and are pursuing and fielding other novel nuclear capabilities. We have no desire or intent to engage in an arms race nor match weapon for weapon the capabilities being fielded by Russia. Again, our objective is a credible nuclear deterrent supported by flexible capabilities residing in the nuclear triad that are tailorable to any potential adversary.

After decades of deferred recapitalization, we must proceed with modernizing U.S. nuclear forces and add additional flexibility consistent with our Nuclear Posture Review, such as the sea-launched cruise missile, to ensure that there are no gains to be made through the use of any nuclear weapon, strategic or otherwise.

The Department of Defense and the National Nuclear Security Administration are critical partners in maintaining and modernizing our nuclear triad to address the challenges we collectively face and appreciate the support that we enjoy from this committee. Funding these critical requirements ensures that modern replacements will be available before the Nation's legacy systems reach the end of their extended service lives and we lose them all together.

The fiscal year 2021 budget request for nuclear forces is \$28.9 billion or roughly 4.1 percent of the total DOD budget request. Modernization or recapitalization of our nuclear forces is about 1.7 percent of the total DOD budget request. The Nation's nuclear modernization program is affordable.

Lastly, nuclear attack is the only existential threat to the United States, and our nuclear arsenal is the Nation's only ultimate insurance policy against such attack. Our nuclear triad underwrites every U.S. military operation around the world and also provides extended deterrence guarantees to over 30 allies and partners, precluding the need for them to pursue their own nuclear arsenals. This is the return on investment of our nuclear forces.

I thank this committee for its support, and I look forward to your questions.

[The prepared statement of Mr. Mercado can be found in the Appendix on page 49.]

Mr. COOPER. Thank you very much.

Vice Admiral Wolfe.

**STATEMENT OF VADM JOHNNY R. WOLFE, JR., USN, DIRECTOR, STRATEGIC SYSTEMS PROGRAMS, DEPARTMENT OF THE NAVY**

Admiral WOLFE. Chairman Cooper, Ranking Member Turner, and distinguished members of the subcommittee, thank you for the opportunity to testify on the Department of Defense's budget request for nuclear forces. I am honored to be here today. I would like to thank this subcommittee for its continued support of the Navy's deterrent mission. I ask you that you please accept my written statement for the record.

Mr. COOPER. Without objection, so ordered.

Admiral WOLFE. The Nation's nuclear triad of intercontinental ballistic missiles, heavy bombers, and submarines equipped with

submarine-launched ballistic missiles is the bedrock of our ability to deter aggression, assure our allies and partners, achieve U.S. objectives should deterrence fail, and hedge against an uncertain future.

Nuclear modernization is the Department of Defense's number one priority. Nuclear modernization is the Navy's number one priority, and nuclear modernization must be fully funded. The Navy's Strategic Systems Programs, or SSP, fiscal year 2021 budget request reflects investment in our responsibility to maintain a safe and secure deterrent that is effective, flexible, and adaptable for the strategic environment.

This investment is imperative both to sustaining and to recapitalizing the sea-based strategic deterrent. Our budget request represents the faith and trust that the Congress and this Nation have placed in the Navy to responsibly steward the strategic deterrent mission. Our nuclear deterrent is credible, but it is aging. Our modernization efforts are underway, but we have much to accomplish over this decade.

As I look to the future of our submarine-launched ballistic missile force, I must urgently express a critical juncture that we have reached. National capabilities and technologies that underpin our needed recapitalization efforts have eroded and atrophied. We are feeling today the consequences of historical decisions, and we have reached the inflection point.

The SSP fiscal year 2021 budget request wholly funds the sustainment of today's deterrent, but it also begins the investment needed to build and reenergize capabilities, technologies, workforce, and critical skills required of any nuclear nation. This very foundation is timeless, is agnostic to a future warfighter solution, and will be a collaborative effort with the United States Air Force.

Today SSP continues to extend the life of the Trident D5 strategic weapons system and to demonstrate its highly reliable performance. Just last month we reached 178 successful flight tests, an exceptional record for any weapon system. Our current life extension is designed to meet today's form, fit, and function to match the *Ohio*-class submarine service life and to serve as the initial weapon system on the *Columbia*-class submarine.

As the Navy carefully manages the transition of our SSBN [ballistic missile submarine] force so too must we manage the age-out and attrition of our strategic weapons system. The SSP fiscal year 2021 budget reflects important investments in our follow-on Trident II D5 Life Extension 2 needed for strategic deployment no later than 2039. This funding focuses on technical maturation of complex and fundamental technologies and opportunities to provide flexibility and adaptability in a dynamic and evolving threat environment.

As our triad's delivery systems and platforms are exceeding their planned service lives, our modernization efforts will produce just-in-time replacements. Deferred recapitalization has left no margin for unanticipated challenges in technical work that we had not executed in over 30 years.

Historical timelines from our first life extension coupled with the increased complexity and scope of the D5 Life Extension 2 signal

that we must begin now. Now is the right time to ensure that the sea-based deterrent continues to meet strategic requirements.

From a warhead perspective, the Navy and our partners at the National Nuclear Security Administration have successfully completed the refurbishment of the W76 warhead family and have modified a small number of warheads to fill the low-yield option to address an identified deterrence need.

As we continue to refurbish today's aging warheads, we have revised the timeline for completion of the W88 alteration 370 program, which is now scheduled to reach first production unit next year. The fiscal year 2021 budget also reflects the Department of Defense's direction to pursue a W93 Mark 7 warhead, an aeroshell program of record.

The W93 Mark 7 will address an evolving threat environment and ballistic missile warhead modernization requirements, will improve operational effectiveness for U.S. Strategic Command, and will mitigate technical, operational, programmatic, and geopolitical risk in the sea-based leg of the deterrent.

The Navy's funding request supports solution-agnostic reentry body components and materials and is the first step toward rebuilding a national industrial base to produce aeroshells and other critical components, which the United States has not exercised since the early 1990s.

This investment is also critically important to our other U.S. programs and to our United Kingdom partners as they too face significant recapitalization demands and execute an independent but parallel warhead effort.

As the 14th director, it is my highest honor to represent the men and women of SSP comprising approximately 1,700 sailors; 1,000 Marines; 300 coastguardsmen; 1,200 civilians; and thousands of contractor personnel. It is my personal goal to ensure that they are poised to execute the mission with the same level of success, passion, and rigor both today and tomorrow as they have since our program's inception since 1955.

Thank you for the opportunity to testify today on behalf of the men and women who truly make nuclear deterrence their life's work. I look forward to your questions.

[The prepared statement of Admiral Wolfe can be found in the Appendix on page 64.]

Mr. COOPER. Thank you, Admiral.

Now, General Clark.

**STATEMENT OF LT GEN RICHARD M. CLARK, USAF, DEPUTY CHIEF OF STAFF FOR STRATEGIC DETERRENCE AND NUCLEAR INTEGRATION, DEPARTMENT OF THE AIR FORCE**

General CLARK. Chairman Cooper, Ranking Member Turner, and distinguished members of the subcommittee, thank you for this opportunity to discuss the Air Force contributions to the nuclear triad. And thank you for your support in ensuring the Department of the Air Force has the required resources to execute our nuclear deterrence mission.

I prepared a written statement that conveys the current status of the Air Force portion of the nuclear enterprise, and I respectfully request that it be submitted for the record.

Mr. COOPER. Without objection, so ordered.

General CLARK. Thank you, sir.

In addition to my written statement, I would like to emphasize three points before the subcommittee today. First, we are grateful for the men and women of the U.S. Air Force who built and currently maintain the resilient nuclear triad and the nuclear command, control, and communications systems we are using today. It is a testament to their ingenuity and hard work that the systems built to deter their generation's nuclear threats are still meeting America's deterrent needs today.

But those systems are now decades past their intended service lives. Minuteman III is 39 years past its planned retirement, and the air-launched cruise missile is 26 years past its original service life. Decades of airmen have performed valiantly to sustain the capabilities and credibility of these systems, but we no longer have the luxury of deferring these systems' upgrades or replacements to future generations.

Second, we need your continued support. There is very little margin between the age-out of our existing systems and the fielding of the replacement capabilities. We need the support of Congress to establish stable funding for the National Nuclear Security Agency and all of our DOD nuclear systems, both in sustaining current capabilities and developing future capabilities. Without stable funding, we cannot deliver these systems on time and run the risk of a deterrence gap that will put our national security at risk.

Third, and most importantly, these capabilities will backstop the next generation of American security and diplomacy. Future airmen will see GBSDs [Ground Based Strategic Deterrent] replace Minuteman IIIs as the ready and responsive ICBM force deterring tomorrow's threats. They will see B-21s take up the bomber mission from B-2s, giving America the flexibility of a tailored deterrent response visible to adversary and ally alike.

Men and women across this country will live in a world where future American ambassadors can conduct diplomacy with the confidence underwritten by stealthy, survivable *Columbia*-class submarines, and together our airmen and sailors will connect with the warriors of the Space Force to guarantee seamless command and control of nuclear forces all day, every day without fail.

These points may sound grandiose, but to me it is very real. My son Milo is heading to college this fall, and he desires an Air Force career. He may find himself as one of the airmen fielding, operating, or sustaining these systems. My hope is that we set up his generation and the generation to follow with a nuclear deterrent every bit as robust as the one that was bestowed upon us.

So, in summary, please let me reiterate my three points. First, past generations have given us a credible and effective nuclear deterrent, but a day is coming in the future where it will be impossible to sustain it; next, we need your continued support to stabilize funding so we can modernize and recapitalize these systems to maintain their credibility; and, finally, the investments we make today will ensure tomorrow's generation and the generations that follow have the capabilities they need for the continued defense of our Nation.

Through all of this, the nuclear enterprise remains the number one responsibility of the Department of Defense, and my fellow airmen and I are proud of the role we play in maintaining a credible and capable nuclear deterrent. Again, I appreciate the opportunity to share my thoughts on strategic deterrence, and I look forward to answering your questions.

[The prepared statement of General Clark can be found in the Appendix on page 76.]

Mr. COOPER. Thank you very much, General.

Ms. Bawden.

**STATEMENT OF ALLISON B. BAWDEN, DIRECTOR, NATURAL RESOURCES AND ENVIRONMENT TEAM, GOVERNMENT ACCOUNTABILITY OFFICE**

Ms. BAWDEN. Chairman Cooper, Ranking Member Turner, and members of the subcommittee, thank you for inviting me to discuss GAO's views on NNSA's plans for modernizing the Nation's Nuclear Security Enterprise and aligning its efforts with DOD's to modernize delivery systems. These remarks should be viewed as helping NNSA set itself up for success.

I also have submitted a written statement for the record and ask that it be entered.

Mr. COOPER. Without objection, so ordered.

Ms. BAWDEN. The Nuclear Security Enterprise is embarking on its most ambitious level of effort since the Cold War era. NNSA is currently managing four weapon modernization programs, proposing a fifth, and undertaking infrastructure projects that affect every strategic material and component used in nuclear weapons.

Today I will discuss the schedule risks presented by the integrated nature of NNSA's and DOD's nuclear modernization efforts, budget and schedule estimates for implementing the overall program, and the importance of NNSA setting priorities among its efforts in the event of budget shortfalls or cost or schedule overruns.

First, on the schedule risks, because NNSA's modernization program is highly integrated, any delay could have a significant cascading effect on the overall effort. Here are three scenarios. First, weapons programs depend on the completion of certain infrastructure projects. For example, the W87-1 program will require all new components, including plutonium pits. The construction schedule for pit facilities is aggressive, and a delay could have an impact on the schedule for the weapons programs it supports.

Also, because NNSA uses the same production infrastructure for each weapon program and capacity is limited, each program schedule can impact the next. In addition, NNSA's weapons programs schedules must remain aligned with the schedules for DOD's new delivery systems to ensure essential testing is completed at critical times. This is especially true for the W80-4 warhead and the Air Force's long-range standoff missile, as well as the W87-1 warhead, and the Air Force's ICBM replacement. The current schedules have little margin for delay.

Second, on budget and schedule estimates, in the past GAO has been critical of NNSA's performance on a number of weapon modernization programs and major construction projects. We identified poor planning and overly optimistic assumptions about perform-

ance that contributed to cost overruns, schedule delays, and program and project cancellations.

NNSA has made improvements to management controls for these efforts, especially around cost and schedule estimating, and is increasingly paying attention to program and project management capacity. As NNSA undertakes an increased scope of work, it is essential that its overall plans reflect realistic cost and schedule estimates rather than best case estimates. For example, while NNSA has not yet fully developed its schedule for constructing pit facilities, its own analysis of alternatives suggests current dates will be difficult to achieve.

Finally, on setting priorities. The President's fiscal year 2021 budget request includes a 25 percent increase for NNSA's modernization program and anticipates sustaining this increased funding level for at least the next 5 years.

In 2017, GAO reviewed NNSA's long-term plans for its modernization program. At the time, we found that NNSA planned to defer work to a period beyond its 5-year programming window. We concluded that these deferrals created a significant bow wave of funding needs in future years to undertake the simultaneous weapons programs and construction projects it planned. The requested budget increase for next year suggests this bow wave has arrived.

Requesting a funding increase is one way to address the bow wave and maintain the overall scope of planned modernization efforts. However, actual funding in future years could fall short of budget estimates, and programs or projects could and have encountered cost overruns or schedule delays.

GAO recommended in 2017 that, to increase the credibility of its modernization plans, NNSA should develop a portfolio approach as a way to manage these risks. Such an approach would present options that could be exercised if budget or schedule risks materialize. This would include identifying programs for which starts could be deferred. Any such plan would need to be put forward in collaboration with DOD.

NNSA's most recent long-term plan includes an assessment of whether its budget requests fall within the range of its program cost estimates. However, it has not yet adopted a portfolio approach to setting its priorities should cost or schedule risks materialize. NNSA's planning could further benefit from this approach in light of the 2018 Nuclear Posture Review and additional programs it anticipates.

I appreciate your time this afternoon, and I am happy to answer your questions.

[The prepared statement of Ms. Bawden can be found in the Appendix on page 86.]

Mr. COOPER. Thank you very much.

I am going to hold most of my questions for the closed session. But I would like to ask Ms. Gordon-Hagerty about a sentence of her testimony on page 11. It reads, "Additionally, the request for M3," that is Material Management Minimization program, "supports the removal and disposal of weapons-usable nuclear material, with priority on removing surplus plutonium from the State of South Carolina."

I was wondering about the urgency of that given the fact that the second site for pit production is supposed to be the State of South Carolina. Why are we so interested in getting plutonium out of South Carolina if we are just going to be returning plutonium to South Carolina?

Ms. GORDON-HAGERTY. Mr. Chairman, the removal of the material from South Carolina is through a program for our nonproliferation needs. That resulted in the agreement that we had with the former Soviet Union, with Russia to remove 34 metric tons of excess plutonium from the world, and we were planning on doing that through the MOX [Mixed Oxide Fuel] program at Savannah River Site.

But since MOX was over construction, over budget—under construction and over budget, we decided to bring that program to termination, and we made that decision, Secretary Perry did, in 2018.

Subsequently, we have been working aggressively to remove the 9.5 metric tons of material still in the State of South Carolina, and we are committed to that approach. We are committed to removing 34 metric tons of excess plutonium from the United States, and we are doing it through a tried and true process called dilute and dispose or surplus plutonium disposition.

So that is material that would not otherwise be used in our stockpile. It is excess material. It is not in a good form, and we would have to put it through quite a number of steps before we were able to use it for the stockpile. That material will go through a process and then be ultimately buried at WIPP, at the Waste Isolation Pilot Plant.

We have made a commitment to the State of South Carolina, and we are sticking with our commitment. In fact, last year we were under court order to remove a metric ton of material from the State of South Carolina. We did it in 6 months ahead of schedule, and so we are moving on that. And we have an aggressive schedule, but it is a doable schedule. We have got long lead procurements going on for the State of South Carolina. We have got a program to undertake that mission at South Carolina.

Mr. COOPER. Thank you.

Mr. Turner.

Mr. TURNER. Thank you, Mr. Chairman.

I first want to open by giving the heartfelt sorrow, I think, from everybody in the room, about the tornados that have hit your community. It is very difficult. My community last summer had eight tornados that hit the city of Dayton and the surrounding areas. It did not make the extent of damage that you have had, but I know to what extent a community has to rally, and I want you to know that certainly you have our support and sympathy.

So I am a big fan of GAO because, I mean, your reports are—they are almost prophetic, right. You go back and you read them, and you think: Gosh, I wish we had done that.

So, you know, I appreciate really just the extent to which you pore over things.

And, gosh, Allison, looking at your resumé and bio, what a great, you know, academic work you have done. I appreciate you have dedicated yourself to the GAO.



I am going to ask the group a question that I am going to ask you slightly differently because it applies to you slightly differently, right. So I am going to begin by reading the quote. So, last week, Admiral Richard, the commander of STRATCOM [United States Strategic Command], testified before this subcommittee and I read this quote in my opening statement. He stated, quote: The entire triad is reaching the end of its useful life, and so either we replace what we have now or we start to divest almost on a path to unilateral disarmament in the face of this growing threat.

I am going to ask each of you if you agree with that, and then, with Allison, I am just going to ask, does GAO disagree, because you are not really in a position to agree, but I don't think you disagree. So, to our Administrator, do you agree with that quote?

Ms. GORDON-HAGERTY. Yes, I do.

Mr. TURNER. Mr. Mercado.

Mr. MERCADO. Yes, sir, I do.

Mr. TURNER. Vice Admiral Wolfe.

Admiral WOLFE. Yes, sir, I do.

Mr. TURNER. General Clark.

General CLARK. Yes, sir, absolutely.

Mr. TURNER. Does GAO disagree with that quote?

Ms. BAWDEN. No.

Mr. TURNER. Great. Excellent.

So, Administrator, you have been just dogmatic in ensuring that people understand that you need infrastructure, that you need production, that in order for there to be a viable deterrent that then there has to be production and that your system has not been in a production mode for a very, very long time; that in order for us to just stay with what we have, we have to invest to be able to respond.

Now, most people don't understand that, in NNSA, under the Department of Energy, is actually where these things are made, where you have to invest in the nuclear infrastructure in order for you to be able to perform and to deliver.

Give us a picture of what you are facing because the—you know, as Allison from GAO was saying, you know, all these are critical paths, which means if we don't fund these, we miss. I mean, you have got to deliver. You can't make a mistake. But we have got to deliver first or you surely can't. So tell us what you are facing as to why currently we have to fund this bill.

Ms. GORDON-HAGERTY. Mr. Turner, let me state by saying I am very proud to be able to represent the 50,000 men and women that support our Nuclear Security Enterprise. And in that regard, we are talking about an infrastructure that was developed and built in the Manhattan Project. Thirty percent of our facilities were built and constructed in the Manhattan Project, and we are operating in those facilities.

Now, we are operating to the point of obviously past their lifetime. More than 50 percent of our facilities are more than 40 years old. Most of our facilities are in the single point of failure where we don't have replication, where we don't have a resilient and responsive infrastructure.

We have waited for almost three decades now. We have endured budget caps. We have endured promises to be able to increase and

to modernize our infrastructure as well as our capacity to support the Department of Defense requirements. We are at a turning point, Representative Turner. We have got to get on with this. We have no margin built in any longer for infrastructure or modernization.

And on top of all of that, while over the last 20 years we were effectively working on one major modernization program, that of the 76-1, which we completed ahead of schedule and on budget, we are now committed to supporting five major modernization efforts of the Department of Defense.

So we are working. We have a schedule. We are working. We are committed, and we are completely aligned with the Department of Defense, with our colleagues who are sitting with me today at the table, but we have very little margin for error. We know we have got the schedule. We know we can commit to, and we can execute. However, we have limited capacity.

What we saw recently with the issue—with the capacitor issue with the 61-12 and the 88 was a result of the fragility of our complex, we have allowed programs to basically evaporate our business sector, if you will, our—pretty much our defense industrial complex, of which we are our own defense industrial complex.

You can't go out and buy plutonium or put out a bid for things like that and for manufacturing the unique components that we put into our nuclear weapons systems. Those programs are long gone. And so what we are doing is basically building up capacity from the ground up.

We would have liked to have avoided the situation that we find ourselves in with the 61 and the 88. That said, we have had lessons learned from that. We are able to apply them to our other systems under which we are operating now and which we are modernizing. We are working closely to continue to be aligned with the Department of Defense.

So we are really at, as I said before, a tipping point. We have no more margin for error. We have got facilities that need to be modernized. We have got personnel that need to be hired so we can undertake and execute our Nation's nuclear deterrent.

Mr. TURNER. Two more quick questions for you, Administrator. You talked—you used numbers, 61, 88—

Ms. GORDON-HAGERTY. My apologies.

Mr. TURNER. No. No. Could you tell us what those relate to? Where do those numbers come from, 61, 88?

Ms. GORDON-HAGERTY. I am sorry. So the B61 Mod 12 is the gravity bomb that the U.S. Air Force deploys. That is a modernization program. It was actually fielded. The first B16 was fielded in the early 1960s.

Mr. TURNER. Okay. That is what I wanted you to get to. So 61 refers to like 1961?

Ms. GORDON-HAGERTY. Pretty much roughly the age at which—about the time where it was deployed.

Mr. TURNER. And 88?

Ms. GORDON-HAGERTY. And the 88 was 1988 or so.

Mr. TURNER. Okay. So can you tell us how long has it been since we have called on you to do this? Because there—I mean, it has been over 20 years, has it not—

Ms. GORDON-HAGERTY. Yes, sir.

Mr. TURNER [continuing]. Since your—the NNSA has been required to actually construct the pit, the nuclear weapon portion of a weapon.

Now, what is important about that—now, I want to hear what the year is, how long you think it has been, because people think that once you have a nuclear weapon you have a nuclear weapon. But if you have it and it sits there for 20, 30, 40 years, it begins to degrade. So you are going to have to replace it. And I think the understanding that people have of this, that once you buy one, you have got one, is contrary to what your experience is. Could you speak about that for a moment?

Ms. GORDON-HAGERTY. Certainly. Let me state by beginning my statement by saying that the United States is the only nuclear weapons state that is neither designing nor fielding new nuclear weapons. We are modernizing our current nuclear weapons stockpile, a stockpile that was built for approximately 20 years for the weapons when they were fielded.

We have stockpile modernization programs for all of the stockpile—of all the weapons that are in our stockpile currently. And to your point, we are modernizing them, so we are providing—what we are doing, just like I referred to the W76-1, that was introduced into the stockpile, into the deployable stockpile in the mid-1970s.

We modernized that over a 20-year plan. It took 10 years to develop the technical modernization programs, and then we did the production for another 10 years, and we finished that in the beginning of 2019. That gives you some idea about the progress that it took, but that was the only modernization program we had at that time. We are now going through significant—some major modernization programs, life extension programs for other systems that are currently in the stockpile.

At some point, however, to your point, sir, that we are not going to be able to life extend our way out of our current nuclear weapons stockpile. It talks—it speaks to the unbelievable talent of our laboratories, plants, and our sites that they designed and fielded nuclear weapons for approximately 20 years, and we are going to have weapons in our stockpile for 60-plus years.

Mr. TURNER. Mr. Chairman, thank you for your indulgence. I have additional questions for the rest of them but I will hold those until afterwards. Thank you.

Mr. COOPER. I thank the gentleman for forbearing.

Mrs. Davis.

Mrs. DAVIS. Thank you, Mr. Chairman.

And thank you to all of you for being here and joining with us and doing the exceptional work that you do.

I wanted to just turn first, Secretary Gordon-Hagerty, to you, because as you may know, there was bipartisan concern expressed in our hearing of last week, and it goes back to the fact that last year you told us that you needed \$16.9 billion for fiscal year 2021 to execute the program of record. And now only 1 year later, we are speaking about another \$3 billion more than you planned for just a year ago.

So I want—if you could express for us, do you consider it important that this committee understand why a *Virginia*-class sub-

marine was cut to pay for this increase? General Milley specifically said in the last hearing that he did not think that this was good prioritization.

Ms. GORDON-HAGERTY. The administration has made it clear, as has the Department of Defense, the Secretary of Defense, that modernization of our nuclear triad is the number one priority. And NNSA is part and parcel of that process.

And so the requirements that we laid out for our 2021 request was something that went like this: This was a requirements-based, yearlong approach that I shepherded personally with our laboratory, plant, site, field office, and headquarters leadership to look at every single requirement across our enterprise, what was executable and we can execute at this level of funding, what were our priorities, what were our commitments based on the requirements set forth by the Department of Defense and the Nuclear Weapons Council.

This was not just a number that we grabbed. This was a number that we said: Can you execute? And I asked in our internal discussions with our labs, plants, and sites leadership, will you be able to execute if we receive these resources if they are appropriated by Congress. And the answer was a resounding yes.

We know we have an aggressive schedule. I also recognize last year we had not asked for or sought this amount of—these amount of resources, but that was because we have a budget caps, and we were operating under other situations. This is the number. This is a realistic number to get us to resolve the decades-long neglect that has been applied to NNSA and our enterprises.

Mrs. DAVIS. Thank you.

I want to just turn now to Ms. Bawden because—and you can answer this with either a yes or no, if you wish. Are you confident that NNSA can execute an unplanned \$3 billion, 20 percent increase in a single year?

Ms. BAWDEN. It will be very challenging.

Mrs. DAVIS. So we are kind of faced with both of those somewhat realities, I guess.

Secretary Gordon-Hagerty, so given past practice, NNSA is likely to only increase its uncosted balances in fiscal year 2020 given the large increase NNSA received. Is that correct?

Ms. GORDON-HAGERTY. There is a great deal—

Mrs. DAVIS. Those are going to grow a lot.

Ms. GORDON-HAGERTY. Well, there has been a great deal talked about the uncosted balances in the Department of Energy at NNSA in particular. I am happy to report by the—at the end of fiscal year 2019, NNSA had a net funds of only \$637 million. That \$8 billion carryover, despite the impressive number, is, in fact, a reasonable amount for NNSA to carry over when you look at \$100 billion program over the next 5 years.

In fact, we are comparable to or less than most other Federal agencies when it comes to major construction and the life extension programs and all of the other programs that we have to administer.

Mrs. DAVIS. And can I turn to you again, Ms. Bawden, and forgive me for going back and forth like this, but the reality is that I think this is helpful for us to get a sense of the evaluation on both ends. Can you comment on what the Secretary has said? How

likely are we to see significant increases in the already very large \$8 billion uncosted and unobligated balances if NNSA were to receive all the money that it is requesting?

Ms. BAWDEN. It is a great question, and it really depends on how quickly NNSA can ramp up its spending rate. There are really two ways to do that, which is through hiring people and increasing activity on their contracts. There are plans to do that. The Administrator spoke about the Federal salaries and expenses increase that is being requested, and we do see, you know, a lot of hiring activity among the contractors, but that spend rate has to go up very quickly to not see those balances.

Mrs. DAVIS. To do that, yeah.

And, Secretary Gordon-Hagerty, so one of the issues, of course, is that the NNSA didn't share their budget information in a timely manner. So part of the concern here is that we want to be certain that the proper planning was done for this budget if it was not shared with the DOD in a timely manner. So, in fact, they had no way of responding to your request.

Mr. COOPER. The gentlelady's time is expired. If you could give us a quick answer here, that would be great.

Ms. GORDON-HAGERTY. We worked through the Nuclear Weapons Council process, and we worked collaboratively with our counterparts in the Department of Defense to ensure that we continued to be aligned with the requirements set forth by DOD.

Mrs. DAVIS. So, in the future, that information would be shared with DOD in a timely fashion?

Ms. GORDON-HAGERTY. We will continue to work through the executive branch process.

Mrs. DAVIS. Thank you very much, Mr. Chairman.

Mr. COOPER. The gentleman from South Carolina, Mr. Wilson.

Mr. WILSON. Thank you, Mr. Chairman.

And thank each of you for being here today. And, Administrator Gordon-Hagerty, I want to thank you very much, several weeks ago visiting the Savannah River Site, hosting Chairman Adam Smith to witness the crucial national security work that NNSA does at the site.

And I am also very happy to extend a warm welcome to any of my colleagues who would like to visit the site to see the critical work that has taken place there, and it is especially meaningful to me. I am the only Member of Congress who has ever worked at the Savannah River Site, and so I know how capable the people are who are there on behalf of the American citizens.

With that, Administrator, how is the site progressing with the conceptual design for the proposed Savannah River plutonium processing facility, and what is the current schedule for the crucial Decision 1 package?

Ms. GORDON-HAGERTY. Representative Wilson, we are making great progress in conceptual design, and we are hopeful that the contractor that is working that process at Savannah River Site will have that to us this year. Critical Decision 1, or CD-1, will be available, will be provided, and will be executed in fiscal year 2021 with the request for our funding at \$442 million.

Mr. WILSON. That is very encouraging. And I know my constituents are very happy about any expedition and expedited effort.

Admiral Wolfe, the Navy fielded the W76-2 low-yield warhead earlier this month. The Nuclear Posture Review identifies the requirement to modify a small number of submarine-launched ballistic missile warheads to combat potential adversaries, such as Russia, who believe that employment of the low-yield nuclear weapons give them an advantage over the United States.

However, the W76-2 is one of two varieties of W76 which just completed its life service extension program. These systems will require modernization in the coming years as their cores are increasingly older. What are the steps the Department is taking to ensure seamless modernization of these systems and to ensure that readiness is not impacted given the growing nuclear threat of other countries? Additionally, what steps are being taken to ensure that the U.S. maintains its nuclear deterrence?

Admiral WOLFE. Yes, sir. Thank you for the question.

So the answer to your first part of that is we continue to work within NNSA, as Ms. Gordon-Hagerty said, on the modernization, on the life extension, particularly the 76, and as we went through that program we were lockstep with NNSA. And so as we have received custody of those and started to deploy those, we have absolute confidence that those weapons are what they need to be.

As we look to the future, as I said, the W88 as we continue the Alt 370 for that particular weapon, that will give us additional life extension for it. So that will give us the deterrent that we need for the W88. And then, in the future, that is the whole reason why we are moving forward with NNSA on the new program of record, the W93 Mark 7.

That will give us what we need going into the future to help what a STRATCOM requirement is, to meet that, as well as make sure that we have a viable deterrent, we have a viable path forward for everything that we do both on *Ohio* and with what we are doing with our modernization for the *Columbia* submarine as well.

Mr. WILSON. Thank you very much. And, indeed, peace through strength. So thank you for what you are doing.

And, General Clark, I appreciate the administration is undergoing review of the U.S. participation in the Open Skies Treaty. There is significant cost associated with modernizing our Open Skies aircraft for arguably little payoff. Additionally, Russia has violated the treaty by restricting our access for certain areas of flyovers and also using the treaty for surveillance of our President and his home and the nuclear command and control.

With commercial providers able to provide the same, if not better, imagery for our NATO [North Atlantic Treaty Organization] allies, is there any strategic reason to remain in this outdated treaty?

General CLARK. Sir, thank you for your question. And currently we are executing Open Skies completely as an Air Force to execute it within the bounds of the treaty, and we are also moving forward on modernization of the programs until told otherwise.

Regarding whether or not we should be in the treaty, from an Air Force perspective, we are in favor of any treaty that is verifiable, enforceable, equitable, and to the best interest of the United States. But you are correct that we have noted some violations by Russia in the treaty, and really it is up to the administration to make a decision on the cost benefit of whether or not it is worth us staying

in. But until that decision is made, the Air Force will continue to abide by the treaty and execute as appropriate.

Mr. WILSON. Thank you again.

General CLARK. Thank you again.

Mr. COOPER. The gentleman's time is expired.

Mr. Carbajal.

Mr. CARBAJAL. Thank you, Mr. Chair.

Ms. Bawden, the NNSA is requesting \$15.6 billion for weapons activities in fiscal year 2021. The request is \$2.8 billion above the NNSA's plan to request for fiscal year 2021 as of the fiscal year 2020 budget plan. How concerned are you about the long-term affordability of the NNSA's nuclear weapons sustainment and modernization plans, and what steps, if any, is the NNSA taking to ensure the affordability and executability of the 2018 Nuclear Posture Review?

Ms. BAWDEN. Thank you. We are concerned about the long-term affordability of the plans. The request that was made for this year is sustained over the next 5 years, and we await the long-term 25-year plan from NNSA to see what is anticipated as budgetary needs beyond that.

I talked earlier about a recommendation the GAO made in 2017 concerning the importance of prioritizing programs should there be budgetary shortfalls or should programs experience cost overruns or schedule delays. And we continue to believe it is important that NNSA move toward those kinds of plans in case those risks are experienced.

Mr. CARBAJAL. Thank you.

Mr. Mercado, the New START Treaty expires in less than 1 year. While the administration has said they intend to pursue a nuclear arms control agreement with Russia and China, China has publicly rejected negotiations. What is the path forward to engage with China and pursue an arms control agreement, and what is the strategy if China will not participate?

Mr. MERCADO. Mr. Carbajal, sir, I believe as we assess China's intent, I think they see more benefit to be part of an agreement for the purposes of just to gain information, you know, to understand, you know, they have leverage because they are expanding their nuclear arsenal while we and Russia have a fairly robust, mature arsenal.

So what they would gain from trying to be part of a treaty and still preserve the right to continue to expand, we believe that there may be an incentive for them to want to participate. However, we have to continually assess their motives. So, as you state, Russia and China and us are in very different states of our nuclear capabilities. So we have to be very careful about that.

Mr. CARBAJAL. Thank you, Mr. Chair. I yield back.

Mr. COOPER. I thank the gentleman.

The next questioner was Ms. Cheney, but I believe she has left, so Mr. Khanna.

Mr. KHANNA. Thank you, Mr. Chairman.

My understanding is that we have about 6,550 nuclear weapons. Russia has about 6,800, and China has about 270. Is that correct, Ms. Gordon-Hagerty, or whoever knows the answer? Ballpark.

Mr. MERCADO. Sir, I think China seems about right. And I think our—we are capped at roughly about 1,500 or so deployed.

Mr. KHANNA. How many nuclear weapons do we have? My understanding is Russia has about 6,800, and we have 6,550. It seems like a pretty basic question. I think we should know how many nuclear weapons we have.

Mr. TURNER. If the gentleman would yield, the question is to deployed weapons and long range and short range, and as they just said, we are going to go to classified session. Perhaps it would be best for that to be answered there.

But the distinction, while they were all deer in the headlights when you asked the question, is that you have got to give them questions based on categories so they are not going to—no one—they are not going to be answering a question as just an aggregate because of the way things break down. But we do have a classified session that the chairman has arranged.

Mr. KHANNA. I guess, what I am trying to understand also is, and maybe this would be in classified setting, I mean, 10 years from now, let's say we didn't do anything, because I appreciate Representative Turner's point—at some point, these weapons deteriorate, but that is over 20, 30 years. In 10 years, do we have—do we track how many weapons would we still have operational in 10 years and 20 years and 30 years?

Admiral WOLFE. So, from our perspective, sir, for the Navy, absolutely. I mean, but, again, the fundamental discussion goes back to what Ms. Gordon-Hagerty said, what we have been saying is. But even those in the stockpile, they age every day. Whether they are deployed or not, they are aging. And so, you know, the physics of all of this starts to take over. So you can't just look at this from a pure numbers perspective because, as we built these 30, 40 years ago, they will continue to age, and so, at some point, to remain credible you have to start modernizing.

Mr. KHANNA. Well, we have—and maybe you could present this in a classified setting or others—we have a chart saying, you know, like a corporation would. Here is when these weapons would no longer be good, and here is—you know, in 2030, we are going to have these many weapons that work; in 2035, these many. Is that correct, somewhere that exists?

General CLARK. Sir, I think, from my perspective, our plans for modernization aren't about increasing the numbers of the weapons. It is about increasing the quality and modernizing them so that they are still credible, capable into the future. But as far as greater numbers of weapons is not the direction that we are headed.

Mr. KHANNA. No. No. But I guess it would be different, right, I mean, it would make a difference for people to know whether in 2030 we are going to have 100 weapons that work or whether in 2030 we are going to have 2,500 weapons that work.

You know, I mean, I guess the question is on deterrence, right. I mean, I believe—I mean, you may disagree—that there is no way in the world—and people can—this is on tape—that Russia is going to launch a nuclear weapon against China, even though China only has 270 weapons.

So the question is, what is—is their thinking on what a deterrence stockpile is, on what a second credible threat is, how many



weapons we need to sufficiently achieve deterrence and a second strike because it is all priorities? I mean, my bigger concern is, is Russia going to launch a cyber attack or election interference? And so are people doing that kind of analysis?

Mr. MERCADO. Sir, in a closed session, we can go into what we have observed and assessed with regard to Russia's recent exercise that they have conducted just late last year, to try to glean their doctrine and their intent with regard to nuclear weapons.

Mr. KHANNA. And my final question, I don't know if you can answer it in open session, is what is Russia's strategy in terms of—I mean, let's say they have 6,000 and they go to 15,000. I mean, what are they hoping—what strategic advantage does that afford them? Because they would know even if we had 5,000, we could obliterate them if they struck. So what does the marginal advantage of going from 6,000 to whatever give Russia?

Mr. MERCADO. Sir, as I said in my opening remarks is that our biggest concern at this point, one of the biggest concerns is the 2,000 numbers of nonstrategic nuclear weapons that Russia is maintaining and how they are updating that arsenal. And I guess we can go again in closed session about, you know, how we see their doctrine of employing those 2,000 nonstrategic nuclear weapons.

Mr. KHANNA. All right. My final point for the record is I fundamentally believe Russia is a has-been power. They are about one-tenth of our economy. They are not nearly as innovative. We won the Cold War. I think they are the last grasp. I am far more concerned about the rise of China and other nations.

Mr. COOPER. The gentleman's time is expired.

Mr. Larsen.

Mr. LARSEN. Thank you, Mr. Chairman.

Ms. Bawden, could you explain what a portfolio management approach is compared to what NNSA is doing now and why that would be better?

Ms. BAWDEN. Thank you.

Mr. LARSEN. In the opinion of GAO.

Ms. BAWDEN. Sure. So a portfolio management approach essentially looks at the big picture. It looks across all of the programs and projects, and it would think about sort of where are the performance cliffs, what has to be done by a certain date, and what are potential tradeoffs? And it identifies what that trade space is so that the agency can select between programs and projects if such a thing was necessary.

Mr. LARSEN. And are you arguing in your report that that is more likely to happen and therefore NNSA ought to take that approach?

Ms. BAWDEN. What we are arguing is that it is an effective risk mitigation strategy, and that it should sort of be in their back pocket should it be needed. And effectively communicating that strategy, we believe, would engender a level of trust to understand what requests they are putting forward, what that request funds, and what options are should what they have requested differ from what actually happens.

Of course, looking back historically, there have been differences between what NNSA and the President have requested in their

budgets and what has been actually received. So we feel that this is an effective risk mitigation strategy should that be needed.

Mr. LARSEN. Yeah. Ms. Gordon-Hagerty, thanks for coming. And I don't mean this question—because I respect you and I respect the work that you are doing, so I don't mean this question to be too snarky, but it seems like the risk strategy right now is to throw more money at the enterprise instead of manage the portfolio. Tell me where I am wrong.

Ms. GORDON-HAGERTY. I would respectfully disagree with your comment. What we have done, as I said, we took a yearlong approach. It was requirements based, meaning the priorities set forth by the Nuclear Weapons Council and by all of the requirements set forth in the Nuclear Posture Review and all of the documents that are guiding requirements for the NNSA—

Mr. LARSEN. Can I stop you there, though?

Ms. GORDON-HAGERTY. Yeah.

Mr. LARSEN. Because if it is requirements based, and I will grant you that, then it means you will always have to meet the requirements even if you run into delays, you run into the issues of programs, platforms and delivery platforms and weapons being integrated. If there is delays in one and not delay in the other, then the only way to address—meeting the requirement is to put more money at it.

Ms. GORDON-HAGERTY. Not necessarily, sir. What we do is we remain very closely aligned almost on a daily basis with our colleagues in the Navy and the Air Force through the Nuclear Weapons Council, through action officer groups to ensure that we remain aligned through all the programs if we have slips.

We are working together. In fact, we had recently had one with the capacitor issue, and we remain fully aligned with our colleagues to ensure that any slippage in the program continues—remains fully aligned.

Mr. LARSEN. I would note that last week we perhaps heard that the Chairman of the Joint Chiefs of Staff is not part of that group that is fully aligned with you in testimony where he didn't—he wasn't part of that decision making where the money was taken out of shipbuilding and put it into nuclear weapons. So you all might agree, but maybe it is not everyone is agreeing. I would just note that.

Ms. GORDON-HAGERTY. If I may, sir, just one final thing, we have updated our weapons activities where we more modernized, if you will, or aligned our programs where all of our strategic materials now are in alignment. All of our bombs, all of our weapons, all of our systems are now aligned to reflect modern and future requirements that we have so that we find more efficiencies and find—continue to find efficiencies and improvements to apply higher fidelity to our programs throughout all of NNSA.

Mr. LARSEN. Sure.

Ms. Bawden, you noted that in your report that NNSA has agreed to some of your recommendations and some of them are still open. Are they open because there is disagreement, or are they open because they haven't got around to them yet?

Ms. BAWDEN. We don't see disagreement on this recommendation, but typically we measure implementation over a 4-year pe-

riod, which we haven't reached yet. We acknowledge some progress in terms of planning toward portfolio management. Their last long-term plan that was put out last year included an affordability analysis, but it didn't expose sort of what those tradeoffs might be should budget shortfalls or performance problems occur.

Mr. LARSEN. All right. Thank you.

I yield back.

Mr. COOPER. I thank the gentleman.

Mr. Garamendi. I thought Ms. Horn was here, but it looks like she has departed as well. You are in luck.

Mr. GARAMENDI. I think I prefer to get to the classified.

Mr. COOPER. Classified session? You are my hero. What a great American.

Mr. GARAMENDI. I will take what praise I can get.

Mr. COOPER. Mr. Lamborn, our honorary member.

Mr. LAMBORN. Thank you, Mr. Chairman, for letting me be part of this hearing and for having this hearing. I am going to have a question or two so I may not be as much of a hero at this moment.

But, Ms. Gordon-Hagerty, let me just ask several questions drilling down a little bit on the W93. What is driving the requirements for the W93 that NNSA is pursuing?

Ms. GORDON-HAGERTY. The W93 Mark 7 is a Nuclear Weapons Council directed program, a program of record. It was endorsed by the—approved by the Deputy Secretary of Defense, and at this time, NNSA is being directed to conduct a rigorous phase one study to inform us better on the W93. I would defer to my colleague from the Navy who sets the requirements for the W73 Mark 7.

Admiral WOLFE. Yes, sir. Thank you. So I think you heard Admiral Richard last week talk about this is a STRATCOM requirement. He has a need. He has laid that requirement into the Nuke Weapons Council. The Nuke Weapons Council has validated that, and that is why the Nuke Weapons Council directed a new program of record called the Mark 93—or the W93 Mark 7.

My portion of that is the actual aeroshell development and all of the nonnuclear components that go with that, which is why, as we look into the future, this is an opportunity not only to meet a STRATCOM requirement, but as I said earlier, to really recapitalize everything that we do.

We haven't developed aeroshells or built aeroshells in this Nation for almost 30 years. That is a technology that is very unique to our business, to the Air Force and to the Navy. And if we don't start now just looking at the basic technologies, and as I talked to the chairman about in a closed session recently, and look at where we get those materials, we will find ourselves short. And so we have got to start that now as we move into the future.

Mr. LAMBORN. How will this warhead have an effect on the British allies and their ability to support their modernization efforts? For either one of you.

Admiral WOLFE. So as I said, sir, earlier, so the U.K. [United Kingdom] has a parallel program. They have just announced it to their Parliament under the Polaris Sales Agreement with what I do for the Navy. And I will let Ms. Gordon-Hagerty talk about the mutual defense agreement.

But we are lockstep with the U.K. on what they need to do to modernize everything that they are doing in their business for the Navy's portion of this, the aeroshell and all the nonnuclear components. They will be involved with us. They will understand what we are doing so they can leverage that for their program. So it is absolutely critical for them to be able to do that as we move through our program of record.

Ms. GORDON-HAGERTY. And for the nuclear explosive package for which NNSA is responsible, we work very closely with our MOD [Ministry of Defence] counterparts through the Mutual Defense Agreement of 1958.

Mr. LAMBORN. Okay. Thank you. And, lastly, is this to be considered a new weapon or weapon system or a different configuration of previously produced components?

Ms. GORDON-HAGERTY. The warhead, as we know it today, but that is what will inform us and that will be borne out in the phase one study as we undertake that phase one study. Right now, it is based on previously deployed and also previously tested nuclear explosive components. So it will not be considered in that vein of we will be producing a whole new system. We are, however, required to and will be borne out in the study that is called the phase one study. So answering questions about whether or not this is a new weapon or we will require pits for this, it is premature to answer those questions. We do not know, which is why we need to be fully informed by the phase one study.

Admiral WOLFE. Yes, sir. And on the Navy side, this will be—for the nonnuclear components outside of the aeroshell this will be a continued evolution and modernization of all of the nonnuclear components, electronics, things that are very unique to what we do in this business.

For the aeroshell, we will start to look for all of those technologies, like I said, for 30 years that we haven't done, and we have basically got to look and figure out how we can even produce an aeroshell. Agnostic of whatever the final solution is from NNSA, we have got to have this for all of our systems as we move into the future. So the budget that we requested starting in 2021 goes to develop all those technologies so that as we marry up we have got a solution moving forward.

Mr. LAMBORN. When I look at what the Russians are doing with talk about a nuclear cruise—powered cruise missile or an underwater nuclear-tipped submarine, an unmanned submarine or some kind of vessel that goes at high speed, those to me are new weapons. But to me it strikes me and my personal opinion that this is an upgrade of an existing weapon. Would you share that perspective?

Ms. GORDON-HAGERTY. Our perspective is that these are new and novel approaches. They are not something that we would ever undertake.

Mr. LAMBORN. You mean the Russians?

Ms. GORDON-HAGERTY. That the Russians are undertaking. That is not something that is even anything we are even considering. And we think that those do not help with stability—strategic stability talks.

Mr. LAMBORN. But the W93 is an upgrade of an existing—

Ms. GORDON-HAGERTY. Yes, sir. And it will not—at this time, we believe that, because it is based on previously tested designs, we will not need to test. There will be no explosive—nuclear explosive testing required for this system.

Mr. LAMBORN. Thank you. I yield back.

Mr. COOPER. I thank the gentleman. The honorary member was in danger of losing his honorary status there.

The subcommittee will adjourn the public session and resume in 2337 as soon as we can get up there.

[Whereupon, at 3:42 p.m., the subcommittee proceeded in closed session.]



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# **A P P E N D I X**

MARCH 3, 2020

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**PREPARED STATEMENTS SUBMITTED FOR THE RECORD**

MARCH 3, 2020

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**Opening Statement**  
**Rep. Jim Cooper, Chairman**  
**Subcommittee on Strategic Forces**  
**March 3, 2020**

Welcome to the distinguished witnesses today, the Hon. Lisa Gordon-Hagerty, Victorino Mercado, performing the duties of Assistant Secretary of Defense, Vice Admiral Johnny Wolfe, Lt. Gen. Richard Clark, and Allison Bawden of the GAO.

This is one of the most important, most complicated hearings of any subcommittee so I hope that all members will stick with the five-minute rule so that we can have plenty of time in closed session following the public hearing. I plan on deferring my time to the closed session.

As I mentioned in last week's subcommittee hearing, the main issues are budgetary and we have the high-class problem of unexpected largesse from the Administration, nearly a \$3 billion increase for NNSA over FY20. Although we appreciate the nearly 20% increase, the burden of proof is on Administrator Gordon-Hagerty to justify the amounts, particularly in view of the NNSA's \$8 billion in uncosted funds.

Now I recognize the Ranking Member for his opening statement.

**Testimony Statement of  
The Honorable Lisa E. Gordon-Hagerty  
Under Secretary for Nuclear Security  
and Administrator of the  
National Nuclear Security Administration  
U.S. Department of Energy  
Before the  
Subcommittee on Strategic Forces  
House Armed Services Committee**

**March 3, 2020**

Chairman Cooper, Ranking Member Turner, and Members of the Subcommittee, thank you for the opportunity to present the President's Fiscal Year (FY) 2021 budget request for the Department of Energy's (DOE) National Nuclear Security Administration (NNSA). NNSA greatly appreciates the Committee's bipartisan support for our nuclear security mission and for the people that are responsible for executing it every day.

The Department's top priority is to support the President's agenda and direction for defending the Nation. NNSA's diverse and enduring missions are vital to the national security of the United States: maintaining a safe, secure, and effective nuclear weapons stockpile, reducing global nuclear threats, and providing the U.S. Navy's submarines and aircraft carriers with militarily effective nuclear propulsion. NNSA is the only organization that can accomplish this unique mission on behalf of the American people.

The U.S. nuclear deterrent is the foundation of our national defense and its credibility serves as the ultimate insurance policy against a nuclear attack. While the ultimate goal of eliminating nuclear weapons has been an aspiration for generations, we must recognize the reality of today's evolving and uncertain international security environment. China and Russia are advancing their nuclear capabilities to directly challenge our advantages. The U.S. must be responsive to the increasing desire for state and non-state actors to reshape the world in their favor, doing so at the expense of our Nation, Allies, partners, and accepted international norms and rules.

To execute the Nation's nuclear weapons program, NNSA, in partnership with the Department of Defense (DoD) through the Nuclear Weapons Council (NWC), conducts activities in a joint nuclear weapons lifecycle process for sustainment of the stockpile through refurbishment activities. Referred to as the phase 6.X process, this addresses DoD and NNSA weapons modernization needs from concept assessment to full scale production, and finally to retirement. With five warhead modernization activities underway, NNSA is executing an unprecedented variety of complex component development and production work through this process, and continues to make progress across all five programs.

While the U.S. nuclear weapons stockpile and its supporting infrastructure are safe, secure, effective, and reliable, they are aging. Competing interests over the past thirty years postponed weapon and infrastructure modernization programs, which directly contributed to erosion of our critical capabilities, infrastructure, and capacity to ensure the deterrent's viability into the future.

The need to modernize our nuclear weapons stockpile and recapitalize its supporting infrastructure has reached a tipping point. More than half of NNSA's facilities are over 40 years old, and roughly 30 percent date back to the 1940s. If not appropriately addressed, the age and condition of NNSA's infrastructure will put NNSA's mission, safety of its workers, the public, and the environment at risk.

With support from the Administration and Congress, NNSA is undertaking a risk informed, complex, and time-constrained modernization and recapitalization effort. NNSA does not rely on the commercial industry's infrastructure to do this. NNSA manages its own industrial base within its nuclear security enterprise (NSE). We manage eight government-owned, contractor operated facilities throughout the country. This includes national laboratories, plants, and sites that perform the research, development, production, and dismantlement necessary to maintain and certify a safe, secure, reliable, and effective nuclear stockpile.

#### **NNSA's Accomplishments in 2019**

Last year, NNSA made tremendous progress across its NSE with several notable accomplishments.

*Plutonium Pit Production:* Los Alamos National Laboratory (LANL) completed fabrication of five developmental plutonium pits, a key component of nuclear weapons, in support of NNSA's strategic effort to revitalize U.S. pit production capability.

*NNSA's Life Extension Programs (LEPs), Modifications, and Alteration:* NNSA completed the final weapon refurbishment for the W76-1 LEP, extending the warhead's service life another 30+ years. NNSA also delivered W76-2 warheads to the U.S. Navy. A modification of the W76-1, the W76-2 provides a low-yield, submarine-launched ballistic missile (SLBM) warhead capability as directed in the 2018 Nuclear Posture Review (NPR).

*Infrastructure Investments:* NNSA commenced construction of the main buildings of the Uranium Processing Facility (UPF) at the Y-12 National Security Complex (Y-12). For the seventh year in a row, UPF remains on budget and on schedule for delivery by the end of 2025 for no more than \$6.5 billion. Additionally, the Albuquerque Complex was "topped out" – meaning the highest and last piece of structural steel was placed. This state-of-the-art facility is anticipated for delivery in 2021, providing modern and efficient workspace for approximately 1,200 employees.

*HEU Minimization:* NNSA completed its largest ever, multiyear removal campaign to the U.S. by transporting approximately 700 kilograms of excess highly enriched uranium (HEU) from the United Kingdom for downblending. Additionally, U.S. industry producers were awarded \$60 million in FY 2019 to support the establishment of domestic supplies of the critical medical isotope molybdenum-99 produced without the use of HEU in support of NNSA's goal to minimize the use of HEU in civilian applications. NNSA also completed the Repurposed Enriched Uranium campaign by downblending a cumulative total of over 163 metric tons of HEU.

*Counterterrorism:* NNSA provided counterterrorism technical training and expertise in support of numerous major public events such as the Super Bowl, Boston Marathon, Macy's Thanksgiving Day Parade, and the Pan-American Games in Peru. Three new fixed-wing Aerial Measuring System aircraft were acquired, improving the program's reliability and range in providing rapid, wide-area assessments of radiological or nuclear events anywhere in the continental U.S.

*Naval Nuclear Propulsion:* Contracts were placed by Naval Reactors for reactor plant heavy equipment, including the lead ship reactor core, for the COLUMBIA-Class ballistic missile submarine. This milestone helps ensure the Navy remains on track to construct, test, deliver, and deploy the vessels on schedule.

*Supercomputing:* NNSA signed a \$600 million contract for its first exascale supercomputer, El Capitan, slated to be delivered in 2022 and operating in 2023 at Lawrence Livermore National Laboratory (LLNL) to support NNSA's nuclear weapons programs. As a world leader in supercomputing, NNSA's acquisition of El Capitan is a critical addition to its next generation supercomputing systems.

*Educational Partnerships:* NNSA funded over \$100 million in grants and cooperative agreements with top universities across the country, through programs such as the Stewardship Science Academic Alliances Program and the Minority Serving Institution Partnership Program to recruit the next generation of scientists and engineers for our NSE and to conduct cutting-edge science in national security and nonproliferation.

#### **NNSA's FY 2021 Budget Request**

The President's FY 2021 budget request for NNSA is \$19.8 billion. This is an increase of \$3.1 billion, or 18.4 percent, over the FY 2020 enacted level.<sup>1</sup> For the Nation to retain a credible deterrent and prevent, counter, and respond to global nuclear security threats, NNSA will require significant and sustained investments in its nuclear security mission. We are mindful of the sustained financial commitment and gratefully recognize the ongoing support of the American people and Congress for this important mission.

#### **Weapons Activities Appropriation**

The FY 2021 budget request for the *Weapons Activities* account is \$15.6 billion, an increase of \$3.14 billion, or 25.2 percent, over FY 2020 enacted levels. This budget request supports the Administration's goals to modernize the Nation's nuclear weapons stockpile and infrastructure to meet the DoD deterrent requirements.

The FY 2021 request is presented in a new proposed structure that consolidates various funding sources, aligns current and future workload, and improves transparency for interaction with Congress regarding program execution and funding requests. The major programs include Stockpile Management; Production Modernization; Stockpile Research, Technology, and

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<sup>1</sup> The FY 2020 enacted level, \$16.7 billion, does not reflect the mandated transfer of \$88.5 million from Naval Reactors to Nuclear Energy for the operation of the Advanced Test Reactor.

Engineering; Infrastructure and Operations; Secure Transportation Asset; Defense Nuclear Security; and Information Technology and Cybersecurity. Funding comparisons between FY 2020 and FY 2021 are done on a “comparable” basis as if the new structure was in place in FY 2020.

These programs support the Nation’s current and future defense posture and the associated nationwide infrastructure of science, technology, engineering, cybersecurity, and production capabilities. This account provides for the maintenance and refurbishment of nuclear weapons to continue sustained confidence in their safety, security, reliability, and performance; continued investment in scientific, engineering, and manufacturing capabilities to enable certification of the enduring nuclear weapons stockpile; continued manufacturing of nuclear weapon components; and continued maintenance and investment in the NSE to be more responsive and resilient.

### **Stockpile Management**

In FY 2020, the science-based Stockpile Stewardship Program supported certifying to the President for the 24th consecutive year that the U.S. nuclear weapons stockpile remains safe, secure, and reliable without the need for nuclear explosive testing. This remarkable scientific achievement is made possible through the work accomplished by NNSA’s world-class scientists, engineers, and technicians, and through the investments made in state-of-the-art diagnostic tools, high performance computing platforms, and modern facilities.

For Stockpile Management, the FY 2021 budget request is \$4.3 billion, an increase of \$604.2 million, or 16.4 percent, over the FY 2020 enacted level. Included within this request is funding to maintain a safe, secure, and effective nuclear weapons stockpile. Activities include extending the expected life of weapons; maintenance, surveillance, assessment, development, and program planning related to the existing weapons stockpile; providing safe and secure dismantlement of nuclear weapons and components; and providing sustainment of needed manufacturing focused on increased efficiency of production operations.

*B61-12 LEP:* The B61-12 LEP will consolidate four variants of the B61 gravity bomb and improve the safety and security of the weapon. Currently in Phase 6.4, the B61-12 LEP achieved first production unit on 93 of 112 weapon components, including all nuclear components. A lifetime reliability concern with base metal electrode capacitors necessitated a delay in delivery of the first production unit (FPU) to the first quarter of FY 2022. NNSA is coordinating with the U.S. Air Force (USAF) to mitigate delays. After discovery of this technical issue, NNSA conducted two internal reviews in addition to a third congressionally mandated review currently in progress and for which the review team is actively working on their report for submission to Congress. All other major components, unaffected by the capacitor failures, are continuing with production and readiness activities.

*W88 Alteration (Alt) 370:* This program, which supports the sea-based leg of the nuclear triad, is currently in Phase 6.4. This program has completed its System-Level Final Design Review, 20 system-level qualification tests, including the Commander’s Evaluation Test 2 and Demonstration and Shakedown Operation’s 29 flight tests. The same technical issue impacting the B61-12 LEP is also impacting the W88 Alt 370. NNSA is aggressively managing the FPU

for this program. NNSA's revised FPU date is scheduled for the fourth quarter of FY 2021. All other major components, unaffected by the capacitor failures, are continuing with production and readiness activities.

*W80-4 LEP:* Currently in Phase 6.3, Development Engineering, NNSA is continuing activities in support of the USAF Long Range Standoff (LRSO) program. Funding in FY 2021 represents the planned ramp-up of production agency activities in conjunction with design activities as the program transitions towards Phase 6.4, Production Engineering.

*W87-1 Modification Program:* The W87-1 Modification Program will replace the aging W78 warhead using a modification of the existing legacy W87-0 design with planned first production in 2030 to support fielding on the USAF's Ground Based Strategic Deterrent missile system. The W87-1 Modification Program will deploy new technologies that improve safety and security, address antiquated design and material obsolescence, and improve warhead manufacturability. In FY 2020, NNSA will continue Phase 6.2, Feasibility Study and Design Options, activities. The FY 2021 budget request for this program will support its transition from Phase 6.2 to Phase 6.2A, Design Definition and Cost Study. Phase 6.2A activities include continuing feasibility study of design options, beginning development of the Weapon Design and Cost Report, and an independent cost estimate conducted by NNSA's Office of Cost Estimating and Program Evaluation (CEPE).

*W93/Mk7:* NNSA is requesting \$53 million in FY 2021 to initiate the warhead acquisition portion of the W93 program beginning with Phase 1, Concept Study and refinement activities to include study of future Navy ballistic missile warhead options and requirements in collaboration with the U.S. Navy. The W93 will incorporate modern technologies to improve safety, security, and flexibility to address future threats—and will be designed for ease of manufacturing, maintenance, and certification. All of its key nuclear components will be based on currently deployed and previously tested nuclear designs, as well as extensive stockpile component and materials experience. It will not require additional nuclear explosive testing to certify. NNSA does not anticipate that fielding the W93 will increase the overall size of the U.S. deployed strategic stockpile. Based on current projections, introduction of W93 weapons into the stockpile will be offset by corresponding reductions in legacy weapon quantities.

Within Stockpile Management, the FY 2021 budget request includes \$998.4 million for *Stockpile Sustainment*, an increase of \$35.6 million, or 3.7 percent above the FY 2020 enacted level. This program sustains the stockpile in accordance with the Nuclear Weapon Stockpile Plan by producing and replacing limited-life components such as neutron generators and gas transfer systems; conducting maintenance, surveillance, and evaluations to assess weapon reliability; detecting and anticipating potential weapon issues; and compiling and analyzing information during the annual assessment process.

The request for Stockpile Management also includes \$569 million for *Production Operations*, an increase of \$25 million, or 7.2 percent, above the FY 2020 enacted level. Included in this request is funding to support continued growth of base capabilities, both workforce and equipment, required to support the increased LEP workload as these programs reach full-scale production rates.



### **Production Modernization**

For Production Modernization, the FY 2021 budget request is \$2.46 billion, an increase of \$892.4 million, or 57.0 percent over the FY 2020 enacted level. Included in this request is funding that focuses on the production of capabilities of nuclear weapons, including primaries, secondaries, and radiation cases, which are critical to weapons performance.

*Primary Capability Modernization:* NNSA's highest infrastructure priority is to reconstitute plutonium pit production. Since the closure of the Rocky Flats facility 30 years ago, the Nation has not been able to produce more than 10 pits in a year. The Nation must be able to produce no fewer than 30 pits per year during 2026 and produce at least 80 pits per year during 2030 to maintain stockpile effectiveness. NNSA's two-site plan to achieve plutonium pit production at LANL and the Savannah River Site (SRS) is prudent and necessary to achieve pit production requirements rather than accept pit lifetimes that threaten the confidence in our weapons' capabilities. This approach will require NNSA to fund activities at two sites. Any interruption or delay to pit production, due to the lack of resiliency, will have huge cost increases across the entire NSE in the future.

The FY 2021 budget request of \$1.44 billion includes funding for plutonium operations and the plutonium pit production projects at LANL and SRS. This level of funding is required for NNSA to produce no fewer than 80 pits per year during 2030, consistent with federal law, national policy, and DoD requirements.

NNSA continues to invest in Plutonium Facility-4 capabilities at LANL to support an enduring 30 pit production capacity during 2026. LANL has demonstrated progress in meeting production realization efforts by fabricating 10 development pits over the last two years. During FY 2020 and FY 2021, LANL will transition to the product realization process prove-in phase.

In FY 2021, NNSA will continue to design, procure long lead materials, and plan for demolition and equipment removal at the proposed Savannah River Plutonium Processing Facility (SRPPF), which will produce no less than 50 pits per year during 2030. Currently, 285 project designers and support staff are working on the project. That number is expected to increase significantly in FY 2021. The SRPPF Project is on budget and on schedule to complete conceptual design in FY 2020 and receive Critical Decision-1 approval in FY 2021.

*Secondary Capability Modernization:* The FY 2021 budget request of \$457 million for Secondary Capability Modernization represents a 55.7 percent increase over the FY 2020 enacted budget. This funding supports NNSA's uranium and lithium modernization efforts.

NNSA's uranium strategy invests in the reliability of key systems to sustain casting, assembly, and analytical chemistry, which supply the current stockpile with purified enriched uranium metal. It also seeks to decrease mission dependency on Building 9212 at Y-12 by relocating the facility's enriched uranium processing capabilities into UPF and other existing facilities. In FY 2021, nuclear construction at UPF will reach its peak. The project has successfully completed

the first three subprojects under budget and remains on budget and schedule to be completed for no more than \$6.5 billion by the end of 2025.

NNSA's Lithium Strategy supports the sustainment of existing infrastructure and ensures the lithium processing needs of the nuclear security enterprise are met through 2035. It also funds activities in support of the Lithium Processing Facility (LPF) to meet NNSA's lithium needs beyond 2035 by replacing the existing at-risk Lithium Processing Building located at Y-12. Loss of this capability prior to programmatic usability of LPF will impact warhead modernization activities.

*Tritium Modernization and Domestic Uranium Enrichment:* The FY 2021 budget request of \$457 million is an increase of \$10.6 million, or 2.4 percent, above the FY 2020 enacted level.

The mission of Tritium Modernization is to establish and operate a domestic source of tritium to meet national security requirements, recycle tritium gas to maintain required inventories, and sustain reliable supply chain infrastructure and equipment to ensure delivery goals. Since 2003, tritium production has met all production, delivery, and schedule requirements. Currently, NNSA is ramping up production levels at Tennessee Valley Authority and is confident that current tritium production plans will meet future tritium delivery requirements. NNSA will continue to ramp up production levels of tritium, to begin producing increased levels of tritium per reactor cycle by FY 2025, and will continue to manage risk by constructing the Tritium Finishing Facility to finish, package, and ship gas reservoirs. NNSA continues to advance responsive science and design and integrate new technologies to support aging equipment and infrastructure.

This funding request will also continue efforts to make available, when needed, the necessary supplies of enriched uranium for a variety of national security needs. The *Domestic Uranium Enrichment* (DUE) program schedule is driven by the nearest-term defense need—unobligated low enriched uranium for tritium production. Other Departmental needs for enriched uranium (e.g., research reactors, naval fuel) are supported by this effort as well. NNSA is currently executing an Analysis of Alternatives examining a wide range of options for meeting the enriched uranium need. These options include an AC100 centrifuge and a smaller centrifuge being developed by Oak Ridge National Laboratory, as well as other enrichment technologies and non-construction options. The analysis is expected to conclude mid-to-late FY 2020.

#### **Stockpile Research, Technology, and Engineering**

The FY 2021 budget request for Stockpile Research, Technology, and Engineering (SRT&E) is \$2.8 billion, an increase of \$229 million, or 9 percent above the FY 2020 enacted levels. This program provides the foundation for science-based stockpile decisions, tools, and components; focuses on the most pressing investments the nuclear security enterprise requires to meet DoD warhead needs and schedules; enables assessment and certification capabilities used throughout the enterprise; and provides the knowledge and expertise needed to maintain confidence in the nuclear weapons stockpile without additional explosive nuclear testing.

*Assessment Science* (\$773 million) requests additional funding to support subcritical experiments used to assess the state of the current stockpile and certify warhead modernization programs and advanced diagnostics for subcritical hydrodynamic integrated weapons experiments that produce data for stockpile certifications.

*Engineering and Integrated Assessments* (\$337.4 million) sustains NNSA's capability for creating and maturing advanced toolsets and technologies to improve weapon surety and support annual stockpile assessments.

*Weapons Technology and Manufacturing Modernization* (\$297 million) develops the materials, technology and manufacturing solutions that will significantly reduce the time and cost of planned and future warhead modernization programs and manufacturing processes. This area has already provided great benefits to the current stockpile and is instrumental to a more responsive and resilient nuclear enterprise.

*Inertial Confinement Fusion* (\$554.7 million) will continue to maintain essential experimental capabilities and expertise in high energy density science. These efforts continue to provide data to reduce uncertainty in calculations of nuclear weapons performance and improve the predictive capability of science and engineering models in high-pressure, high-energy, high-density regimes.

The FY 2021 request includes \$732 million for the *Advanced Simulation and Computing* (ASC) Program, which continues NNSA's close collaboration with DOE's Office of Science to implement the Exascale Computing Initiative. The first NNSA Exascale computer will be located at Lawrence Livermore National Laboratory. The ASC Program supports stockpile stewardship by developing and delivering predictive simulation capabilities for nuclear weapons systems in addition to deploying increasingly more powerful supercomputers at Sandia, Los Alamos, and Lawrence Livermore National Laboratories. Improvements in high performance computing and artificial intelligence are essential for NNSA next-generation simulation capabilities to support weapons design and science-based stockpile stewardship.

#### **Secure Transportation Asset**

The Secure Transportation Asset (STA) provides safe, secure transport of the Nation's nuclear weapons, weapon components, and special nuclear material throughout the NSE to meet nuclear security requirements and support broader NNSA and DOE operations. Nuclear weapon life-extension programs, limited-life component exchanges, surveillance, dismantlement, nonproliferation activities, and experimental programs rely on transport of weapons, weapon components, and special nuclear material on schedule and in a safe and secure manner.

The FY 2021 budget request of \$390 million supports modernizing STA transportation assets, replacement of STA's DC-9 aircraft, vehicle sustainment, replacement of armored tractors, escort and support vehicles; and upgrade of the Tractor Control Unit to accommodate for communications and security. Funding also supports a commitment to a stable human resources strategy that recruits and retains Federal Agents and staff with the requisite skills to meet priorities and mission requirements.

The FY 2021 request includes \$102 million for development and testing of the Mobile Guardian Transporter (MGT), which will provide a replacement trailer system that will meet nuclear safety requirements, address evolving potential security threats, and replace the current Safeguards Transporter, which first entered service in 1997.

### **Improving Safety, Infrastructure, and Operations**

An effective, responsive, and resilient nuclear weapons infrastructure is essential to the U.S. capacity to adapt flexibly to shifting requirements. Such an infrastructure offers tangible evidence to both allies and potential adversaries of U.S. nuclear weapons capabilities and can help to deter, assure, and hedge against adverse developments, and discourage adversary interest in arms competition.

The FY 2021 budget request for Infrastructure and Operations is \$4.4 billion, an increase of \$1.2 billion, or 37.0 percent above the FY 2020 enacted level. More than a third of NNSA's facilities are over 60-years-old. It will take sustained, significant resources and sound management practices to modernize NNSA's nuclear weapons infrastructure.

The FY 2021 budget request includes significant increases in the *Operations of Facilities*, *Maintenance and Repair of Facilities*, *Infrastructure and Safety Recapitalization*, and *Construction* accounts. These increases support major efforts like the LANL pit production mission and LEP missions at Kansas City; and begin to address space issues across the nuclear security enterprise as the sites are staffing up to tackle these challenging missions.

The *Programmatic Construction* activities provide continued support to major construction projects such as the Uranium Processing Facility, the Chemistry and Metallurgy Research Replacement project, the Lithium Production Capability, and U1a Complex Enhancements Project, among others. The request also supports the initiation of design efforts for the High Explosive Synthesis, Formulation, and Production project at Pantex.

Thanks to the support of Congress, NNSA is making progress in repairing, replacing, and modernizing NNSA's facilities and stabilizing deferred maintenance; yet much more remains to be done.

NNSA is deploying a new science-based infrastructure stewardship approach that is improving infrastructure data quality. Part of this approach includes the deployment of BUILDER, a system developed by the U.S. Army Corp of Engineers and recognized by the National Academy of Sciences as a best-in-class practice for infrastructure management.

Using BUILDER-based calculations has provided us with a more accurate and transparent understanding of NNSA's vast infrastructure. Historical approaches had greatly underestimated the replacement plant value of NNSA's facilities. For example, NNSA's replacement value was previously estimated to be \$55.4 billion and is now estimated to be \$124.3 billion. Deferred maintenance costs are tied to the replacement plant value as it costs more to repair a more

expensive facility. Therefore, as expected, NNSA deferred maintenance increased with the deployment of our new, more accurate, data-driven approach, from \$2.5 billion to \$4.8 billion.

However, this is not an indication that NNSA's infrastructure condition declined, merely that the values are more accurate. In fact, the ratio of deferred maintenance to replacement plant value decreased from 4.6 percent to 3.8 percent, an indication that NNSA's investments have been successful.

NNSA is using BUILDER to pinpoint infrastructure investments that reduce the most risk to the mission. In addition, NNSA is undertaking new initiatives and pilots to identify opportunities for improved project execution and asset acquisition.

NNSA is making critical investments to stabilize and dispose of high-risk excess facilities. For example, in FY 2019, NNSA completed its first large-scale process-contaminated disposition at LANL building 46-001. In FY 2021, NNSA is investing \$30 million for the disposition of ten facilities, including three process-contaminated facilities.

#### **Defense Nuclear Security Efforts**

Defense Nuclear Security's FY 2021 budget request is \$826.9 million, an increase of \$51.9 million, or 6.7 percent, over the FY 2020 enacted amount. The Office of Defense Nuclear Security's (DNS) primary mission is protecting the facilities, people, and assets that are critical to achieving NNSA's important national security missions. While NNSA faces challenges replacing and refreshing aging physical security infrastructure, it is making key investments to recapitalize this infrastructure through the Security Infrastructure Revitalization Program. Increased security requirements are associated with growth across the nuclear security enterprise, including plutonium pit production efforts. DNS is focused on countering the threat posed by unmanned aircraft systems, and aims to complete the installation of counter unmanned aircraft systems at Y-12, the Pantex Plant, and the Nevada National Security Site in calendar year 2020.

#### **Enhancing Cybersecurity**

Information Technology and Cybersecurity enable every element of NNSA's missions. The FY 2021 budget request is \$375.5 million, an increase of \$75.5 million, or 25.2 percent, over the FY 2020 enacted level. This increase will continue cybersecurity enhancements, bolster cybersecurity capabilities, and support the continuation of IT modernization efforts. NNSA is making steady progress in enhancing and upgrading components of the Enterprise Secure Computing environment to ensure that nuclear security enterprise missions can be completed without disruption. As NNSA mission requirements expand in scope, IT and cyber programs require modernization, expansion, and innovation in a commensurate fashion. Cybersecurity is a defense and deterrence mechanism and a powerful tool. In the current threat environment, NNSA cannot afford to neglect its cybersecurity capabilities, which serve as frontline assets that protect the information, systems, and networks NNSA depends on to execute its mission.

### **Defense Nuclear Nonproliferation Appropriation**

The FY 2021 budget request for the Defense Nuclear Nonproliferation account is \$2 billion, an increase of \$86.6 million, or 4.5 percent, over the FY 2020 enacted level, after adjusting for the \$220 million FY 2020 appropriation for the termination of the Mixed Oxide Fuel Fabrication Facility (MOX) project. Defense Nuclear Nonproliferation account activities address the entire nuclear threat spectrum by helping to prevent the proliferation of nuclear weapons, counter the threat of nuclear terrorism, and respond to nuclear and radiological incidents around the world.

This appropriation funds five existing programs and expands NNSA's nuclear forensics mission. These six programs, as part of a whole-of-government approach, provide policy and technical leadership to prevent or limit the spread of weapons of mass destruction (WMD)-related materials, technology, and expertise; develop technologies to detect nuclear proliferation; secure or eliminate inventories of nuclear weapons-related materials and infrastructure; and ensure that technically trained emergency management personnel are available to respond to nuclear and radiological incidents and accidents.

### **Nonproliferation Efforts**

The Office of Defense Nuclear Nonproliferation works to: remove or eliminate vulnerable nuclear material; improve global nuclear security through multilateral and bilateral technical exchanges and training workshops; help prevent the illicit trafficking of nuclear and radioactive materials; secure domestic and international civilian buildings containing high-priority radioactive material; provide technical reviews of U.S. export license applications; conduct export control training sessions for U.S. enforcement agencies and international partners; strengthen the IAEA's ability to detect and deter nuclear proliferation; advance U.S. capabilities to monitor arms control treaties and detect foreign nuclear programs; and maintain organizational readiness to respond to and mitigate radiological or nuclear incidents worldwide.

The *Material Management and Minimization (M3)* program provides an integrated approach to addressing the risk posed by nuclear materials. The FY 2021 budget request is \$400 million, an increase of \$37.2 million, or 10.2 percent above the FY 2020 enacted level. The request provides additional cooperative agreement funding for establishing non-HEU-based molybdenum-99 production technologies in the U.S. Additionally, the request for M3 supports the removal and disposal of weapons-usable nuclear material, with priority on removing surplus plutonium from the state of South Carolina.

The *Global Material Security* program works with partner nations to increase the security of vulnerable nuclear and radioactive materials and improve their ability to detect, disrupt, and investigate illicit trafficking of these materials. The FY 2021 budget request of \$400 million is a decrease of \$42 million, or 9.6 percent, below the FY 2020 enacted level. This reduction is a result of a funding increase received in FY 2020 for Cesium Irradiator Replacement Program activities, to include addressing the container breach in Seattle, and for efforts to partner with state and local governments to train first responders. The requested funding includes efforts to secure and protect at risk nuclear and radioactive materials both domestically and internationally, remove and reduce radioactive materials, prevent and investigate the illicit trafficking of

materials, and promote international and national best practices in nuclear security and long-term sustainment of national programs. NNSA is on track to replace all cesium-137 based blood irradiators in the U.S. by the end of 2027.

The *Nonproliferation and Arms Control* program develops and implements programs to: strengthen international nuclear safeguards; control the proliferation of nuclear and dual-use material, equipment, technology and expertise; verify nuclear reductions and compliance with nonproliferation and arms control agreements and arrangements; and address enduring and emerging proliferation challenges requiring the development of innovative policies and approaches. The FY 2021 budget request is \$138.7 million. This request fully funds our statutory and agreement obligations, commitments, and authorities. It includes efforts to strengthen the U.S. safeguards technology and human capital base to meet projected U.S. and International Atomic Energy Agency resource requirements, facilitate the expansion of civil nuclear power while minimizing proliferation risks through the negotiation of 123 Agreements, maintain technical monitoring, verification, and analysis capabilities to support implementation of strategic arms and nuclear testing limitations initiatives, and strengthen domestic and international implementation of export controls.

The *Defense Nuclear Nonproliferation Research and Development* (DNN R&D) program supports innovative unilateral and multilateral technical capabilities to detect, identify, and characterize foreign nuclear weapons programs, illicit diversion of special nuclear material, and nuclear detonations worldwide. The FY 2021 budget request for this program is \$531.7 million. The funding requested strengthens U.S. technical capabilities to detect, locate, and characterize foreign nuclear programs and expands the Nonproliferation Stewardship Program efforts.

*Nonproliferation Construction* consolidates construction costs for DNN projects. The FY 2021 budget request is \$148.6 million, a decrease of \$150.4 million, or 50.3 percent, below the FY 2020 enacted level. The decrease reflects the completion of the MOX contractual termination settlement. The \$148.6 million will be used for the Surplus Plutonium Disposition (SPD) project, which supports the dilute and dispose approach. This supports the execution of early site preparation and long lead procurements activities, as well as continuing the maturation of the design for all major systems supporting the plutonium processing gloveboxes. NNSA will continue looking at opportunities for improving the SPD project schedule.

The *NNSA Nuclear Forensics Research and Development* effort will expand our capabilities and reflects NNSA taking a more active leadership role in this area. The FY 2021 budget request for this program is \$40 million, which includes consolidating \$12 million from DNN R&D. NNSA will focus on expanding nuclear forensics capabilities in both research and development and operations. NNSA will leverage its existing capabilities to develop advanced technical nuclear forensics analysis capabilities within the Office of Counterterrorism and Counterproliferation to support interagency response to a nuclear event.

#### **Nuclear Counterterrorism and Incident Response**

The FY 2021 request for the Nuclear Counterterrorism and Incident Response (NCTIR) Program is \$377.5 million, an increase of \$5.4 million over the FY 2020 enacted level. NCTIR includes

two subprograms: the *Emergency Operations* (EO) subprogram and the *Counterterrorism and Counterproliferation* (CTCP) subprogram. EO executes the DOE/NNSA's Comprehensive Emergency Management System program that administers implementation and support of emergency management for all DOE/NNSA offices and sites, and manages the DOE/NNSA Consolidated Emergency Operations Center and Emergency Communications Network.

CTCP provides effective capabilities to respond to any nuclear or radiological incident in the U.S. or abroad by applying the unique technical expertise found in NNSA's nuclear security enterprise. Highly trained personnel with specialized technical equipment maintain readiness to support lead federal agencies to find and render safe potential nuclear and radiological threat devices, to effectively manage the consequences of nuclear or radiological emergencies, and to support enhanced security operations for National Security Special Events (NSSE).

NNSA's Aerial Measuring System (AMS) provides airborne remote sensing in the event of a nuclear or radiological accident or incident within the continental U.S., as well as in support of regularly scheduled NSSE. With the support of Congress, NNSA completed procurement of three fixed-wing AMS aircraft in FY 2020 and is in the process of procuring two rotary-wing AMS aircraft. The new airframes will minimize the risk of mission failure due to unscheduled maintenance and reduce future maintenance costs.

NNSA, in conjunction with the Federal Bureau of Investigation (FBI), supports regional teams at FBI field offices in 12 major American cities that are specially trained and equipped to identify and mitigate the function of a nuclear or radiological device. CTCP provides specialized technology, equipment, and training to the FBI's regional teams responsible for responding to radiological and nuclear threat devices. With the FY 2021 requested budget, CTCP will be able to enhance WMD device defeat capabilities; increase the number of regional render safe teams in major metropolitan areas from 12 to 14 by FY 2022; and enhance NNSA facilities to accommodate increased training requirements.

Complementing these efforts, the FY 2021 budget sustains and improves the nation's capability to understand and counter nuclear threats, informing a range of technical and policy efforts to detect and defeat efforts to illicitly acquire nuclear capabilities. This work informs the capabilities of the military, intelligence, and security communities by leveraging the technical innovation of the nuclear security enterprise to achieve increased confidence and accuracy in predictive modeling and new tools in support of the nuclear incident response mission.

CTCP provides technical and operational capabilities in support of the interagency National Technical Nuclear Forensic mission. When nuclear materials or devices are interdicted or, in the event of a nuclear detonation, NNSA responds with national laboratory expertise and deployable field teams to provide technical analysis in support of the attribution process.

CTCP maintains an operational nuclear forensics capability in three distinct areas: (1) pre-detonation device disassembly and examination; (2) post-detonation assessment; and (3) analysis and characterization of nuclear materials. The program maintains readiness to deploy device disposition and device assessment teams, conduct laboratory operations in support of analysis of



bulk actinide forensics, and deploy subject matter expertise and operational capabilities in support of ground sample collections that support attribution of a nuclear detonation.

As referenced above, in FY 2021, NNSA's request expands our national technical nuclear forensics work. CTCP is requesting \$40.0 million to support this effort. This scope of work includes coordinating interagency nuclear forensics activities through the National Nuclear Forensics Center. Without the requested funding, many laboratory experts will continue to migrate from this NPR priority mission to other areas of work, posing a threat to U.S. national security.

### **Naval Reactors Appropriation**

#### **Advancing Naval Nuclear Propulsion**

Nuclear propulsion for the U.S. Navy's fleet of submarines and aircraft carriers is critical to the security of the U.S. and its allies as well as the security of global sea lanes. The Office of Naval Reactors remains at the forefront of technological developments in naval nuclear propulsion by advancing new technologies and improvements in naval reactor performance. This preeminence provides the U.S. Navy with a commanding edge in naval warfighting capabilities.

The FY 2021 budget for *Naval Reactors* is \$1.68 billion, an increase of \$35.6 million, or 2.2 percent, over the FY 2020 enacted level.<sup>2</sup> The budget request supports the requirements for Naval Reactors' three major projects – COLUMBIA-Class reactor 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. The budget request also ensures Naval Reactors can support the operational nuclear fleet, continue research and development efforts for future generations of nuclear powered warships, and make progress on both the recapitalization of laboratory facilities and the environmental remediation of legacy responsibilities.

Naval Reactors has requested funding in FY 2021 to support these projects and fund necessary reactor technology development, equipment, construction, maintenance, and modernization of critical infrastructure and facilities. By employing a small but high-performing technical base, the teams at Bettis Atomic Power Laboratory in Pennsylvania; Knolls Atomic Power Laboratory and Kesselring Site in New York; and the Naval Reactors Facility in Idaho can perform the research and development, analysis, engineering, and testing needed to support today's fleet at sea and develop future nuclear-powered warships. These laboratories also perform the technical evaluations that enable Naval Reactors to thoroughly assess emergent issues and deliver timely responses to ensure nuclear safety and maximize operational flexibility.

### **NNSA Federal Salaries and Expenses Appropriation**

The FY 2021 budget request for *Federal Salaries and Expenses* (FSE) is \$454 million, an increase of \$19.3 million, or 4.3 percent, over the FY 2020 enacted level. This budget will support an additional 83 Full Time Equivalents (FTE), a one percent cost of living increase, five

<sup>2</sup> The FY 2020 enacted level, \$1.6 billion, does not reflect the mandated transfer of \$88.5 million from Naval Reactors to Nuclear Energy for the operation of the Advanced Test Reactor.

percent benefit escalation, and funding for training, travel, support services, and field and headquarters security investigations, among other workforce needs.

The 2018 NPR highlighted the need to properly support civilian personnel who protect the U.S. against nuclear threats. Effective deterrence would be impossible without the vital contributions our personnel make to the U.S.' nuclear capabilities and deterrence.

NNSA must have sufficient people, with the right capabilities and security clearances, to ensure we can modernize the nuclear deterrent, recapitalize an aging infrastructure, and continue to meet the requirements of our nonproliferation and counterterrorism programs. A skilled federal workforce is required to execute appropriate program and project oversight as the NSE is busier than it has been since the end of the Cold War. NNSA needs additional staff to support growing mission scope, including: (1) initiating new modernization programs, and (2) new unique high hazard, high scrutiny plutonium pit production, domestic uranium enrichment, tritium, lithium, and high explosives projects.

In 2018, two independent studies concluded that the NNSA had unmet critical staffing needs. The Office of Personnel Management (OPM) and NNSA's CEPE separately arrived at the conclusion that additional federal staff would be needed to meet the demands of the NNSA mission. Both studies recommended NNSA hire additional staff above its previous statutory cap of 1,690 FTE positions. In March 2019, the Government Accountability Office (GAO) endorsed OPM and CEPE's conclusions across multiple NNSA functions.

Congress, recognizing NNSA's need to properly support its growing workforce, appropriated \$434.7 million for FSE (at NNSA's FY 2020 request level), authorized an additional 200 FTEs, and raised the Excepted Service cap by 200. With this strong support from Congress in FY 2020, NNSA will focus on external hiring to reach an end strength of 1,858 FTE positions.

NNSA is taking steps to implement an aggressive, external hiring strategy to address personnel shortages across the enterprise. With a renewed focus on recruitment in multiple cities to support all program areas, NNSA is working to close its manpower gap to successfully meet its mission growth and commitments from the 2018 NPR.

### **Conclusion**

NNSA's diverse and enduring national security missions are crucial to the security of the U.S., the defense of its allies and partners, and global stability. The U.S. nuclear deterrent has been and will continue to remain the cornerstone of America's national security. NNSA has the unique responsibility to ensure its continued safety, security, reliability, and effectiveness.

Nuclear nonproliferation and nuclear counterterrorism activities are essential to promoting the peaceful use of nuclear energy and preventing malicious use of nuclear and radioactive materials and technology around the world and rely on the technical expertise uniquely available from Defense Programs activities. Providing naval nuclear propulsion to the U.S. Navy is crucial to the U.S. to defend interests abroad and protect the world's commercial shipping lanes. NNSA is

mindful of the resources entrusted to it and gratefully recognizes the ongoing support of the American people and Congress for this important mission.

**Lisa E. Gordon-Hagerty**  
**Under Secretary for Nuclear Security and NNSA Administrator**

Lisa E. Gordon-Hagerty serves as the Under Secretary for Nuclear Security of the U.S. Department of Energy (DOE) and Administrator of the National Nuclear Security Administration. She was confirmed by the U.S. Senate on February 15, 2018. With more than 30 years of national security experience, Ms. Gordon-Hagerty is responsible for the management and operations of NNSA in support of President Trump's and Secretary Perry's nuclear security agenda.

Ms. Gordon-Hagerty served previously in several U.S. Government leadership positions, including as the Director of Combating Terrorism, National Security Council staff, directing overseas crisis and consequence management and responsible for coordinating the U.S. Government's activities to deter, disrupt, prevent, and respond fully to conventional, biological, chemical, nuclear or radiological WMD attacks, through research and development, special operations, intelligence, and exercises/contingency planning. She also served at DOE as the Director, Office of Emergency, Defense Programs, administering and directing the Nation's technical nuclear emergency response programs and assets utilized in response to nuclear terrorism, radiological accidents, nuclear weapons accidents and major radiological emergencies worldwide, and as Acting Director, Office of Weapons Surety. Ms. Gordon-Hagerty was a professional staff member on the U.S. House of Representatives Committee on Energy and Commerce, providing technical support to Committee Members on issues related to DOE national security issues. She began her professional career as a health physicist at DOE's Lawrence Livermore National Laboratory.

Prior to joining the Trump Administration, Ms. Gordon-Hagerty was president of Tier Tech International, Inc., a Service Disabled Veteran Owned Small Business providing professional expertise to combating weapons of mass destruction terrorism worldwide. She was also president and CEO of LEG, Inc., a consulting firm focusing on national security issues. Ms. Gordon-Hagerty served as the Executive Vice President and Chief Operating Officer of USEC, Inc.

Ms. Gordon-Hagerty holds a Master of Public Health degree in Health Physics and a Bachelor of Science, both from the University of Michigan.

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HOUSE ARMED SERVICES COMMITTEE  
U.S. HOUSE OF REPRESENTATIVES

OFFICE OF THE UNDER SECRETARY OF DEFENSE FOR POLICY

PRESENTATION TO THE  
SUBCOMMITTEE ON STRATEGIC FORCES  
HOUSE ARMED SERVICES COMMITTEE  
U.S. HOUSE OF REPRESENTATIVES

SUBJECT: FY2021 Budget Request for Nuclear Forces and Atomic Energy Defense Activities

STATEMENT OF: Vic G. Mercado  
Principal Deputy Assistant Secretary of Defense

March 3, 2020

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HOUSE ARMED SERVICES COMMITTEE  
U.S. HOUSE OF REPRESENTATIVES

**HASC-SF Hearing on President's Fiscal Year 2021 Budget Request for  
Nuclear Forces**

**Vic G. Mercado**

**Principal Deputy Assistant Secretary of Defense**

March 3, 2020

Chairman Cooper, Ranking Member Turner, and distinguished Members of the Committee, thank you for the opportunity to testify on the President's Fiscal Year (FY) 2021 Budget Request for nuclear forces and our nuclear posture.

The United States faces an extraordinarily complex and increasingly dangerous global security environment, in which the central challenge to us and our allies' prosperity and security is the reemergence of long-term strategic competition with China and Russia.

Great power competition has returned as China and Russia reassert their global influence. The *2018 National Defense Strategy* (NDS) states that both countries seek to overturn the long-standing free and open international order and alter territorial boundaries. Moreover, rogue regimes such as North Korea and Iran are destabilizing regions through their pursuit of nuclear weapons or ballistic missile programs.

For decades, the United States has led the world in efforts to reduce the role and number of nuclear weapons. Successive treaties required reductions in accountable delivery platforms and associated U.S. nuclear warheads. Additionally, thousands of shorter-range nuclear weapons not covered by any treaty were almost entirely eliminated from the U.S. nuclear arsenal. Overall, the U.S. nuclear weapons stockpile has drawn down by more than 85 percent from its Cold War high.

Unfortunately, Russia and China have chosen a different path and have increased the role of nuclear weapons in their strategies and are increasing the size, diversity, and sophistication of their nuclear forces.

A modern and effective U.S. nuclear deterrent is necessary to deter nuclear attack as well as prevent large-scale conventional war between nuclear-armed states.

**The Nuclear Threat**

Nuclear weapons have served a vital purpose in America's National Security Strategy for the past 70 years, and continue as the foundation of our strategy to preserve peace and stability by deterring aggression against the United States, our allies, and our partners. DoD's strategic priority to maintain a safe, secure, survivable and effective nuclear

deterrent that takes into account the challenges posed by Russia, China, North Korea, and Iran.

### *Russia*

The Russian threat is increasing. As the Russian economy declines, the imperative increases for President Putin to bolster his domestic legitimacy through assertive—and well-advertised—moves on the international stage. Modernizing Russia's nuclear forces and brandishing its nuclear might to show that Russia is a great power to be reckoned with is key to President Putin maintaining his domestic legitimacy.

In his recent January 2020 annual address to Parliament, President Putin stated, “Our efforts to strengthen national security were made in a timely manner and in sufficient volume. For the first time ever—I want to emphasize this—for the first time in the history of nuclear missile weapons, including the Soviet period and modern times, we are not catching up with anyone, but on the contrary, **other leading states have yet to create the weapons that Russia already possesses.**”

These are not hollow words, as Russia is actively developing, testing, and fielding five new nuclear weapons capabilities, which have been referred to as novel nuclear systems. In particular, Russia has fielded the *Avangard* hypersonic glide vehicle and the *Kinzhal* air-launched ballistic missile.

Russia is not only fielding new capabilities, but modernizing its existing inventory and is conducting nuclear weapons tests that have created nuclear yield. Last year, Putin declared that the proportion of state-of-the-art weapons in Russia's strategic nuclear forces had reached 82 percent. This includes 80 new intercontinental ballistic missiles (ICBMs), 102 submarine-launched ballistic missiles, and three Borei nuclear-powered ballistic missile submarines, with the number of guided cruise missiles increasing thirty-fold.

Russia's capabilities are backed by a military doctrine that emphasizes the coercive nature and military value of nuclear weapons, including limited nuclear first use in a regional context. Putin's boasting about the extent and speed of Russia's nuclear modernization program and development of novel systems is concerning because it reflects the value Russia attaches to using nuclear force as an instrument of intimidation. Russia has demonstrated its willingness to forcibly seize territory of other countries and alter established borders, with implicit and explicit threats to use nuclear weapons. During its invasion of Crimea, Russia raised the alert level of its nuclear forces and issued veiled nuclear threats to ensure the West did not intervene. In recent years, Russia has also brandished its nuclear sword towards our NATO Allies.

Russia's nuclear modernization program not only covers every leg of the strategic Triad, but includes non-strategic nuclear weapons—sometimes referred to as tactical or theater

nuclear weapons—that can be deployed on ships, bombers, and tactical aircraft, and with ground forces. Russia has significantly increased the capabilities of its non-nuclear forces to project power into regions adjacent to Russia. It has approximately 2,000 non-strategic nuclear weapons of more than a dozen types, including nuclear torpedoes, nuclear air and missile defense interceptors, nuclear depth charges, nuclear landmines, and nuclear artillery shells. None of these are limited by any arms control treaty. Moreover, according to the Defense Intelligence Agency, the number of non-strategic nuclear weapons is expected to grow significantly over the next decade and these weapons are being modernized with an eye towards greater accuracy, longer ranges, and lower yields to suit their potential warfighting role.

In contrast, the United States deploys to NATO Allied territory a small number of just one type of non-strategic nuclear weapon—the B61 nuclear gravity bomb—which is delivered by a dual-capable tactical aircraft. Both the B61 and its delivery aircraft are being modernized, but not increased in number.

Finally, Russian production, flight-testing, and deployment of the SSC-8 ground-launched cruise missile not only violated Russia's Intermediate-Range Nuclear Forces (INF) Treaty obligations, but led to the treaty's termination. Russia now has fielded multiple SSC-8 Battalions that threaten our European Allies and aim to threaten the U.S. and European security partnership.

### *China*

China continues its expansive military modernization and is challenging traditional U.S. military superiority in the Western Pacific. Over the next ten years, China is expected to at least double the size of its nuclear stockpile while implementing the most rapid expansion and diversification of its nuclear arsenal in its history. China is examining how low-yield nuclear weapons, air-launched ballistic missiles, and other novel delivery systems fit into its expanding nuclear arsenal. In 2018, China launched more ballistic missiles for testing and training than the rest of the world combined.

China is developing a new generation of mobile missiles, with warheads consisting of multiple independently targetable reentry vehicles (MIRVs) and penetration aids. In particular, China has developed a new road-mobile strategic ICBM and has armed its most advanced ballistic missile submarine with new submarine-launched ballistic missiles (SLBMs).

In addition to its land and sea-based components, China has announced development of a new nuclear-capable strategic bomber designed for stealth, the H-20. China has long signaled its intent to field a strategic nuclear triad, and its pursuit of the H-20 nuclear bomber further suggests China's commitment to expanding the role and centrality of nuclear forces in its military planning.



China has also deployed a nuclear-capable precision guided DF-26 intermediate-range ballistic missile capable of attacking land and naval targets. The DF-26 is an INF Treaty-range weapon (though China was never a party to the INF Treaty), which places it in the category of ground-launched missiles that Russia and the United States had eliminated from their arsenals until Russia violated the INF Treaty. China—like Russia—is also committed to the development of hypersonic weapons and is actively flight-testing hypersonic vehicles.

China's nuclear forces include a mix of strategic-range systems capable of striking our homeland as well as theater-range forces capable of threatening allies, U.S. bases, and forces in the region. The Defense Intelligence Agency (DIA) assesses that China's continued use of explosive containment chambers at its nuclear explosive test site at Lop Nur, together with its lack of transparency, raises questions about its testing activities. These activities further underscore the centrality of China's nuclear forces in its military strategy. As China's capabilities both diversify and improve, there is risk China may perceive that these weapons provide it with coercive options in a crisis or conflict.

#### ***North Korea***

North Korea continues its illicit pursuit of nuclear weapons and missile capabilities in direct violation of United Nations (U.N.) Security Council resolutions. North Korea's nuclear capabilities pose a potential threat to our allies and the U.S. homeland.

Between 2006 and 2017, North Korea conducted six progressively sophisticated nuclear explosive tests and three ICBM flight tests that demonstrate its ability to reach the U.S. homeland. It continues to produce fissile material for nuclear weapons. And, more recently, North Korea tested a new sea-launched ballistic missile into the Sea of Japan fired from a sea-based platform.

The United States remains committed to the June 2018 full implementation of the commitments made by President Trump and Chairman Kim in the Singapore Summit Joint Statement. The United States continues to seek the complete elimination of the DPRK's weapons of mass destruction, their means of production, and their means of delivery. This goal is the same one laid out by the UN Security Council in multiple UN Security Council resolutions.

#### ***Iran***

Iran has developed and fielded a substantial arsenal of ballistic missiles that can strike targets throughout the region as far as 2,000 kilometers, as well as cruise missiles and UAVs designed to target U.S. forces and our partners in the region. Iran's ballistic missiles are a key component of its strategic deterrent. This long-range strike capability is used to intimidate our partners in the region. Additionally, Iran's current attempts to launch a space vehicle could provide valuable information that would aid its effort to develop an ICBM capability.

Iran recently launched over a dozen ballistic missiles against U.S. bases in Iraq demonstrating their willingness to not only threaten, but use ballistic missiles for strategic effect. And the threat is increasing. According to DIA, Iran will deploy an increasing number of more accurate and lethal theater ballistic missiles and pursue technical capabilities that could enable it to produce an ICBM.

In addition to developing more capable ballistic missiles, Iran continues to expand its uranium enrichment program in nonperformance of JCPOA commitments. The IAEA has reported since May 2019 that Iran has taken steps to exceed its JCPOA limits, including on the level and amount of enriched uranium, its research and development of advanced centrifuges, as well as on its stockpile of nuclear-grade heavy water. We have made clear that we will continue imposing maximum pressure on the Iranian regime until it ceases its destabilizing activities and negotiates a comprehensive deal.

#### **Nuclear Deterrence Policy**

Nuclear deterrence is the highest priority mission of the Department of Defense. Our deterrent underwrites every U.S. military operation around the world and is the foundation and backstop of our national defense. To maintain credible deterrence in the face of growing nuclear threats, the United States must continue modernizing its nuclear forces—delay is not an option.

The *2018 Nuclear Posture Review* reflects the Department of Defense's strategic priority to maintain a safe, secure, survivable and effective nuclear deterrent. We have made significant progress on implementing the 2018 Nuclear Posture Review. Just over two years after its February 2018 publication, we have completed more than 80 percent of the original tasks that the Department set for itself, with the most significant initiatives having transitioned into routine Departmental processes, such as the Nuclear Weapons Council. Two of the most significant accomplishments include fielding the W76-2 submarine-launched low-yield ballistic missile warhead to the sea-based deterrent force, and reorganizing the Department's governance of nuclear command, control and communications (NC3) activities.

Although nuclear deterrence strategies cannot prevent all conflict, they are essential to preventing nuclear attack, non-nuclear strategic attacks, and large-scale conventional aggression. The extension of the U.S. nuclear deterrent to more than 30 allies and partners helps to ensure their security, and reduces their need to possess their own nuclear capabilities.

No country should doubt the strength of our extended deterrence commitments or the strength of U.S. and allied capabilities to deter or, if necessary, defeat any potential adversary's nuclear or non-nuclear aggression.

#### ***Declaratory Policy***

U.S. nuclear declaratory policy is consistent with longstanding precepts that “the United States would only consider the employment of nuclear weapons in extreme circumstances to defend the vital interests of the United States, its allies, and partners.” The 2018 Nuclear Posture Review (NPR) clarifies that the “extreme circumstances” that may lead the United States to consider nuclear use, include significant non-nuclear strategic attacks. “Significant non-nuclear strategic attacks include, but are not limited to, attacks on the U.S., allied, or partner civilian population or infrastructure, and attacks on U.S. or allied nuclear forces, their command and control, or warning and attack assessment capabilities.”

This clarification is intended to reduce the possibility of adversary miscalculation.

The 2018 NPR further states that “the United States will not use or threaten to use nuclear weapons against non-nuclear weapons states that are party to the NPT and in compliance with their nuclear non-proliferation obligations.”

#### ***Tailored Deterrence with Flexible Capabilities***

The credibility of U.S. nuclear extended deterrence depends on how potential adversaries perceive our resolve to use nuclear weapons in response to a limited nuclear attack against an ally or partner or U.S. deployed forces. We shape an adversary’s perception of U.S. resolve through declaratory policy, capabilities, exercises, and a plausible employment strategy.

For North Korea, the survival of the Kim regime is paramount. Our deterrence strategy for North Korea makes clear that any North Korean nuclear attack against the United States or its allies and partners is unacceptable and will result in the end of that regime. There is no scenario in which the Kim regime could employ nuclear weapons and survive.

Should Russia or China do the unthinkable and launch a limited nuclear strike, the United States will strive to end the conflict and restore deterrence at the lowest level of damage for the United States and its allies and partners.

For this strategy to succeed, the President needs flexible deterrence options. This involves a range of limited, graduated nuclear response options including a variety of delivery systems and explosive yields to deny the adversary any first-use objectives and impose costs to further nuclear use.

The United States must be prepared to respond to first nuclear use not to engage in “nuclear war-fighting,” but to convince an adversary that the cost of any perceived benefit of further use of nuclear weapons will outweigh any benefits an adversary believes it can gain. This strategy serves to reinforce deterrence of conflict at the outset.

***No-First Use***

To preserve deterrence and the assurance of allies and partners, the United States has never adopted a “no first use” policy and, given the contemporary threat environment, such a policy is not justified today. U.S. policy is to retain some calculated ambiguity regarding nuclear employment.

A policy of “no-first use” would increase the risk of nuclear war by changing how adversaries, and allies and partners, view the credibility of the U.S. nuclear deterrent and our resolve to use nuclear weapons when threatened. Adversaries could miscalculate that the United States might not defend its allies and vital interests with every means at our disposal, and this could embolden them to wage aggression using conventional weapons or to use nuclear weapons. Moreover, it would undermine U.S. extended deterrence and damage the health of our alliances because such a policy would call into question the assurance that the United States would come to the defense of allies in extreme circumstances with whatever means is appropriate. Finally, a no-first use policy could undermine U.S. nonproliferation objectives if allies and partners felt the need to develop or possess their own nuclear weapons to deter potential adversaries.

**Force Posture**

The policies set forth in the 2018 NPR reaffirmed the conclusions of previous Republican and Democratic administrations that the nuclear Triad’s diverse capabilities provide the flexibility and resilience needed for deterrence in the most cost-effective manner. Each leg of the Triad is essential, complementary, and critical to ensuring no adversary believes it can successfully employ nuclear weapons for any reason, under any circumstances.

The United States does not need to match adversary capabilities by system or by numbers. But it does need to continue with its current nuclear modernization program.

Each leg of the Triad is now operating far beyond its originally planned service life. The U.S. nuclear deterrent is dependent on nuclear delivery and NC3 systems that were mostly fielded in the 1980s or earlier. Although still reliable and credible today, our current delivery systems, weapons, command and control systems, and infrastructure are rapidly aging into obsolescence. And, because all the systems are reaching the end of their sustainability in the same 2025 to 2035 timeframe, the U.S. nuclear modernization program is relying on “just-in-time” 1:1 replacements of its strategic systems.

Continued funding is of paramount importance because both DoD and the Department of Energy’s National Nuclear Security Administration (NNSA) are engaged in this tightly integrated effort to modernize the U.S. nuclear deterrent to meet today’s challenges.

Our choice is not between replacing our Cold War systems or keeping them, but between replacing them or losing them altogether. As long as nuclear modernization is pursued on a sustained basis, Russia, China, North Korea and Iran can be successfully deterred.

DoD appreciates Congress's recognition of the importance of modernizing U.S. nuclear forces after decades of deferred recapitalization. In FY 2020, Congress funded 98 percent of DoD's budget request for nuclear force modernization, operations and sustainment, and fully funded NNSA's budget request for weapons activities.

We request continued support to modernize and sustain the Nation's nuclear deterrent.

The FY 2021 Budget Request funds all critical DoD modernization requirements, helping to ensure that modern replacements will be available before the Nation's legacy systems reach the end of their extended service lives.

The FY 2021 Budget Request for nuclear forces is \$28.9 billion. This includes \$12.1 billion for recapitalization programs (including the ground-based strategic deterrent (GBSD) ICBM, the B-21 strategic bomber and long-range standoff (LRSO) cruise missile, and the Columbia-class nuclear ballistic missile submarine (SSBN)) as well as \$16.8 billion to sustain and operate our nuclear forces.

DoD's FY 2021 request for nuclear forces is roughly 4.1 percent of the total DoD budget, and the request to recapitalize our nuclear forces is about 1.7 percent of the total DoD budget request. Recent estimates, such as those from the 2018 Nuclear Posture Review, project that the total cost to modernize, sustain, and operate U.S. nuclear forces over the next 20 years will account for about 6.4 percent of the Defense budget at its highest level of funding in 2029, returning to about 3 percent for sustainment and operations upon completion of modernization. Consistent with DoD's estimates, the Congressional Budget Office, in January 2019, concluded that the estimated cost of nuclear forces "is projected to rise from about 5% in 2019 to about 7% in 2028."

The nation's nuclear modernization program is affordable. The United States seeks only what it needs to maintain a credible nuclear deterrence and has no plans to pursue the kinds of exotic novel nuclear capabilities being fielded by Russia. Nuclear attack is the only existential threat to the United States, and our nuclear arsenal is the nation's ultimate insurance policy against such an attack. As the bipartisan National Defense Strategy Commission concluded in its 2018 *Providing for the Common Defense* report, "Given the criticality of effective U.S. nuclear deterrence to the assurance of allies, and, most importantly, the safety of the American people, there is no doubt that these programs are both necessary and affordable."

#### ***Supplemental Capabilities***

The 2018 Nuclear Posture Review recommended two modest supplemental capabilities to the current U.S. stockpile to address Russia and China's growing arsenal of low-yield and

theater—or “non-strategic”—nuclear weapons. While this imbalance was manageable in the past, changes in Russian behavior in recent years, its continued investment in these systems, and the lack of binding limits on its non-strategic nuclear weapons have created a more serious risk, requiring the United States to take countervailing steps.

Development of the low-yield submarine-launched ballistic missile (SLBM) warhead (W76-2) and a nuclear-armed sea-launched cruise missile (SLCM-N) are a measured approach to strengthen deterrence by denying potential adversaries any mistaken confidence that limited nuclear employment can provide a useful advantage over the United States and its allies. Russian doctrine, Russia’s exercises, and its vast arsenal of non-strategic nuclear weapons point to its belief that these weapons provide—through their use or threat of use—a means to coerce NATO or otherwise support conventional aggression against U.S. allies and partners.

The U.S. has fielded a small number of SLBM W76-2 warheads and in the longer term plans to pursue SLCM-N, a capability that existed in the U.S. arsenal until retired in 2010 when the security environment was seen as more benign.

The United States is not attempting to match or counter every new Russian and Chinese system. And to be clear, as stated in the 2018 NPR, these capabilities are “not intended to enable, nor [do they] enable, nuclear war-fighting.” Their purpose is to ensure U.S. deterrence remains strong in the face of this changing nuclear environment.

Both systems complement existing capabilities in the Triad by providing assured, tailored options in the face of increasingly advanced air and missile defenses. These supplemental capabilities strengthen deterrence, are compliant with all treaties and agreements, and provide the United States a prompt, more survivable low-yield strategic weapon, support our commitment to extended deterrence, and demonstrate to potential adversaries that there is no advantage to limited nuclear employment because the United States can credibly and decisively respond to any threat scenario.

These supplemental capabilities do not require nuclear explosive testing, do not violate arms control treaties, and do not lower the U.S. threshold for nuclear use—they are intended to reduce the likelihood that Russia, China, or other potential adversaries would use nuclear weapons first. In other words, these capabilities would raise the threshold for nuclear use.

### ***U.S. Nuclear Stockpile***

To continue to meet military requirements and better mitigate future risks, the United States has adopted a stockpile strategy emphasizing Responsiveness, Resiliency and Flexibility (RRF). The imperative behind this strategy is not to increase the size or scope of the U.S. nuclear arsenal, but to shape the force so it can credibly and effectively deter, assure and, if necessary, defeat potential adversaries today and in an unpredictable future. Building largely on legacy systems, an RRF warhead strategy will provide a nuclear

stockpile that can more readily and confidently hedge both within and between legs of the Triad, thereby mitigating risk and meeting military requirements in a continually evolving threat environment.

The previous “3+2” warhead strategy focused on transitioning to three interoperable ballistic missile warheads and two air-delivered warheads. While appropriate for the more benign environment described in the 2010 Nuclear Posture Review, this approach is not fit for today’s evolving and dynamic security environment.

Today’s dynamic security environment requires a mix of yields and improved platforms that account for the risks identified in the 2018 NPR. By increasing the number of warhead types while retaining roughly the same total number of deployed warheads as in the previous stockpile strategy, the RRF strategy accomplishes this goal.

In the coming years, we will see some adjustment to our approach, including in this budget, \$32 million for the DoD portion of the W93/Mk7 warhead and aeroshell. This warhead will provide USSTRATCOM and the Navy a means to address evolving ballistic missile warhead modernization requirements, mitigate against simultaneous age-out of the W76 and W88 warheads, improve operational effectiveness, and mitigate geopolitical, technical, operational, and programmatic risk in the sea leg of the triad.

As a result of the 2018 NPR directed study to assess the feasibility of fielding the Air Force’s W78 warhead replacement on a Navy reentry body, DoD directed the Navy to pursue developing and fielding the down-selected W93/Mk 7. This will address identified geopolitical, technical, operational, and programmatic risk associated with the Navy’s current warhead composition of the W76 and W88 families. Development of the W93/Mk7 will have the additional benefit of supporting our long-standing ally, the United Kingdom, which needs to field a new ballistic missile system for its continuous-at-sea deterrent. The UK deterrent plays a vital role in NATO’s overall defense posture.

### *Arms Control*

The United States is committed to arms control efforts that advance U.S., allied, and partner security; are verifiable and enforceable; and include partners that comply responsibly with their obligations. The President has charged his national security team to think more broadly about arms control, both in terms of the countries and the weapons systems involved. The President wants serious arms control that delivers real security to the American people and our allies and partners. To achieve this, both Russia and China must be brought to the table.

The United States has not yet made a decision on whether to extend the New START Treaty. The New START Treaty serves its purpose of limiting the number of three categories of strategic offensive arms, together with the warheads deployed on them—ICBMs and their launchers, SLBMs and their launchers, and heavy bombers. But we cannot ignore the imbalance in nuclear weapons created by the size of Russia’s non-

strategic nuclear weapons stockpile, which remains outside of the New START Treaty. Nor can we ignore DIA estimates that regardless of whether or not New START is extended, this stockpile will continue to grow significantly over the next decade. Additionally, Russia continues to develop, test, and field new nuclear-capable strategic offensive systems, several of which will not be subject to New START limitations based on the treaty categories as they exist today.

Russia and China will have little incentive to begin negotiating a more comprehensive nuclear arms control agreement if the United States immediately extends a treaty that does not limit capabilities of concern in either Russia's or China's nuclear arsenal.

I believe Russia and China each have an interest in avoiding a United States that is completely unconstrained in its ability to field nuclear forces.

#### *Allied Engagements*

#### *NATO*

The United States has formal extended nuclear deterrence commitments to assure allies in Europe, Asia and the Pacific region. Based on our long-shared common values and interests, these commitments help address allied and partner concerns over regional threats, such as Russia's nuclear and non-nuclear capabilities and aggressive rhetoric; China's assertiveness; and North Korea's nuclear and non-nuclear threats. No country should doubt the strength of our extended deterrence commitments or the strength of the U.S. and allied capabilities to deter and, if necessary defeat, any potential adversary's nuclear or non-nuclear aggression.

The United States exhibits its commitment to extended deterrence in two ways: first, it maintains the capabilities necessary to deter and, if necessary, to respond decisively across the spectrum of potential nuclear and non-nuclear scenarios that could affect our allies and partners; and second it sustains regular dialogues with allies and partners to facilitate understanding of each other's threat perceptions, to determine how best to demonstrate our collective capabilities and resolve, and to adapt as necessary to a changing security environment.

Within NATO, we continue to participate in the Nuclear Planning Group and the High-Level Group, which our Assistant Secretary for Strategy, Plans, and Capabilities chairs. As NATO Allies reiterated in London in December 2019, as long as nuclear weapons exist, NATO will remain a nuclear Alliance. NATO is determined to maintain the full range of capabilities necessary to deter and defend against any threat to the safety and security of Allied populations. The Alliance's deterrence posture continues to rely on U.S. strategic nuclear forces, U.S. nuclear gravity bombs forward deployed in Europe, and the capabilities and infrastructure provided by Allies concerned. These capabilities include U.S. and Allied dual-capable aircraft, which remain central to the deterrence mission, and related Allied contributions to further enhance the nuclear mission. NATO



continues to adapt in order to ensure that its deterrence and defense posture remains credible, coherent, resilient, and adaptable.

#### ***United Kingdom***

Under the terms of the 1958 Mutual Defense Agreement, the United States and the United Kingdom have maintained robust nuclear cooperation for more than 60 years. We maintain regular dialogue through annual Staff Talks and other technical engagements. The United Kingdom uses U.S. Trident missiles, equipped with UK warheads, onboard its VANGUARD-class SSBNs. The UK's continuous at-sea deterrent contributes to the overall security of both NATO and the United States.

#### ***France***

In addition, the independent strategic nuclear forces of France contribute significantly to the overall security of the NATO Alliance, and enhance the deterrent effect of U.S. strategic forces. The United States maintains a formal dialogue with France through the Annual Staff Talks to facilitate understanding of each other's threat perceptions and on other issues related to nuclear security.

#### ***Japan, Australia Republic of Korea***

In the Indo-Pacific region, the United States maintains formal extended deterrence dialogues with Japan through the Extended Deterrence Dialogue (EDD), Australia with the Strategic Policy Dialogue, and with the Republic of Korea (ROK) through the Deterrence Strategy Committee (DSC) of the Korea-U.S. Integrated Defense Dialogue. Through regular bilateral meetings, site-visits, and table-top exercises, both the EDD and DSC have helped us to develop a common Alliance understanding of deterrence principles, and to test application of those principles to scenarios we may face in the Indo-Pacific region.

#### **Conclusion**

Mr. Chairman, let me conclude by stating that nuclear deterrence is the bedrock of U.S. national security. The U.S. nuclear deterrent must dissuade any adversary from mistakenly believing it can benefit from using nuclear weapons—even in a limited way—against the United States or its allies and partners.

Our nuclear deterrent underwrites all U.S. military operations and diplomacy across the globe—it is the backstop and foundation of our national defense. A strong nuclear deterrent also contributes to U.S. nonproliferation goals by eliminating the incentive for allies to have their own nuclear weapons.

In an increasingly complex and threatening security environment, we must make the investments needed to address the on-going atrophy of our nuclear capabilities and

ensure we have the capabilities, now and in the future, to deter and defend against attacks on our homeland, U.S. forces deployed abroad, and allies and partners.

I urge the Committee to support the important nuclear programs and funding contained in the President's FY 2021 Budget Request.

Thank you again for the opportunity to testify. I look forward to your questions.

**Victorino G. Mercado**  
**Performing the Duties of Assistant Secretary of Defense for**  
**Strategy, Plans, and Capabilities**

Vic Mercado is Performing the Duties of Assistant Secretary of Defense for Strategy, Plans, and Capabilities. He is responsible for advising the Secretary of Defense and the Under Secretary of Defense for Policy on national security and defense strategy; the forces, contingency plans, and associated posture necessary to implement the defense strategy; nuclear deterrence and missile defense policy; and security cooperation plans and policies. Mr. Mercado ensures that the Department's program and budget decisions support and advance senior DoD leaders' strategic direction, especially as articulated in defense planning guidance.

Mr. Mercado graduated from the U.S. Naval Academy in May 1983 with a Bachelor of Science in Mathematics and Computer Science. Mr. Mercado holds a master's degree in systems technology in Joint Command, Control and Communications from the Naval Postgraduate School in Monterey, California.

Prior to his appointment as the Deputy Assistant Secretary of Defense for Plans, Mr. Mercado served in the U.S. Navy for 35 years retiring in November 2018. His service at sea as a surface warfare officer included assignments aboard USS Leftwich (DD 984), USS Valley Forge (CG 50), USS Antietam (CG 54), and USS Curtis Wilbur (DDG 54), culminating with command of USS Decatur (DDG 73) during an accelerated deployment with the John C. Stennis Battle Group in support of Operation Enduring Freedom – Afghanistan and United Nations sanctions on Iraq. He subsequently commanded Destroyer Squadron 21 with additional duties as sea combat commander for the John C. Stennis Carrier Strike Group.

Ashore, he completed a tour with the Navy's engineering and acquisition community as the command, control, communications and intelligence warfare systems engineering manager for the AEGIS Program Manager (PMS 400), served as an action officer and vice director, Navy Staff for Staff Operations and Special Events, Office of the Chief of Naval Operations (OPNAV) N09BX, as the national defense legislative fellow for Sen. Edward M. Kennedy and later led the Commander's Action Group for the Commander, U.S. Pacific Fleet. On the Joint Staff, he served as the joint staff lead in the Joint Chiefs of Staff Strategy Group; as assistant deputy director, Global Strategic Partnerships (J-5); as executive assistant to the director, Strategic Plans and Policy (J-5); and as executive assistant to the Chairman of the Joint Chiefs of Staff. Following his tour on the Joint Staff, he served as the military assistant to the deputy secretary of defense.

Mr. Mercado's flag officer tours include deputy director, Surface Warfare Division (N96B) and Director, Assessments Division (N81) on the staff of the chief of naval operations, and as vice director, Strategy, Plans and Policy (J5) at U.S. Central Command. Afloat, he commanded Carrier Strike Group 8, including the transition from the Dwight D. Eisenhower to the Harry S. Truman Carrier Strike Group. His final assignment on active duty was the director, Maritime Operations for U.S. Pacific Fleet.

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THE HOUSE ARMED SERVICES COMMITTEE  
STRATEGIC FORCES SUBCOMMITTEE

STATEMENT  
OF  
VICE ADMIRAL JOHNNY WOLFE, USN  
DIRECTOR, STRATEGIC SYSTEMS PROGRAMS  
BEFORE THE  
SUBCOMMITTEE ON STRATEGIC FORCES  
OF THE  
HOUSE ARMED SERVICES COMMITTEE  
ON  
FY 2021 BUDGET REQUEST FOR NUCLEAR FORCES AND  
ATOMIC ENERGY DEFENSE ACTIVITIES  
3 MARCH 2020

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STRATEGIC FORCES SUBCOMMITTEE

## **Introduction**

Chairman Cooper, Ranking Member Turner, and distinguished Members of the subcommittee, thank you for this opportunity to discuss the sustainment and recapitalization of the sea-based leg of the triad. It is an honor to testify before you today representing the Navy's Strategic Systems Programs (SSP) and representing the contributions the Navy provides to our national and global security.

The Nation's nuclear triad of intercontinental ballistic missiles, heavy bombers, and ballistic missile submarines (SSBNs) equipped with submarine-launched ballistic missiles (SLBM) is essential to and the very foundation of our Nation's security and survival. The nuclear triad is the bedrock of our ability to deter aggression, to assure our allies and partners, to achieve U.S. objectives should deterrence fail, and to hedge against an uncertain future. The 2018 Nuclear Posture Review (NPR) acknowledged that, while we are actively working to modernize our forces, U.S. modernization efforts lag behind those of our adversaries. Great Power competition has returned, thus reinforcing the need to recapitalize each essential and complementary component of the triad.

Nuclear modernization is the Department of Defense's number one priority.

Nuclear modernization is the Navy's number one priority.

Nuclear modernization must be fully funded.

The Navy provides the most survivable leg of the triad with the interdependent OHIO-Class SSBNs and the Trident II (D5) Strategic Weapon System (SWS), comprising both flight and shipboard systems. SSBNs are responsible for approximately 70 percent of the Nation's operationally deployed nuclear warheads as defined under New START. The Chief of Naval Operations has made clear that the Navy's first acquisition priority is to recapitalize our strategic deterrent and to "support COLUMBIA's fleet introduction on time or earlier." Concurrent with this is the need to develop the next generation of Trident II D5 SWS that will ensure the credibility of the sea-based strategic deterrent for decades.

SSP's core mission comprises two fundamental lines of effort: the safety and security of our Nation's strategic assets entrusted to the Navy; and the design, development, production, and sustainment of the Navy's SWS. We strive to maintain a culture of excellence, underpinned by rigorous self-assessment, to achieve the highest standards of performance and integrity for personnel supporting the strategic deterrent mission. We focus unremittingly on our tremendous responsibility for the custody and accountability of our Nation's nuclear assets. The men and women of SSP, our Sailors, our Marines, our Navy Masters at Arms, our Coast Guardsmen, and our industry partners remain dedicated to supporting the strategic deterrence mission, to responding to the emerging needs of our warfighter, and to protecting and safeguarding our Nation's assets with which we are entrusted. Our Fiscal Year (FY) 2021 budget request provides the required funding to support the recapitalization of the SSP portion of the sea-based strategic deterrent. This funding includes: the SWS sustainment for the OHIO-Class SSBN and SWS procurement for the COLUMBIA-Class SSBN; the Trident II (D5) Submarine-Launched Ballistic Missile (SLBM) Life Extension sustainment and critical initial investment in the next generation Trident II (D5) SWS; continued support of existing warhead activities and required investment in NPR supplemental capabilities; industrial base and infrastructure needed to support modernization; and, most importantly, the people who execute the deterrence mission.

The men and women of SSP and their predecessors have provided unwavering and mission-focused support to develop, sustain, and secure the sea-based leg of the triad for nearly 65 years. However, SSP's critical modernization bow wave is no longer part of the future—it is today. We are heading down a path from which we cannot turn away. Our workforce must evolve from years of sustainment efforts to the dual responsibilities of sustainment and development. Our industrial base has eroded under years of sustainment with minimal focus on future technologies. Investment in critical workforce skills, the industrial base, and complex technologies unique to strategic systems is essential to the Navy's ability to sustain not only today's sea-based strategic deterrent but to respond to emerging warfighter needs with cost-effective, creative, and timely solutions through the life of the COLUMBIA-Class SSBN.

As the fourteenth Director, it is my highest honor to serve as the program manager, technical authority, safety and security lead, regulatory lead, and Polaris Sales Agreement Project Officer for the Navy's nuclear weapons program. Most importantly, I am honored to

represent the men and women of SSP, comprising approximately 1,500 Sailors, 1,000 Marines, 300 Coast Guardsmen, 1,300 civilians, and thousands of contractor personnel. It is my most critical goal to ensure they are poised to execute the mission with the same level of success, passion, and rigor both today *and* tomorrow as they have since our program's inception in 1955.

#### **SWS Sustainment on OHIO-Class SSBN and Procurement for COLUMBIA-Class SSBN**

Today's fragile relationship between sustainment of legacy systems and their replacements remains omnipresent in the calculus of effectively deterring adversaries. The Navy's highest priority acquisition program is the COLUMBIA-Class Program, which replaces the existing OHIO-Class submarines and which must procure a minimum of 12 submarines. The OHIO-Class SSBNs begin decommissioning in the late 2020s, and the COLUMBIA-Class must be ready to begin patrols no later than FY 2031. Recapitalizing our SSBNs is a significant investment that only happens every other generation, making it critically important that we do it right and on time. *Delay is not an option.* The continued assurance of our sea-based strategic deterrent requires not only a next class of ballistic missile submarines, but equally critical, a credible SWS. The Navy is taking the necessary steps to ensure that the next generation deterrent is designed, built, delivered, and tested on time and provides flexibility and adaptability in the dynamic threat environment at an affordable cost.

A critical component of the COLUMBIA-Class Program is the development of a Common Missile Compartment (CMC) with the United Kingdom. Today, the U.S. Navy shares the Trident II (D5) SWS with the UK aboard its Vanguard-Class of ballistic missile submarines. Similar to the U.S. Navy, the UK is recapitalizing its four aging Vanguard-Class SSBNs with the Dreadnought-Class SSBN. The CMC will support today's Trident II (D5) SWS that will be deployed as the initial loadout on COLUMBIA and the UK Dreadnought-Class SSBNs. Our partnership also supports production of these two new classes of SSBNs in both U.S. and UK build yards. Ensuring that the COLUMBIA-Class program remains on schedule supports not only our Nation's operational requirements, but also the ability of the UK, our most important ally, to maintain its Continuous at-Sea Deterrent.

To lower development costs and leverage the proven reliability of the Trident II (D5) SWS, the COLUMBIA-Class SSBN will enter service with the life-extended Trident II (D5) SWS, which is resident on today's OHIO-Class submarines. Maintaining a common SWS during the transition between existing and successor submarine platforms allows the Navy to leverage a mature material and knowledge enterprise, thus reducing programmatic costs and risks. Life-extended missiles will be shared with both the OHIO- and COLUMBIA-Class submarines in the U.S. and with the UK Vanguard-Class and Dreadnought-Class submarines into the 2040s when a next generation SWS must be fielded.

Another major initiative to reduce risk associated with the overhaul of the sea-based strategic deterrent is the SSP Shipboard Systems Integration (SSI) Program, which manages obsolescence and modernizes SWS shipboard systems through the use of open architecture design and commercial off-the-shelf hardware and software wherever feasible. The SSI Program refreshes shipboard electronics hardware and upgrades software, which will extend service life, enable more efficient and affordable future maintenance of the SWS, and ensure we continue to provide the highest level of nuclear weapons safety and security for our deployed SSBNs while meeting U.S. Strategic Command (USSTRATCOM) requirements. The in-progress incremental upgrades to the SWS shipboard systems resident on the OHIO-Class are also linchpins to the timely delivery of the COLUMBIA-Class SSBNs. Modernization of the SWS shipboard systems leverages engineering techniques and methodologies, such as Agile, and embraces model-based engineering design practices in order to effectively respond to today's dynamic environment. The Navy's strategy of addressing obsolescence while simultaneously providing warfighter capability highlights the complex dynamic of sustainment and modernization of our nuclear deterrent.

#### **Trident II (D5) Life Extension and Life Extension 2**

The Trident II (D5) SWS capability has been deployed on the OHIO-Class ballistic missile submarines for nearly three decades and is planned to be deployed more than 50 years. This demand for service life from today's high-performing systems has resulted in a missile life extension effort to match the OHIO-Class submarine service life and, in concert with the SSI Program for shipboard systems, to serve as the initial SWS for the COLUMBIA-Class SSBN.



The D5 Life Extension (D5LE) will ensure an effective and credible SWS on both the OHIO-Class and COLUMBIA-Class SSBNs into the 2040s. Our initial life extension of missile and guidance flight hardware components was designed to meet the same form, fit, and function of the original system, maintain the deployed system as one homogeneous population, control costs, and sustain the demonstrated performance of the system. The Navy's D5 life extension program is executing on schedule to continue to meet deterrence requirements and will complete deployment by FY 2024.

Within the last year, the Navy continued to demonstrate the highly reliable performance of the SWS through a total of seven D5LE flight tests in support of Demonstration and Shakedown Operations (DASO) 29 and 30 and the Commander's Evaluation Test (CET) 2. A DASO flight test is executed following the refueling period of an SSBN and provides the opportunity both to certify the SSBN crew to employ the SWS and to certify that the SWS continues to meet requirements. In contrast, the CET program obtains and monitors reliability, accuracy, and performance data of the D5LE missile population in an operational environment. The events executed to date in 2020 have resulted in 178 successful flight tests—an exceptional record for any weapon system.

As the Navy carefully manages the approach to end of life of our OHIO-Class SSBNs, we must address the viability of the SWS throughout the life of the COLUMBIA-Class SSBNs. As the 2018 NPR concluded, threats continue to evolve, and the warfighter requires flexible and adaptable solutions to complex problems. The current D5LE missile population faces attrition through component aging and flight test requirements, and a next generation of D5—Life Extension 2 (D5LE2)—must be ready for strategic deployment no later than 2039 to ensure that an adequate inventory of SLBMs are available to seamlessly sustain USSTRATCOM requirements. D5LE2 is structured to maintain today's unmatched reliability and demonstrated performance, while unlocking untapped system potential to efficiently respond to emerging needs and to maintain a credible deterrent throughout the life of the COLUMBIA-Class.

SSP has begun technical maturation of the D5 system's most complex and foundational technologies, such as strategic-grade guidance instruments and radiation-hardened microelectronics. This expertise has atrophied in industry today and will require investment and

time to reinvigorate the industrial base to support the deterrence mission. SSP also initiated architecture analyses to evaluate potential solutions to address emerging threats, improve supportability, and improve flexibility to address an uncertain future. To maximize affordability, analysis has focused on determining the effective composition of redesign, remanufacture, and pull-through of the most highly reliable components. This effort will continue in earnest in FY 2021. Historical timelines and lessons learned in our smaller-scale first life extension effort indicate that the workforce development and technology maturation of obsolete and complex components must begin now to support delivery of this capability to the warfighter in 2039. Full support of D5LE2 today is vital to achieving a 2039 fielding and to embarking on a path that maintains an SLBM deterrent capability through the service life of the COLUMBIA-Class SSBN.

#### **Warhead Activities and NPR Supplemental Capabilities**

The Navy also works in partnership with the Department of Energy's National Nuclear Security Administration (NNSA) to refurbish our existing reentry systems and to respond to any emergent USSTRATCOM requirements. The Trident II (D5) is capable of carrying two types of warhead families, the W76 and the W88. In 2019, NNSA completed the W76-1 Life Extension Program, marking the U.S. stockpile's first full-scale warhead refurbishment program. The W76-1 program was a tremendous effort that informs much of our understanding of the technical complexity, costs, and timelines for refurbishment programs, and I laud our NNSA partners for their support of the Navy's deterrent.

The W88 warhead continues to undergo its refurbishment program on a revised timeline based on capacitor component issues that did not meet reliability requirements. In coordination with the Navy and NNSA, the Nuclear Weapons Council (NWC) has approved an 18-month delay to First Production Unit, which is now scheduled for July 2021. I am confident that our teams will work together to manage the delay, as we have historically addressed refurbishment challenges with a mission-focused attitude and rigor. The Navy will prioritize meeting our warfighters' requirements and minimizing disruption to the operational fleet to ensure that the sea-based leg of the triad continues to fulfill its deterrence mission. However, this program

setback represents the pervasive and overwhelming risk carried within the nuclear enterprise as refurbishment programs face capacity, funding, and schedule challenges.

In response to the 2018 NPR guidance to modify a small number of existing warheads to provide a low-yield SLBM warhead option and close an identified deterrence gap, NNSA and the Navy converted a small quantity of refurbished W76 warheads to a low-yield option, the W76-2. The Navy has fielded this capability. The W76-2 strengthens deterrence and provides the United States a prompt, more survivable low-yield strategic weapon; supports our commitment to extended deterrence; and demonstrates to potential adversaries that there is no advantage to limited nuclear employment because the United States can credibly and decisively respond to any threat scenario.

The 2018 NPR also directed the Navy to investigate the feasibility of fielding the nuclear explosive package from the Air Force's W78 warhead replacement into a Navy reentry body. To address the needs of the Navy and the warfighter and to support the United Kingdom's warhead replacement analysis, the NWC directed the Navy and NNSA to broaden the study and assess the feasibility of a range of options. At the study's conclusion, the Department of Defense directed the Navy to pursue the development and fielding of an aeroshell program and to enter into Phase 1 of the joint DoD-DOE Nuclear Weapons Lifecycle Process for a warhead; this effort is collectively known as the W93/Mark 7. This effort will address evolving ballistic missile warhead modernization requirements; improve operational effectiveness for USSTRATCOM; and mitigate technical, operational, and programmatic risk in the sea-leg of the triad. FY 2021 initial investment supports the reinvigoration of critical, niche national skillsets and capabilities uniquely associated with harsh reentry environments, and, therefore, is applicable to both the Navy and Air Force future needs. Development of this system not only addresses known U.S. risks, it supports the UK's critical need to recapitalize its deterrent, which is essential to the North Atlantic Treaty Organization's overall defense posture. Under the auspices of the Polaris Sales Agreement and the Mutual Defense Agreement, the paths and tools are in place to ensure each nation's needs are met. The Navy will work in close coordination with the Department of Defense, NNSA, the NWC, and the Congress as this effort matures.

Finally, SSP will continue to support the Navy's FY 2021 Analysis of Alternatives (AoA) for the 2018 NPR-directed nuclear-armed Sea Launched Cruise Missile (SLCM-N). We have been directed to complete this AoA in time to inform the FY 2022 Presidential Budget Request. Following the near-term W76-2 effort to close identified deterrence gaps, the mid-term SLCM-N could provide a flexible non-strategic option to further strengthen deterrence.

### **Industrial Base and Infrastructure**

Our modernization needs cannot succeed without investing in the research and development (R&D), critical skills, and facilities needed to produce, sustain, and certify our nuclear systems. Ensuring robust defense and aerospace industrial base capabilities—such as radiation-hardened electronics, aeroshells, strategic inertial instruments, and solid rocket motors—remains an important priority in conjunction with R&D investment. SSP has placed particular emphasis on the solid rocket motor industry and its sub-tier suppliers and appreciates the support of the Congress to allow for the continuous production of these vital components. Equally essential to the nuclear deterrent is a national aeroshell production capability. The FY 2021 budget request reflects a reinvigoration of an aeroshell production capability that is executed by a small cadre of highly skilled experts in a niche industry. Aeroshell investment supports not only the Navy but will also be cost-effectively leveraged by the Air Force and United Kingdom in their independent reentry program endeavors. Finally, R&D investment is critical to today's nuclear modernization needs to ensure that we advance necessary technology ahead of design needs and to train our workforce during the early years of development.

From an infrastructure perspective, our Trident and contractor facilities must be upgraded to address aging and to process modernized systems. Facilities and their supporting infrastructure serve as the crux of our ability to equip our SSBNs with the SWS and to provide approximately 70 percent of the Nation's deployed nuclear warheads. Investment in proactive, planned maintenance and upgrades can prevent throughput constraints and can level workload and simultaneous age-out of our processing facilities. The Navy relies on a limited footprint to outfit our submarines, and maintaining and sustaining facilities is critical to meeting our flight testing and deployment requirements. Our Nation must prioritize and fund their upkeep and upgrades in order to provide an effective and flexible deterrent in the future.

As the Navy executes the modernization and replacement of the SSBN and associated SLBM leg of the nuclear triad, DoD and NNSA's infrastructure must be prepared to respond in tandem to the evolving needs of the Nation. Of most importance, we must have an effective, resilient, and responsive plutonium pit production capability with a capacity of 30 pits per year during 2026 and a minimum of 80 pits per year during 2030. This capability can address age-related risks, support planned refurbishments, as well as prepare for future uncertainty. Additionally, tritium, lithium, and uranium, among other strategic materials, are vital to ensuring the Navy can continue to meet its strategic deterrent requirements. The FY 2021 budget for NNSA makes major investments in its infrastructure and in its ability to produce these strategic materials.

### **Workforce**

History reminds us that the swift, successful creation and execution of the Fleet Ballistic Missile program in the 1950s was truly a result of national commitment, congressional support, and cadre of hand-selected scientists, engineers, and inspirational leaders. Though process will always underpin our efforts, our dedicated predecessors—civilians, military, and industry partners alike—responded to the national need with focused determination and drove this program with a vision. People are as fundamental to our nuclear deterrent as the SWS itself. Today, SSP and its industry partners are focused on inspiring, growing, and retaining a generation of workforce that did not live through the darkest days of the Cold War. Connecting a new workforce to this fundamental global security mission remains an important task shared among the entire nuclear enterprise. A capable, credible, and affordable strategic deterrent for our Nation for the next 60 years requires not only technical, policy, management, and financial acumen—it requires passion and a commitment to making this our life's work.

### **Conclusion**

SSP ensures a safe, secure, effective, flexible, and tailorable strategic deterrent, with a steadfast focus on the proper stewardship, custody, and accountability of the nuclear assets entrusted to the Navy. Sustaining and modernizing the sea-based strategic deterrent capability is a vital national security requirement. Our Nation's sea-based deterrent has been a critical component of our national security since the 1950s and must continue to assure our allies and

partners and to deter potential adversaries well into the future. I am privileged to represent this unique organization as we work to serve the best interests of our great Nation. I thank the committee for the opportunity to speak with you about the sea-based leg of the triad and the vital role it plays in our national and global security.

**Vice Admiral Johnny R. Wolfe, Jr.**  
**Director, Strategic Systems Programs**

Vice Adm. Johnny Wolfe is a native of Somerset, Texas. He graduated from the U.S. Merchant Marine Academy, Kings Point, New York, in 1988 with a Bachelor of Science in Marine Systems Engineering. He earned a Master of Science in Applied Physics from the Naval Postgraduate School in 1994, where he was also selected for transfer to the engineering duty officer community.

At sea and on deployment, he served as the assistant weapons officer on USS Lewis and Clark (SSBN 644) from 1988 to 1992, and was part of a forward-based team that led the rebuilding of courthouses and prisons in Iraq in 2007. In 1994 he was assigned as the lead systems engineer on a Ballistic Missile Defense Office (BMDO) joint skunkworks project ran by the U.S. Air Force at Kirtland Air Force Base, New Mexico.

From 1995 to 1996, he was assigned to Strategic Systems Programs (SSP) as the liaison to the Deputy Assistant Secretary of the Navy Command Control Communications Computers & Intelligence (C4I). From 1996 to 2000, he served as the assistant section head for fire control and guidance at SSP. In July 2000, Wolfe was assigned to the Program Management Office, Strategic Systems Programs (PMOSSP), Sunnyvale, California, where he served as the technical division head. During this tour, he was assigned additional temporary duties as a technical investigator for the Columbia Accident Investigation Board where he served as a lead for foam loss testing and orbit impact analysis. From 2003 to 2014, Wolfe was assigned back to SSP Headquarters. While at SSP he served in many positions, including the deputy chief engineer, branch head for Fire Control and Guidance Branch, the nuclear weapons security coordinator and SSGN coordinator, and branch head for Missile Branch.

In 2012, Wolfe assumed duties as the technical director and deputy director reporting program manager for Strategic Systems Programs. Wolfe was promoted to Rear Admiral October 1, 2014, and assigned as the program executive for Aegis Ballistic Missile Defense, Missile Defense Agency.

Wolfe was promoted to Vice Admiral on May 4, 2018 and assumed the duties as director, Strategic Systems Programs.

Wolfe's awards include the Defense Superior Service Medal, Legion of Merit, Bronze Star, Meritorious Service Medal with gold star, Joint Services Commendation Medal, Navy Commendation Medal with gold star, Navy Achievement Medal with three gold stars, Air Force Achievement Medal and various other service awards.

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COMMITTEE STRATEGIC FORCES  
SUBCOMMITTEE

STATEMENT  
OF  
LIEUTENANT GENERAL RICHARD M. CLARK, USAF  
DEPUTY CHIEF, STAFF FOR STRATEGIC DETERRENCE & NUCLEAR INTEGRATION  
BEFORE THE  
SUBCOMMITTEE ON STRATEGIC FORCES  
OF THE  
HOUSE ARMED SERVICES COMMITTEE  
ON  
PRIORITIES FOR  
DEPARTMENT OF DEFENSE NUCLEAR FORCES  
03 MARCH 2020



## INTRODUCTION

The Airmen of the United States Air Force, along with our partners at the National Nuclear Security Administration (NNSA) remain committed to accomplishing the nuclear mission each and every day. Our nuclear force serves as the foundation of the National Defense Strategy—backstopping all U.S. military operations across the globe, while continuing to deter the escalation of conflict between great powers. Deterring nuclear and non-nuclear strategic attack against the United States and our allies remains the highest priority of the Department of the Air Force. The office of the Deputy Chief of Staff for Strategic Deterrence and Nuclear Integration (AF/A10) continues to monitor and provide oversight of the safety, security, reliability, effectiveness, and credibility of the nuclear deterrence mission in accordance with United States law<sup>1</sup>. Over the last year, the Department of the Air Force has continued to work toward full implementation of the recommendations made in the 2014 Nuclear Enterprise Review and 2018 Nuclear Posture Review, while providing updates to the Secretary and Chief of Staff of the Air Force to ensure senior leaders are up to date on developments across the nuclear enterprise. These and many other efforts ensure the Department of the Air Force continues to be a responsible steward of our national nuclear capabilities, while building an integrated approach that addresses the strategic security environment at hand.

## THREAT

Long-term strategic competitions with Russia and China are the principal priorities for the Department of Defense. These priorities require increased, sustained investment because of the magnitude of the threats they pose to U.S. security and prosperity today and the potential for those threats to increase in the future<sup>2</sup>. Additionally, rogue states like Iran and North Korea continue to remain a concern for nuclear proliferation.

Throughout the last year, potential adversaries have continued to expand their strategic and non-strategic capabilities, creating modern and exotic weapons that, in some cases, remain unchecked in today's arms control regime. As a result of their efforts, great power competitors now believe they have an advantage over the rest of the world, evidenced in President Putin's January 15<sup>th</sup> address to the Russian Federal Assembly, in which he touted Russian progress in weapons development by saying that "[F]or the first time in the history of nuclear weapons, we are not catching up with anyone, but, on the contrary, other leading states have yet to create the weapons that Russia already possesses. The country's defense capability is ensured for decades to come, but we cannot rest on our laurels and do nothing. We must keep moving forward, carefully observing and analyzing the developments in this area across the world and create next-generation combat systems and complexes. This is what we are doing today<sup>3</sup>."

Russia continues to engage in a disinformation campaign designed to influence everything from democratic elections to the general opinions and actions of everyday Americans. As they seek to disrupt the rules-based international order and re-establish a position of power, they have also focused on modernization of their nuclear stockpile, which is nearly complete. Upgrades to their

<sup>1</sup> 10 U.S. Code § 9040 directs the Deputy Chief of Staff to carry out the following duties: (1) Provide direction, guidance, integration, and advocacy regarding the nuclear deterrence mission of the Air Force; (2) Conduct monitoring and oversight activities regarding the safety, security, reliability, effectiveness, and credibility of the nuclear deterrence mission of the Air Force; (3) Conduct periodic comprehensive assessments of all aspects of the nuclear deterrence mission and provide such assessments to the Secretary and Chief of Staff of the Air Force.

<sup>2</sup> 2018 National Defense Strategy

<sup>3</sup> Address to Russian Federal Assembly, 15 Jan 2020

strategic forces include updating the Tu-95MS BEAR strategic bombers and the Kh-101 & 102 long-range, air-launched cruise missiles; building and deploying the DOLGORUKIY-class SSBN platform for the BULAVA SS-N-32 SLBM; and replacing silo-based and mobile ICBMs with newer systems and increased warhead capacity. In addition to modernizing its existing capabilities, Russia is embracing new and exotic weapons like the TSIRKON hypersonic anti-ship missile, the BELGOROD nuclear capable submarine and the complimentary POSEIDON nuclear capable, unmanned underwater vehicle, the KINZHAL nuclear-capable air-launched ballistic missile, and the BUREVESTNIK nuclear powered, nuclear capable intercontinental cruise missile. Illustrating the danger of Russia's destabilizing efforts, a test of the BURVESTNIK in August, 2019, resulted in a nuclear explosion that killed seven Russian scientists and spread radiation into the environment. In December 2019, the Russian Defense Minister announced the first deployment of the AVANGARD Hypersonic Missile System, adding it to the list of strategic, nuclear capable weapons in the Russian inventory. Finally, Russia continues to build its arsenal of non-strategic nuclear weapons, while developing the doctrine to employ them in concert with other military forces, a capability that many believe will grow significantly over the next decade.

China's actions, with regard to nuclear weapons, reflect a notable desire to achieve regional hegemony, while expanding Chinese influence beyond the Indo-Pacific. Although China continues to maintain a "No First Use" policy, their lack of transparency regarding their nuclear weapons modernization leaves us to question their motives and intent. During the 70th Anniversary Parade in October 2019, the People's Liberation Army (PLA) unveiled new strategic nuclear systems, including the H-6N BADGER bomber, the DF-41 intercontinental ballistic missile (ICBM), and the DF-17 medium-range ballistic missile (MRBM). China has also taken steps to accelerate nuclear weapons modernization by fast-tracking its Sea-Launched Ballistic Missile (SLBM) program. In December, it took actions to separate the development program for its next generation SLBM (JL-3) from the next generation Ballistic Missile Submarine program. This change will allow China to complete testing of the JL-3 missile faster, while also expanding the capability to deploy the modern missile earlier on its current ballistic missile submarine. Once fielded, this will extend the reach of Chinese SLBMs and increase their ability to threaten the U.S. homeland.

Iran, after an extended period of pressuring France, Germany, and the UK, as well as the European Union, for relief from U.S. sanctions, has announced that it will no longer adhere to commitments under the Joint Comprehensive Plan of Action that limited its nuclear program, and is now once again building up its uranium enrichment program. Iran's past pursuit of nuclear weapons, and its efforts to preserve and conceal information from its prior nuclear weapons work, heightens the already great seriousness with which we must view these new developments. Combined with Iranian ballistic missile technology, a capability that was recently demonstrated against Al Assad and Irbil Air Bases in Iraq, the Iranian regime remains a regional concern. The United States must remain vigilant in this respect.

Finally, North Korea continues to bolster its strategic rocket forces amid diplomatic efforts to denuclearize while ending its self-imposed nuclear weapons test moratorium. Despite U.S. attempts to engage North Korea in working-level negotiations, North Korea has not demonstrated a sincere desire to enter into such negotiations. The United States continues to take steps to ensure the window for diplomacy remains open, but a major North Korean provocation may end this generational window for diplomacy.

## STRATEGY

The National Defense Strategy seeks to *compete, deter, and win* by building a more lethal force, strengthening alliances and partnerships, encouraging American technological innovation, and developing a culture of performance that will generate decisive and sustained U.S. military advantages for the 21st Century<sup>4</sup>. U.S. nuclear weapons are the foundation and backstop for U.S. military operations around the world and continue to play an effective and significant role in this strategic approach by; (1) deterring nuclear and non-nuclear strategic attack; (2) assuring allies and partners; (3) providing a capability to achieve U.S. objectives if deterrence fails; and (4) hedging against an uncertain future. Accomplishing these objectives is a complex and never-ending task that requires a tailored approach to each ally, partner, and adversary, all of whom are both assured and deterred only as long as we remain capable of denying the adversary the advantages they seek through the development and proliferation of weapons of mass destruction (WMD). Denying these advantages, while ensuring the capability to respond decisively, raises the adversaries' threshold for nuclear escalation and bolsters U.S. deterrence. To accomplish this, we must not only ensure our strategic nuclear forces are credible and capable, but we must also ensure our conventional forces are prepared to execute their role in theater nuclear deterrence by being able to effectively operate in, around, and through a nuclear environment while delivering integrated effects across the spectrum of conflict.

Furthermore, we must address the needs of today while continuing to look to the future with a wider aperture than we have for the last three decades. This means rebuilding our strategic industrial base to ensure access to the materials and technologies we need, while maintaining control over the supply chain. It means ensuring the industries we rebuild today to support modernization of the nuclear enterprise are sustained for the next generation so they can respond to the strategic threats of the future. It means protecting the intellectual property that gives us a competitive advantage, and it means partnering with industry and academia to develop experts in science and technology, while ensuring national security jobs are competitive and appealing in the fast-paced, lucrative technology and private sector industries.

## NUCLEAR TRIAD

Working with our Navy partners, the nuclear triad has been the choice of every Presidential administration for 60 years to provide the backbone of our national security. At the center of our strategic capability is the Nuclear Command, Control, and Communications (NC3) network and the three legs of the nuclear triad consisting of the Intercontinental Ballistic Missile (ICBM) force, nuclear-capable bomber fleet, and the ballistic missile submarine fleet. The Department of the Air Force operates two-thirds of the strategic triad, and retains ownership of seventy-five percent of the nation's NC3 capability. Complementary to the nuclear triad, the NATO alliance has provided for the common security of our European Allies since 1949, and U.S. Air Force F-15E dual-capable aircraft, along with our allies' dual-capable aircraft, continue to contribute to NATO's overall deterrence and defense posture.

NC3 is the central nervous system of the nuclear triad that links national leaders to the forces all day, every day, under all conditions. Failure to fully modernize NC3 in parallel with the rest of the

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<sup>4</sup> 2018 National Defense Strategy

triad and other command and control (C2) architecture severely reduces the effectiveness and credibility of U.S. strategic deterrence, while adversely impacting our future ability to integrate sensors, enable deliberate decisions in response to adversary actions, ensure adaptive planning, and connect our national leaders to the forces with resilient communications.

The ICBM leg continues to be a ready response force to deter nuclear strategic attack while greatly complicating the targeting calculus of any potential adversary. Through their combination of high yield, accuracy, and short response time, an adversary must consider our ICBM force in any decision to act aggressively with nuclear weapons. Additionally, the quantity and dispersion of the ICBM force make it a nearly insurmountable targeting problem, and greatly complicates the adversary's decision process.

The air leg, consisting of nuclear capable bombers, standoff, and stand-in weapons continues to provide the flexible response demanded by our functional and geographic combatant commanders around the world, while meeting the modern demands of a regional and tailored deterrent. The bomber force provides a visible message that is capable of employing the full range of combat power across the entire spectrum of conflict, giving combatant commanders the flexibility and reach necessary, if deterrence fails.

## **REQUIREMENTS**

Due to previous deferrals, the Department of Defense is now forced to modernize and recapitalize our NC3 architecture and all three legs of the nuclear triad simultaneously, while balancing overall Air Force modernization to remain ahead of adversary capabilities across all domains. Despite these difficult choices, modernization and recapitalization of the NC3 architecture and the nuclear triad remains the number one priority of the Department of Defense and is both necessary and affordable.

The Minuteman III (MMIII) is currently 39 years beyond its intended design life, and another life extension would be both costly and fiscally irresponsible. The strategic industrial base, supportability of several aging components, and increasingly lethal defenses make modernization of the weapon system necessary to ensure the credibility and effectiveness of our strategic deterrent in the future. The Air Launched Cruise Missile (ALCM), which is operating 26 years past its design life, faces similar challenges and must also be modernized.

Over the next decade, the Air Force will be under significant pressure to ensure our triad modernization and recapitalization remains on time because there is little margin for delay with every new program delivering just in time for its legacy counterpart to be retired. The Air Force maintains that the surest way to prevent a gap in our strategic deterrent is to ensure stability of funding and requirements for our nuclear programs as equally critical pillars of success in this intricate recapitalization environment. However, the Department of the Air Force remains postured to provide operational and programmatic options to hedge against unforeseen roadblocks, while we continue to aggressively execute the programs of record to meet the demands of the combatant commanders.

### **MODERNIZATION AND RECAPITALIZATION**

The Department of the Air Force continues to maintain a strong, mutually supportive partnership with the Department of Energy's National Nuclear Security Administration (NNSA) and our National Labs, which are operating at full throttle to ensure our modernization and recapitalization programs remain on time and on budget. It is critical that each of these programs deliver on schedule to reduce the risk of capability gaps in our nuclear deterrent near the end of the next decade. To that end, in the Fiscal Year (FY) 2021 President's Budget request, the Department of the Air Force is investing \$12.8 billion dollars in the sustainment, modernization, and recapitalization of the nuclear enterprise—an 8.3% increase over the FY20 President's Budget request and in line with Air Force budget estimates.

Additionally, the FY21 budget request fully funds sustainment efforts for MMIII, ALCM, UH-1 helicopter, and nuclear-capable bombers. All major recapitalization programs, including B-21, Ground Based Strategic Deterrent (GBSD), Long Range Standoff Weapon (LRSO), and the MH-139 helicopter are robustly funded. The Air Force is also addressing critical manpower requirements; funding 1,444 civilian positions in our nuclear recapitalization and sustainment workforce within this Fiscal Year Defense Plan (FYDP) to keep our current programs on time and within budget.

### **NUCLEAR COMMAND, CONTROL, AND COMMUNICATIONS**

The Department of the Air Force continues to invest approximately \$3 billion dollars annually in NC3 programs so our national leaders and senior commanders can detect threats, decide on actions, and direct forces. The FY21 President's Budget request fully funds multiple high priority NC3 programs to ensure a robust and resilient architecture integrated through space, aerial, and terrestrial network layers. The Next-Generation Overhead Persistent Infrared (OPIR) system constitutes a survivable next generation missile warning constellation. With Congressional support, the Next Generation OPIR program is currently on track to meet a 2025 requirement date, a program timeline far faster than historical norms due to streamlined acquisition, competitive prototyping, and extensive reuse of mature satellite and sensor technologies. The Department is also investing in recapitalization efforts for platforms like the E-4B National Airborne Operations Center (NAOC), while perusing enhancements to critical Satellite Communications (SATCOM) constellations, emergency conferencing systems for senior decision-makers, fielding radios and satellite terminals for our strike platforms and command posts, upgrading nuclear planning and decision support systems, and modernizing our aging terrestrial networks. With the continued Congressional support to provide stable funding, the Department of the Air Force will be able to maintain momentum toward NC3 modernization for the near term, and for the next generation beyond 2030.

### **INTERCONTINENTAL BALLISTIC MISSILES**

The Minuteman III remains an indispensable part of the nuclear triad; however, the Air Force is losing the ability to cost-effectively sustain it. The first MMIII missile was deployed in 1970 and more than twenty modernization and sustainment programs are required to keep it until replaced by GBSD beginning in FY27. The MMIII Depot Maintenance Program was started to sustain the legacy weapon system up through the deployment of the GBSD. The Air Force continues to work

across multiple lines of effort to ensure the legacy ICBM force remains safe, secure, reliable, and effective for as long as possible. However, the MMIII sustainment efforts cannot change the reality that the legacy platform will not meet the future strategic requirements. As a result, the Air Force is committed to delivering the GBSD on time and on budget as a national imperative for the capability and credibility of the ground leg of the nuclear triad beyond the next decade.

In FY21, the Department of the Air Force plans to invest \$1.5 billion dollars into the GBSD program as it begins the first full fiscal year of the Engineering and Manufacturing Design (EMD) phase, where we will complete full system integration, develop affordable and executable manufacturing processes, complete system fabrication, and test & evaluate the system. Despite any perception of high costs, the GBSD weapon system will provide a cost-effective solution that adds increased capabilities, maintainability, and the ability to evolve with the future threat that is required for deterrence through 2075.

#### **BOMBERS AND DUAL CAPABLE AIRCRAFT**

The nuclear-capable bomber force represents the most flexible leg of the nuclear triad. Our future bomber, the B-21 Raider, is fully executing in the Engineering and Manufacturing Design phase and the Air Force is closely monitoring the build of the initial test aircraft. Over the last year, the B-21 completed the first round of software development and continues to progress on schedule. Combined with the LRSO, investments in the B-21 and B-52 will maintain America's capability to deter adversary aggression, assure allies, and project combat power across the full spectrum of conflict.

To make this all a reality, the Department of the Air Force is employing cutting-edge techniques during the design and manufacturing of these weapon systems, including model-based systems engineering (MBSE) and modern software design strategies. The LRSO, GBSD, and B-21 programs fully exploit modern software development methods and industry best practices that enable us to meet rapidly changing threat environments today and in the future. Those methodologies inform the Air Force's software development focus areas by employing techniques that include; (1) full digitalization of the design, manufacturing, test and sustainment process via the Digital Design, Digital Twin, and Digital Thread processes, allowing us to replicate the manufacturing process and identify gaps before we ever bend the first piece of metal, saving time and money; (2) utilizing government owned and managed advanced open system architecture down to the component level that will allow the system to cost effectively evolve to meet unforeseen security challenges; and (3) using continuous secure software development via the Development, Security, and Operations (DevSecOps) process, allowing the Department to deploy automated tools, services, and standards that enable us to develop, secure, deploy, and operate applications in a secure, flexible and interoperable way that maximizes the benefits of iterative development, while reducing schedule risk, preserving or offsetting costs, and driving down other risks across the lifecycle of these weapon systems.

**CONCLUSION**

Our deterrence relies on the credible capability to hold targets at risk and to deny a potential adversary's ability to do the same. The United States must remain prudent, on behalf of ourselves and our allies, to ensure there is no advantage to be gained by our adversaries in their pursuit or employment of WMD. To accomplish this, the Department of the Air Force, along with the National Nuclear Security Administration and the National Laboratories, will continue to aggressively execute the programs of record that sustain, modernize and recapitalize our nuclear deterrent. The Air Force is committed to providing stable requirements and funding for the current programs across the enterprise as we have in the FY21 President's Budget request. However, we cannot do this alone, and we ask for the continued support of Congress to provide stable authorization and appropriation across both the Department of Defense and National Nuclear Security Administration enterprises as the surest way to avoid gaps in our national strategic deterrent.

### **Lieutenant General Richard M. Clark**

Lt. Gen. Richard M. Clark is Deputy Chief of Staff for Strategic Deterrence and Nuclear Integration, Headquarters U.S. Air Force, Arlington, Virginia. General Clark is responsible to the Secretary and Chief of Staff of the Air Force for focus on Nuclear Deterrence Operations. He provides direction, guidance, integration and advocacy regarding the nuclear deterrence mission of the U.S. Air Force and engages with joint and interagency partners for nuclear enterprise solutions.

General Clark graduated from the U.S. Air Force Academy in 1986. His commands include the 34th Bomb Squadron, Ellsworth Air Force Base, South Dakota, 12th Flying Training Wing, Randolph AFB, Texas, 8th Air Force and Joint Functional Component Commander for Global Strike, Offutt AFB, Nebraska. He has also served as the Vice Commander, 8th Air Force, Barksdale AFB, Louisiana, and Commandant of Cadets, U.S. Air Force Academy, Colorado Springs, Colorado. Prior to his current assignment, he served as the Commander, 3rd Air Force, Ramstein Air Base, Germany.

#### **EDUCATION**

1986 Bachelor of Science, Management, U.S. Air Force Academy, Colorado Springs, Colo.  
 1991 Squadron Officer School, Distinguished Graduate, Maxwell Air Force Base, Ala.  
 1994 Master of Arts, Human Resource Development, Webster University, St. Louis, Mo.  
 1996 U.S. Air Force Weapons School, Distinguished Graduate, Ellsworth AFB, S.D.  
 1998 Master of Strategic Studies, Naval Command and Staff College, Distinguished Graduate, Naval War College, Newport, R.I.  
 1999 Master of Airpower Studies, School of Advanced Air and Space Studies, Maxwell AFB, Ala.  
 2005 Master of National Security Studies, National War College, Distinguished Graduate, Fort Lesley J. McNair, Washington, D.C.

#### **ASSIGNMENTS**

May 1986-February 1987, Junior Varsity Football Coach and Candidate Counselor, U.S. Air Force Academy, Colorado Springs, Colo.  
 February 1987-February 1988, Student, Undergraduate Pilot Training, Laughlin Air Force Base, Texas  
 February 1988-November 1991, EC-135 Pilot, 2nd Airborne Command and Control Squadron, Offutt AFB, Neb.  
 November 1991-November 1994, B-1 Pilot, 28th Bomb Squadron, McConnell AFB, Kan.  
 November 1994-July 1997, B-1 Instructor Pilot, B-1 Flight Training Unit, 28th BS, Dyess AFB, Texas  
 July 1997-June 1998, Student, Naval Command and Staff College, Naval War College, Newport, R.I.  
 June 1998-June 1999, Student, School of Advanced Air and Space Studies, Maxwell AFB, Ala.  
 June 1999-August 2000, Action Officer, Air Force Office of Legislative Liaison, the Pentagon, Arlington, Va.  
 August 2000-August 2001, Fellow, President's Commission on White House Fellowships, Washington, D.C.  
 August 2001-May 2002, Assistant Director of Operations, 77th BS, Ellsworth AFB, S.D.  
 May 2002-May 2004, Commander, 34th BS, Ellsworth AFB, S.D.  
 May 2004-June 2005, Student, National War College, Fort Lesley J. McNair, Washington, D.C.  
 June 2005-January 2006, Vice Commander, 12th Flying Training Wing, Randolph AFB, Texas  
 January 2006-March 2008, Commander, 12th FTW, Randolph AFB, Texas  
 April 2008-April 2009, Director, Joint Interagency Task Force - Iraq, Multi-National Force - Iraq, Baghdad, Iraq  
 May 2009-July 2010, Vice Commander, 8th Air Force (Air Forces Strategic), Barksdale AFB, La.  
 July 2010-August 2012, Commandant of Cadets, U.S. Air Force Academy, Colorado Springs, Colo.  
 August 2012-August 2014, Senior U.S. Defense Official; Chief, Office of Military Cooperation; and Defense Attaché, Cairo, U.S. Central Command, Cairo, Egypt.  
 August 2014-April 2015, Vice Commander, Air Force Global Strike Command, Barksdale AFB, La.  
 April 2015-October 2016, Commander, 8th Air Force (Air Forces Strategic), Barksdale AFB, La., and



Joint Functional Component Commander for Global Strike, U.S. Strategic Command, Offutt AFB, Neb.  
 October 2016-October 2018, Commander, 3rd Air Force, Ramstein Air Base, Germany.  
 October 2018-present, Deputy Chief of Staff, Strategic Deterrence and Nuclear Integration, Headquarters  
 U.S. Air Force, Arlington, Va.

#### **SUMMARY OF JOINT ASSIGNMENTS**

April 2008-April 2009, Director, Joint Interagency Task Force - Iraq, Multi-National Force - Iraq,  
 Baghdad, Iraq as a colonel.  
 August 2012-August 2014, Senior U.S. Defense Official; Chief, Office of Military Cooperation; and  
 Defense Attaché, Cairo, U.S. Central Command, Cairo, Egypt, as a brigadier general.  
 April 2015-October 2016, Joint Functional Component Commander for Global Strike, U.S. Strategic  
 Command, Offutt AFB, Neb., as a major general.

#### **FLIGHT INFORMATION**

Rating: command pilot  
 Flight hours: more than 4,200  
 Aircraft flown: B-1, EC-135, KC-135, T-1, T-38, T-6 and C-21

#### **MAJOR AWARDS AND DECORATIONS**

Distinguished Service Medal with oak leaf cluster  
 Defense Superior Service Medal  
 Legion of Merit with oak leaf cluster  
 Distinguished Flying Cross  
 Bronze Star Medal with oak leaf cluster  
 Meritorious Service Medal with two oak leaf clusters  
 Air Medal with two oak leaf clusters  
 Aerial Achievement Medal  
 Air Force Commendation Medal with oak leaf cluster  
 Combat Action Medal  
 Nuclear Deterrence Operations Service Medal

#### **EFFECTIVE DATES OF PROMOTION**

Second Lieutenant May 28, 1986  
 First Lieutenant May 28, 1988  
 Captain May 28, 1990  
 Major Sept. 1, 1997  
 Lieutenant Colonel May 1, 2000  
 Colonel Aug. 1, 2004  
 Brigadier General Nov. 18, 2009  
 Major General June 4, 2013  
 Lieutenant General Oct. 21, 2016

(Current as of February 2019)



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United States Government Accountability Office

Testimony

Before the Subcommittee on Strategic  
Forces, Committee on Armed Services,  
House of Representatives

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For Release on Delivery  
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## NUCLEAR WEAPONS

### NNSA's Modernization Efforts Would Benefit from a Portfolio Management Approach

Statement of Allison B. Bawden, Director  
Natural Resources and Environment

## GAO Highlights

Highlights of GAO-20-4437, a testimony before the Subcommittee on Strategic Forces, Committee on Armed Services, House of Representatives

### Why GAO Did This Study

NNSA is simultaneously modernizing the nation's nuclear weapon stockpile and the infrastructure on which weapon programs depend. In a 2010 report, NNSA stated that this is the busiest time for the nuclear security enterprise since the Cold War era. GAO's April 2017 review of NNSA nuclear modernization programs concluded that NNSA made optimistic assumptions about future costs. DOD and DOE estimate that nuclear modernization will cost hundreds of billions of dollars over the next decade.

This statement is based on 18 GAO reports issued from July 2003 to February 2020 and selected updates. It discusses (1) NNSA's ongoing and planned programs and projects to modernize weapons and related infrastructure and challenges they present; (2) NNSA's improvements in managing these programs and projects, and additional steps NNSA could take to make further improvements; and (3) GAO's prior recommendation to NNSA on assessing the affordability of its portfolio of modernization programs. To conduct the updates, GAO reviewed DOE planning and budget documents.

### What GAO Recommends

GAO has made numerous recommendations to NNSA, including that it assess its portfolio of modernization programs to present options to align programs and budgets. NNSA has taken some action but has not fully responded to this recommendation.

View GAO-20-4437. For more information, contact Allison D. Bowden at (202) 512-3041 or abowden@gao.gov.

March 3, 2020

## NUCLEAR WEAPONS

### NNSA's Modernization Efforts Would Benefit from a Portfolio Management Approach

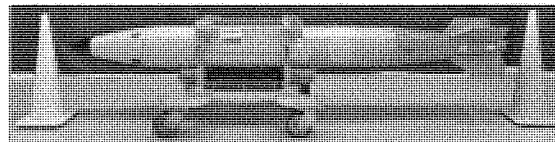
### What GAO Found

The Department of Energy's (DOE) National Nuclear Security Administration (NNSA) is conducting four programs to modernize nuclear weapons, and the Department of Defense's (DOD) 2018 *Nuclear Posture Review* calls for NNSA to consider additional programs to refurbish or build new weapons over the next 2 decades. NNSA is also managing numerous, multi-billion-dollar construction projects to modernize the infrastructure it uses to produce components and materials needed for its weapon programs. GAO has reported on challenges NNSA faces in managing these efforts. For example, GAO's February 2020 report on the W87-1 warhead program found that NNSA's past challenges in managing plutonium activities cast doubt on NNSA's ability to produce the required number of plutonium weapon cores on schedule. GAO also found in June 2019 that future weapon programs will require newly produced explosives, including some that NNSA has not produced at scale since 1993.

NNSA has improved its management of weapon programs and related projects in some respects. For example, NNSA has established requirements for independent cost estimates in weapon programs and has made progress in revising plans for the Uranium Processing Facility project. However, GAO has identified additional actions that could further improve NNSA's management of weapon programs and projects. For example, in September 2017, GAO reported that NNSA had not developed a complete scope of work, a life-cycle cost estimate, or an integrated master schedule for its overall uranium program. GAO recommended that NNSA set a time frame for developing these plans. GAO expects to issue a report on NNSA's uranium program plans in March 2020.

GAO concluded in April 2017 that NNSA had not addressed a potential mismatch between funding needs and funding availability. GAO recommended that NNSA assess its portfolio of modernization programs—for example, by presenting options to align programs to potential future budgets, such as potentially deferring the start of or cancelling specific programs. NNSA did not explicitly agree or disagree with GAO's recommendation. NNSA included an affordability analysis in July 2019 planning documents, but the analysis does not fully respond to GAO's recommendation because it does not state how potential misalignment between program costs and budget projections may be addressed. GAO continues to believe that presenting options to align its portfolio of programs to potential future budgets could help Congress and NNSA better understand NNSA's priorities and trade-offs that may need to be undertaken in the future.

Figure: The B61-12 Nuclear Bomb



Source: Sandia National Laboratories. | GAO-20-4437

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Chairman Cooper, Ranking Member Turner, and Members of the Subcommittee:

Thank you for the opportunity to discuss the challenges facing the Department of Energy's (DOE) National Nuclear Security Administration (NNSA) as it works to sustain and modernize the nation's nuclear arsenal.<sup>1</sup> NNSA's work comprises two simultaneous, interdependent efforts: modernizing the stockpile of nuclear bombs and warheads, and modernizing the research and production infrastructure on which stockpile programs depend.<sup>2</sup> NNSA manages these efforts in coordination with the Department of Defense (DOD), which undertakes related work to modernize nuclear weapon delivery systems, including heavy bombers, intercontinental ballistic missiles, and submarine-launched ballistic missiles and the submarines that carry them. According to NNSA's *Fiscal Year 2020 Stockpile Stewardship and Management Plan*, the nuclear security enterprise is experiencing its busiest time since the Cold War era.<sup>3</sup>

In an April 2017 report, we concluded that NNSA's assessment on the affordability of the agency's nuclear modernization programs was predicated on optimistic assumptions about future-year costs, particularly for fiscal years 2022 through 2026.<sup>4</sup> In particular, we reported that, according to NNSA's fiscal year 2017 budget materials and agency officials, work deferred by NNSA contributed to a significant bow wave of funding needs in future years as the agency made plans to undertake

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<sup>1</sup>NNSA is a separately organized agency within DOE. It was created under Title 32 of the National Defense Authorization Act for Fiscal Year 2000, Pub. L. No. 106-65, §§ 3201 – 3299, 113 Stat. 512, 953-971 (1999) (codified as amended at 50 U.S.C. §§ 2401-2484). NNSA has responsibility for the nation's nuclear weapons, nonproliferation, and naval reactor programs.

<sup>2</sup>All nuclear weapons in the U.S. stockpile are designated either as a warhead or as a bomb. Warheads are weapons that have certain engineering requirements because they must interface with a launch or delivery system. Bombs are weapons that do not have these interface requirements, such as gravity bombs and atomic demolition munitions (now retired and dismantled).

<sup>3</sup>DOE/NNSA, *Fiscal Year 2020 Stockpile Stewardship and Management Plan* (Washington, D.C.: July 2019). The *Stockpile Stewardship and Management Plan* is NNSA's formal means for annually communicating to Congress the status of certain activities and its long-range plans and budget estimates for sustaining the stockpile and modernizing the nuclear security enterprise.

<sup>4</sup>GAO, *National Nuclear Security Administration: Action Needed to Address Affordability of Nuclear Modernization Programs*, GAO-17-341 (Washington, D.C.: Apr. 26, 2017).

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multiple, simultaneous life extension programs (LEP) and other weapon programs.<sup>5</sup> A funding bow wave—that is, an impending and significant increase in the requirements for additional funds—occurs when agencies defer costs of their programs to the future, beyond their programming periods, and often occurs when agencies are undertaking more programs than their resources can support.<sup>5</sup>

At the time of our April 2017 report, NNSA had concluded that its nuclear modernization program plan was generally affordable because it assumed that future budgets would meet or exceed the low range of NNSA's cost estimates for its programs. However, we found that, particularly in the period of fiscal years 2022 through 2026, NNSA's budget estimates may have exceeded funding projections in the President's budget for those same years. We recommended that NNSA include an assessment of its portfolio of modernization programs in future versions of the *Stockpile Stewardship and Management Plan*—for example, by presenting options NNSA could consider to bring its estimates of modernization funding needs into alignment with potential future budgets. This could include potentially deferring the start of or canceling specific modernization programs if program budgets fell short of program estimates.

Less than 1 year later, in February 2018, DOD issued the *2018 Nuclear Posture Review*, which outlined plans for starting several additional nuclear weapon modernization programs while accelerating an existing program.<sup>7</sup> DOD and DOE cost estimates show that nuclear weapon programs and related efforts are expected to cost hundreds of billions of

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<sup>5</sup>NNSA undertakes LEPs, in coordination with DOD, to refurbish or replace nuclear weapons' components to extend their lives, enhance their safety and security characteristics, and consolidate the stockpile into fewer weapon types to minimize maintenance and testing costs while preserving needed military capabilities. Generally, we use the term "weapon programs" in this testimony to refer to LEPs and other weapon modernization efforts—such as alterations, which usually entail replacing an older component with a newer component that does not affect military operations, logistics, or maintenance, according to DOD documentation.

<sup>6</sup>We have reported on funding bow waves in other major government programs. See GAO, *Orion Multi-Purpose Crew Vehicle: Action Needed to Improve Visibility into Cost, Schedule, and Capacity to Resolve Technical Challenges*, GAO-16-520 (Washington, D.C.: July 27, 2016) and *Weapon System Acquisitions: Opportunities Exist to Improve the Department of Defense's Portfolio Management*, GAO-15-466 (Washington, D.C.: Aug. 27, 2015).

<sup>7</sup>Department of Defense, *Nuclear Posture Review*, February 2018. The *Nuclear Posture Review* assesses the global threat environment and establishes policy on U.S. nuclear forces.

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dollars over the next decade, but neither agency has yet released long-term budget estimates that fully reflect implementation of the 2018 *Nuclear Posture Review's* priorities. The President's fiscal year 2021 budget request includes a 25 percent increase for NNSA's modernization program, suggesting the bow wave has arrived.

My testimony today discusses (1) NNSA's ongoing and planned programs and projects to modernize the nuclear stockpile and related production infrastructure and any challenges they present; (2) improvements in NNSA's management of weapon programs and related capital asset projects, and additional steps NNSA could take to make further improvements; and (3) our prior recommendation to NNSA on assessing the affordability of its portfolio of modernization programs.

My statement is based primarily on our work from 18 GAO reports issued from July 2003 to February 2020 and selected updates. Detailed information about the scope and methodology we used to conduct our prior work can be found in each of our issued reports. For the updates, we interviewed NNSA officials to assess any actions NNSA has taken in response to our April 2017 recommendation and included updated information on the status of other recommendations based on documentation NNSA provides to us periodically. In addition, we reviewed several documents to provide selected updates to information on program schedules, cost estimates, and budgets on which we had previously reported. Specifically, we reviewed *NNSA's Fiscal Year 2020 Stockpile Stewardship and Management Plan*; the testimony of an NNSA official from a September 2019 hearing on the status of two LEPs; the DOE Office of Project Management's January 2020 Monthly DOE Project Portfolio Status Report; and the President's DOE budget request for fiscal year 2021. NNSA also reviewed information from a classified report we issued in February 2020 to ensure that information we drew from that report was suitable for public release.

We conducted the work on which this statement is based in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

## NNSA Faces Challenges in Executing Ongoing and Planned Weapon Programs and Related Capital Asset Projects to Modernize the Nuclear Stockpile

NNSA is executing and plans to carry out multiple weapon programs and a range of related capital asset projects over the next 2 decades. First, NNSA is currently conducting four weapon modernization programs: the B61-12 LEP, the W88 Alteration 370, the W80-4 LEP, and the W87-1 Modification program. Table 1 provides more information on each of these programs based on our prior work, with selected updates on program schedules, cost estimates, and budgets from the Fiscal Year 2020 *Stockpile Stewardship and Management Plan* and NNSA testimony.

**Table 1: Ongoing National Nuclear Security Administration (NNSA) Weapon Modernization Programs**

Program	Description
B61-12 Life Extension Program (LEP)	The B61 bomb is the oldest nuclear weapon in the stockpile. <sup>a</sup> It was first fielded in 1968, with current modifications fielded from 1979 to 1991. The B61-12 LEP is to consolidate and replace the B61-3, B61-4, B61-7, and B61-10 modifications of the bomb. <sup>b</sup> NNSA formally estimated in October 2016 that it would incur a total cost of about \$7.6 billion for the program and that it would complete the first production unit in March 2020. <sup>c</sup> However, in September 2019, due to problems with an electrical part, NNSA revised its estimated first production date for the program to the first quarter of fiscal year 2022. According to September 2019 congressional testimony by NNSA's Deputy Administrator for Defense Programs, the electrical part problem and resulting delay will increase the cost of the program by about \$600 million to \$700 million.
W88 Alteration 370 program <sup>d</sup>	The W88 Alteration 370 program is to replace the arming, fuzing, and firing subsystem and high explosive main charge for the W88 warhead, which is deployed on the Navy's Trident II D5 submarine-launched ballistic missile system. As of 2017, NNSA formally estimated the program would cost about \$2.6 billion and would complete the first production unit in December 2020. <sup>e</sup> However, in September 2019, due to problems with an electrical part—the same part affecting the B61-12 LEP—NNSA revised its estimated first production date for the program to the fourth quarter of fiscal year 2021. According to September 2019 congressional testimony by NNSA's Deputy Administrator for Defense Programs, the electrical part problem and resulting delay will increase the cost of the program by about \$120 million to \$150 million.
W80-4 LEP	The W80-4 LEP is intended to provide a warhead for a future long-range standoff missile to replace the Air Force's current air-launched cruise missile. As of January 2019, according to NNSA's preliminary estimates, the program will cost about \$12 billion and will complete the first production unit by fiscal year 2025. <sup>e,g</sup>
W87-1 Modification program <sup>h</sup>	In fiscal year 2019, NNSA restarted a program to replace the capabilities of the W78 warhead, used on Air Force intercontinental ballistic missiles. As of July 2019, NNSA preliminarily estimated that the program would cost about \$11.7 billion to \$14.8 billion. NNSA plans to produce the first production unit by the beginning of the second quarter of fiscal year 2030 to field on the Air Force's Ground Based Strategic Deterrent, which is also in development. <sup>e,i</sup>

Source: GAO, with selected updates based on the DOE Fiscal Year 2020 *Stockpile Stewardship and Management Plan* and NNSA testimony. | GAO-20-443T

<sup>a</sup>All nuclear weapons in the U.S. stockpile are designated either as warheads or as bombs. Warheads are weapons that have certain engineering requirements because they must interface with a launch

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or delivery system. Bombs are weapons that do not have these interface requirements, such as gravity bombs and atomic demolition munitions (now retired and dismantled).

<sup>3</sup>Throughout the history of nuclear weapons development, the United States has developed families of weapons based on a single design. Thus, some weapons in the U.S. stockpile were developed as modifications to an already complete design. For example, the B61 bomb has had 12 variations over time, each designated as a different modification.

<sup>4</sup>The first production unit milestone occurs when DOD accepts the weapon's design and NNSA verifies that the first produced weapon or weapons meets the design.

<sup>5</sup>The W88 Alteration 370 program is an alteration, not an LEP. An alteration is usually a replacement of an older component with a newer component that does not affect military operations, logistics, or maintenance, according to DOD documentation. NNSA manages significant alterations as LEPs.

<sup>6</sup>The estimated cost of about \$12 billion for the W80-4 program includes about \$800 million in sunk costs, which are not factored into the \$11.2 billion estimate given in the program's Weapon Design and Cost Report.

<sup>7</sup>The Ground Based Strategic Deterrent is intended to replace the Minuteman III intercontinental ballistic missile.

In addition to these four ongoing programs, the 2018 *Nuclear Posture Review* calls for NNSA to consider additional weapon programs—specifically, a program to develop a modern nuclear-armed sea-launched cruise missile, and another to develop a new submarine-launched ballistic missile warhead (now being referred to as the W93). The *Nuclear Posture Review* also instructs NNSA to maintain the B83-1 bomb until a suitable replacement can be found.<sup>8</sup>

To support and enable ongoing and planned weapon programs, NNSA also plans to spend billions of dollars over the next 2 decades on capital asset projects and other infrastructure risk reduction and recapitalization efforts to modernize the production infrastructure NNSA uses to produce components and materials needed for its weapon programs. Table 2 provides more information on selected NNSA capital asset projects discussed in our recent reports, with selected updates on program schedules and cost estimates from the DOE Office of Project Management's January 2020 Monthly DOE Project Portfolio Status Report.

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<sup>8</sup>Congressional committees have requested reports from DOD, NNSA, and the Commander of U.S. Strategic Command on aspects of the B83-1 replacement. S. Rep. No. 116-48, at 331 (2019); H.R. Rep. No. 115-676, pt. 2, at 236-7 (2018).



**Table 2: Selected Ongoing Department of Energy (DOE) and National Nuclear Security Administration (NNSA) Capital Asset Projects Supporting Production Modernization and Discussed in Recent GAO Reports**

Project	Description
Chemistry and Metallurgy Research Building Replacement (CMRR)	The current Chemistry and Metallurgy Research Building at the Los Alamos National Laboratory in New Mexico is nearly 70 years old and is used to conduct chemical analysis and materials characterization for nuclear weapon pit production, development and testing; stockpile life extension programs; and dismantlement efforts. The CMRR project includes several subprojects, one of which is to reconfigure space in the existing Radiological Laboratory Utility Office Building and install plutonium analysis equipment by January 2022 at a cost of \$633 million, according to NNSA's formal estimates. Another subproject will reconfigure space in the existing Plutonium Facility and install new plutonium analysis equipment by April 2022 at a cost of \$394 million, according to NNSA's formal estimates. Two additional subprojects are at an earlier planning stage and could be completed by December 2024 at a total cost of \$731 million to \$1.05 billion, according to NNSA's preliminary estimates.
Plutonium Pit Production Facilities	The plutonium pit is a critical component of a nuclear weapon. NNSA is pursuing a two-pronged approach to produce 80 pits per year to meet anticipated pit requirements for ongoing and future weapon programs. Specifically, NNSA plans to repurpose the Mixed Oxide Fuel Fabrication Facility at the Savannah River Site in South Carolina to produce at least 50 pits per year in 2030 and modernize its pit production capabilities at Los Alamos National Laboratory to produce at least 30 pits per year by 2026. According to NNSA's preliminary estimates, the effort to repurpose the Savannah River Site facility could cost from \$1.3 billion to \$3 billion and be completed by the end of 2027. According to DOE documentation, the scope associated with modernizing pit production at Los Alamos will be satisfied under an expanded version of the current CMRR project.
Uranium Processing Facility	NNSA conducts enriched uranium activities, produces uranium-related components for nuclear warheads, and processes nuclear fuel for the U.S. Navy at the Y-12 National Security Complex in Tennessee. Current operations are conducted in four separate facilities facing aging, safety and other challenges. To address these issues, NNSA plans to construct the Uranium Processing Facility to consolidate these activities into one facility. According to NNSA's formal estimates, the project will be completed by December 2025 at a cost of \$6.5 billion. We are doing ongoing work on the Uranium Processing Facility and expect to issue a report in March 2020.
High Explosives Facilities	Approximately 100 different explosive components are essential to the operation of nuclear weapons, and NNSA's supply of certain highly specialized explosive materials is dwindling. Future weapon programs will require newly produced explosives; however, the design of several older facilities is insufficient to meet current needs, negatively affecting productivity and safety. NNSA's plans to build a new high explosives science and engineering facility at the Pantex Plant in Texas—at a cost of up to \$155 million, according to preliminary estimates—have been on hold since September 2018. At that time, the facility was projected to be completed in 2023. NNSA completed the conceptual design report for a high explosives synthesis, formulation, and blending facility at Pantex in December 2019. According to NNSA's preliminary estimates, the project could be completed by September 2025 at a cost of \$96 million to \$240 million.
Lithium Processing Facility	An isotope of lithium is a key component of nuclear weapons and is essential for their refurbishment. The United States no longer maintains full lithium production capabilities and relies on recycling as the only source of lithium for nuclear weapon systems, but could run out without further action. NNSA is preparing to construct a new Lithium Processing Facility at the Y-12 National Security Complex in Tennessee. According to NNSA's preliminary estimates, the facility could be completed by September 2031 at a cost of \$955 million to \$1.65 billion. We are currently reviewing these plans.
Tritium Finishing Facility	Tritium, an isotope of hydrogen, is used in a component in the triggering mechanism in nuclear weapons. NNSA plans to replace an aging facility at the Savannah River Site in South Carolina that processes tritium with a new Tritium Finishing Facility. According to NNSA's preliminary estimates, the facility could be completed by September 2031 at a cost of \$305 million to \$640 million.

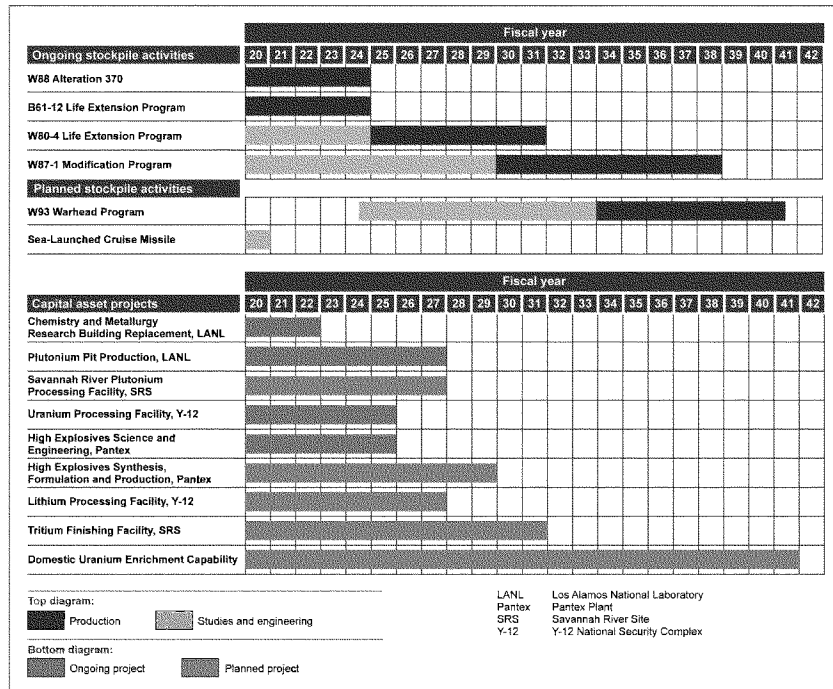
Project	Description
Domestic Uranium Enrichment	NNSA has several mission needs for enriched uranium, including providing low-enriched uranium to fuel a nuclear reactor that produces tritium. Because of its relatively short half-life of 12.3 years, NNSA needs an assured source of tritium, which relies on irradiating enriched uranium to produce. NNSA projects that it will exhaust its supply of low-enriched uranium to produce tritium by 2041. The agency is currently evaluating alternatives to reestablish a domestic uranium capability to produce enriched uranium and expects to complete its evaluation this year. If NNSA decides to pursue a government funded enrichment solution, a capability sized to produce enriched uranium solely for tritium production could cost \$3.3 billion to \$14.1 billion, according to NNSA's preliminary estimates.

Source: GAO, with selected updates based on the DOE Office of Project Management's January 2020 Monthly DOE Project Portfolio Status Report. | GAO-20-443T

Note: We are currently reviewing other programs and capital asset projects supporting modernization. We expect to issue reports on NNSA's production capabilities for depleted uranium and specialized microelectronics later this year.

According to NNSA's plans, the agency must carry out many of its weapon programs while simultaneously modernizing the very infrastructure on which these weapon programs rely for components and other materials. Therefore, any delays or technical challenges that affect NNSA's plans for its production facilities may be expected to result in delays and challenges to the weapon programs. Figure 1 shows the estimated schedules for the weapon programs and related capital asset projects described in tables 1 and 2 and reported on in our prior work, with updated information as presented in the *Fiscal Year 2020 Stockpile Stewardship and Management Plan*.

**Figure 1: Estimated Schedules of National Nuclear Security Administration (NNSA) Weapon Modernization Programs and Selected Enabling Capital Asset Projects**



Source: Department of Energy and National Nuclear Security Administration, Fiscal Year 2020 Stockpile Stewardship and Management Plan. | GAO-20-443T

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We have reported on the potential effects on NNSA's weapon programs of delays or technical challenges in modernizing its production facilities. For example:

- The W87-1 Modification program's schedule may be particularly vulnerable to production challenges, including pit production challenges, because, as we reported in November 2018, it will require all newly-made components, including pits.<sup>9</sup> In our most recent report on the W87-1 program, a classified report issued in February 2020, we found that NNSA's past challenges in managing plutonium activities at Los Alamos and in executing projects of this size cast doubt on NNSA's ability to produce 80 pits per year in 2030.<sup>10</sup> As we note in that report, an independent assessment of NNSA's pit production strategy in March 2019 concluded that no options evaluated by NNSA could be expected to produce 80 pits per year by 2030.<sup>11</sup> The independent assessment further stated that NNSA had no precedent for major projects costing more than \$700 million dollars that had been completed in fewer than 16 years, and that many similar projects were eventually cancelled.
- Future weapon programs will require newly produced explosives, including some that NNSA has not produced at scale since 1993. As we reported in June 2019, NNSA officials stated that producing these materials will pose challenges that include replicating decades-old recipes for the materials and preparing for their full-scale production in aging facilities.<sup>12</sup> As we noted in that report, similar problems restarting dormant production capabilities have delayed past weapon programs—notably, the W76-1 LEP, which NNSA completed in December 2018. As we reported in March 2009, NNSA had to delay first production of the W76-1 from September 2007 to September

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<sup>9</sup>GAO, *Nuclear Weapons: NNSA Has Taken Steps to Prepare to Restart a Program to Replace the W78 Warhead Capability*, GAO-19-84 (Washington, D.C.: Nov. 30, 2018).

<sup>10</sup>GAO, *Nuclear Weapons: NNSA Should Further Develop Cost, Schedule, and Risk Information for the W87-1 Warhead Program*, GAO-20-207C (Washington, D.C.: Feb. 28, 2020). Between 2021 and 2026, NNSA is required to increase pit production from 10 to 30 pits per year. During 2030, NNSA is required to produce not less than 80 pits. 50 U.S.C. § 2538a.

<sup>11</sup>Institute for Defense Analysis, *Independent Assessment of the Plutonium Strategy of the National Nuclear Security Administration: Executive Summary*, IDA Paper P-10524 (Alexandria, VA: March 2019).

<sup>12</sup>GAO, *Nuclear Weapons: Additional Actions Could Help Improve Management of Activities Involving Explosive Materials*, GAO-19-449 (Washington, D.C.: June 17, 2019).

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2008 when it encountered problems restarting production of a key material, known as Fogbank.<sup>13</sup> NNSA is working to reconstitute its high explosives capabilities, as we reported in June 2019.

- Nonnuclear parts and components comprise over 80 percent of the items in a nuclear weapon, and NNSA's Kansas City National Security Campus procures or produces most of these. In April 2019, we found that work on the B61-12 LEP and W88 Alteration 370 was expected to double at the Kansas City site during fiscal years 2020 through 2022.<sup>14</sup> Our April 2019 report also identified challenges that could complicate work at the site. For example, disruption to the established supply chain for externally supplied parts—which comprise about 65 percent of the nonnuclear parts used at the Kansas City site—could result in production delays, and the site needs hundreds of thousands of additional square feet of manufacturing space to meet workload demands.

We have also recently completed work in which we reported on challenges integrating the schedules of NNSA's weapon programs with the schedules for DOD's modernized delivery systems. For example, the W87-1 warhead will need to be integrated on a delivery system that is under development, an intercontinental ballistic missile known as the Ground-Based Strategic Deterrent. We have ongoing work examining DOD and DOE plans to modernize and integrate warheads and delivery vehicles and expect to issue a classified report in spring 2020.

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<sup>13</sup>GAO, *Nuclear Weapons: NNSA and DOD Need to More Effectively Manage the Stockpile Life Extension Program*, GAO-09-385 (Washington, D.C.: Mar. 2, 2009).

<sup>14</sup>GAO, *Modernizing the Nuclear Security Enterprise: NNSA Is Taking Action to Manage Increased Workload at Kansas City National Security Campus*, GAO-19-126 (Washington, D.C.: Apr. 12, 2019).

## NNSA Has Taken Steps to Improve Its Management of Weapon Programs and Enabling Capital Asset Projects, but Additional Improvements Are Needed

As we have recently reported, NNSA has made improvements in its management of some weapon modernization programs and enabling capital asset projects. We have concluded that NNSA's federal program and project management capacity is improving, as are the controls it has developed for program and project performance.<sup>15</sup> For example:

- We found in January 2018 that NNSA has established and strengthened management requirements for LEPs.<sup>16</sup> Specifically, in January 2016, NNSA's Office of Defense Programs issued a program management directive that designates risk-based program execution requirements that all programs must follow.<sup>17</sup> The directive places LEPs in one of the highest-risk categories, meaning these programs are required to apply more rigorous management controls specified in the directive, including using earned value management.<sup>18</sup> Further, in January 2017, NNSA issued two directives implementing requirements for NNSA's Office of Cost Estimating and Program Evaluation to conduct independent cost estimates.<sup>19</sup> In May 2018, we found that the program cost estimate for the B61-12 LEP substantially met the criteria for all four characteristics of a high-quality, reliable

<sup>15</sup>For additional information on DOE and NNSA improvements and challenges in managing projects, see GAO, *High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High-Risk Areas*, GAO-19-157SP (Washington, D.C.: Mar. 6, 2019).

<sup>16</sup>GAO, *Nuclear Weapons: NNSA Should Adopt Additional Best Practices to Better Manage Risk for Life Extension Programs*, GAO-18-129 (Washington, D.C.: Jan. 30, 2018).

<sup>17</sup>National Nuclear Security Administration, *DP Program Execution Instruction: NA-10 Program Management Tools and Processes* (Washington, D.C.: Jan. 14, 2016). NNSA has subsequently updated this directive; the current version is dated June 2019.

<sup>18</sup>Earned value management is a means of conducting cost and schedule performance analysis, through which programs measure the value of work accomplished in a given period and compare the measured value with the planned value of work scheduled for that period and the actual cost of work accomplished.

<sup>19</sup>Independent cost estimates provide an objective and unbiased assessment of whether a program's cost estimate can be achieved. We recommended in July 2003 that NNSA establish its LEPs as projects and manage them according to DOE project management requirements, which then included the use of earned value management and independent cost estimates. See GAO, *Nuclear Weapons: Opportunities Exist to Improve the Budgeting, Cost Accounting, and Management Associated with the Stockpile Life Extension Program*, GAO-03-583 (Washington, D.C.: July 28, 2003).

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cost estimate, in part because it was the first LEP to undergo an independent cost estimate.<sup>20</sup>

- We reported in our February 2017 high-risk update that DOE demonstrated a strong commitment and top leadership support for improving project management.<sup>21</sup> For example, DOE made changes to its revised project management order, issued in May 2016, in response to recommendations we made in prior years, such as requiring that projects develop cost estimates and analyses of alternatives according to best practices we identified.
- In September 2017, we found that NNSA had made progress in developing a revised scope of work, cost estimate, and schedule for the Uranium Processing Facility project, which is to modernize uranium production efforts at the Y-12 National Security Complex.<sup>22</sup> We reported at that time that these improvements may help NNSA stabilize escalating project costs and technical risks experienced under the previous strategy.
- In November 2017, we found that NNSA had established programs to manage strategic materials—specifically, uranium, plutonium, tritium, and lithium—and had defined requirements and managerial roles for program managers.<sup>23</sup> Since that time, NNSA has taken steps to implement a new enterprise-wide approach for managing explosives activities, as we found in our June 2019 report on those activities.<sup>24</sup>

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<sup>20</sup>GAO, *B61-12 Nuclear Bomb: Cost Estimate for Life Extension Incorporated Best Practices, and Steps Being Taken to Manage Remaining Program Risks*, GAO-18-456 (Washington, D.C.: May 31, 2018). Our cost estimating guide identifies best practices for developing a high-quality, reliable cost estimate and identifies four characteristics of such an estimate: it is comprehensive, well-documented, accurate, and credible. See GAO *Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs*, GAO-09-3SP (Washington, D.C.: March 2009).

<sup>21</sup>GAO, *High-Risk Series: Progress on Many High-Risk Areas, While Substantial Efforts Needed on Others*, GAO-17-317 (Washington, D.C.: Feb. 15, 2017). GAO's biennial high-risk update identifies government operations with greater vulnerabilities to fraud, waste, abuse, and mismanagement or the need for transformation to address economy, efficiency, or effectiveness challenges.

<sup>22</sup>GAO, *Modernizing the Nuclear Security Enterprise: A Complete Scope of Work Is Needed to Develop Timely Cost and Schedule Information for the Uranium Program*, GAO-17-577 (Washington, D.C.: Sept. 8, 2017).

<sup>23</sup>GAO, *Nuclear Weapons: NNSA Needs to Determine Critical Skills and Competencies for Its Strategic Materials Programs*, GAO-18-99 (Washington, D.C.: Nov. 14, 2017).

<sup>24</sup>GAO-19-449.

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However, we have identified additional actions NNSA could take to further improve its management of weapon modernization programs and related projects. As NNSA's workload increases, additional management rigor will help ensure that programs and projects are executed consistent with cost and schedule estimates, and that risk is effectively managed and communicated. For example:

- We found in our January 2018 report that NNSA had not adopted the best practice of having an independent team validate its earned value management systems against the national standard for such systems, which could help the agency better manage risk in its LEPs.<sup>25</sup> We also found that NNSA had not established specific benchmarks for technology readiness at LEP decision points, consistent with best practices. We recommended that NNSA require an independent team to validate contractor earned value management systems for LEPs and establish technology readiness requirements at LEP decision points. According to an update NNSA provided to us in September 2019, the agency has not taken action to address these recommendations. We continue to believe that it should do so.<sup>26</sup>
- We found in our September 2017 report that NNSA had not developed a complete scope of work, a life-cycle cost estimate, or an integrated master schedule for its overall uranium program—of which the Uranium Processing Facility is only one part—and had no time frame for doing so.<sup>27</sup> We recommended that NNSA should set a time frame for when the agency would develop a complete scope of work, a life-cycle cost estimate, and an integrated master schedule for the overall uranium program. NNSA generally agreed with our recommendation and has taken actions to respond to it. We expect to

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<sup>25</sup>GAO-18-129.

<sup>26</sup>NNSA stated at the time of our report that it agreed with our recommendations. Furthermore, it cited DOE's surveillance reviews of its earned value management systems and NNSA's use of technology readiness benchmarks at decision points in stating that it had already taken steps to address them. As we noted in our report, however, NNSA's internal reviews of its earned value management systems cannot replace validating those systems against the national standard for such systems; both of these activities are important and supplement each other. We also noted that without a requirement for explicit management approval in cases where an LEP's critical technology does not meet a specific technology readiness level, NNSA may not have a sufficiently developed process for assessing and accepting technical risk.

<sup>27</sup>GAO-17-577.



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issue a report on the Uranium Processing Facility and NNSA's plans for its uranium program in March 2020.

- As we reported in February 2020, the plutonium program has begun to develop a schedule for pit production.<sup>28</sup> However, NNSA allows strategic materials programs such as the plutonium program to tailor their approach to developing schedules and does not require that they meet best practices for schedule estimating. We recommended that NNSA ensure that the plutonium program develop a schedule for pit production consistent with best practices for schedule development. NNSA agreed with our recommendation.

Our ongoing work includes reviews of NNSA's management of other efforts essential to ongoing weapon modernization programs, such as the production of radiation-hardened microelectronics at Sandia National Laboratories in New Mexico and of depleted uranium at the Y-12 National Security Complex in Tennessee.

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### NNSA Needs a Portfolio-based Approach to Managing Its Weapon Modernization Programs and Related Efforts

NNSA's weapon modernization programs and enabling infrastructure efforts have significant interdependencies that require integrated management across the portfolio of programs to effectively manage cost, schedule, and risk. Portfolio management best practices developed by the Project Management Institute state that organizations can optimize their portfolios of programs and projects by assessing their capability and capacity to finance specific portfolio components; determining which portfolio components should receive the highest priority; and identifying components to be suspended, reprioritized, or terminated.<sup>29</sup> In our April 2017 report on NNSA's budget materials and modernization plans, we found that NNSA did not clearly identify the extent to which its long-range budget estimates for its overall modernization program fell short of specific annual budget requests anticipated in this plan.<sup>30</sup> We concluded that NNSA had not addressed the projected bow wave of future funding needs and the mismatch between those needs and the potential funding available in the years in question. By not addressing the risks associated with the potential funding shortfall, we concluded, NNSA raised questions

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<sup>28</sup>GAO-20-207C.

<sup>29</sup>Project Management Institute, Inc. *The Standard for Portfolio Management*, Third Edition, 2013. The Project Management Institute, Inc., is a not-for-profit association that provides global standards for, among other things, project and program management. These standards are utilized worldwide and provide guidance on how to manage various aspects of projects, programs, and portfolios.

<sup>30</sup>GAO-17-341.

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about its ability to achieve its modernization program goals at cost and on schedule. As a result, as discussed above, we recommended that NNSA include an assessment of the affordability of its portfolio of modernization programs in future versions of the *Stockpile Stewardship and Management Plan*—for example, by presenting options NNSA could consider to bring its estimates of modernization funding needs into alignment with potential future budgets, such as potentially deferring the start of or canceling specific modernization programs. NNSA did not explicitly agree or disagree with our recommendation. The President's fiscal year 2021 budget request for NNSA indicates that the bow wave has arrived, requesting an increase of about \$3.1 billion over the funding enacted for Weapons Activities in fiscal year 2020—a year-to-year increase of over 25 percent.<sup>31</sup>

The *Fiscal Year 2020 Stockpile Stewardship and Management Plan*, issued in July 2019, includes a new section on affordability analysis and states that the section was added in response to our April 2017 recommendation. However, our review of this section indicates that it does not fully respond to our recommendation because it does not provide information about how potential misalignment between NNSA's modernization budget estimates and projections of the President's modernization budgets may be addressed, or about the potential impacts of adjusting program schedules or cost or schedule overruns. Since the issuance of the 2018 *Nuclear Posture Review*, NNSA's portfolio of planned programs has only grown more extensive and complex. We continue to believe that NNSA, by assessing its portfolio of modernization programs in future versions of the *Stockpile Stewardship and Management Plan*—for example, by presenting options NNSA could consider to bring its estimates of modernization funding needs into alignment with potential future budgets, such as potentially deferring the start of or canceling specific modernization programs—could help congressional and NNSA decision makers better understand NNSA's priorities and trade-offs that it may need to undertake in the future, depending on funding and program performance.

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<sup>31</sup>Specifically, the DOE budget justification indicates that NNSA's enacted funding level was about \$12.5 billion in fiscal year 2020 and that it is requesting about \$15.6 billion for fiscal year 2021.

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Chairman Cooper, Ranking Member Turner, and Members of the Subcommittee, this completes my prepared statement. I would be pleased to respond to any questions you may have at this time.

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**GAO Contact and  
Staff  
Acknowledgments**

If you or your staff members have any questions about this testimony, please contact me at (202) 512-3841 or [bawdena@gao.gov](mailto:bawdena@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. GAO staff who made key contributions to this testimony are Jason Holliday, Assistant Director; Antoinette C. Capaccio; Julia Coulter; Rob Grace; John Hocker; Dan Royer; and Kiki Theodoropoulos.

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## Related GAO Products

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The following is a selection of GAO's recent work assessing the National Nuclear Security Administration's management of nuclear weapon programs and related capital asset projects:

*Nuclear Weapons: NNSA Should Further Develop Cost, Schedule, and Risk Information for the W87-1 Warhead Program.* GAO-20-207C. Washington, D.C.: February 28, 2020.

*Nuclear Weapons Sustainment: Improvements Made to Budget Estimates in Fiscal Year 2019 Joint Report, but Opportunities Remain to Enhance Completeness.* GAO-20-37R. Washington, D.C.: November 7, 2019.

*Nuclear Weapons: Additional Actions Could Help Improve Management of Activities Involving Explosive Materials.* GAO-19-449. Washington, D.C.: June 17, 2019.

*Modernizing the Nuclear Security Enterprise: NNSA Is Taking Action to Manage Increased Workload at Kansas City National Security Campus.* GAO-19-126. Washington, D.C.: April 12, 2019.

*High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High-Risk Areas.* GAO-19-157SP. Washington, D.C.: March 6, 2019.

*Nuclear Weapons: NNSA Has Taken Steps to Prepare to Restart a Program to Replace the W78 Warhead Capability.* GAO-19-84. Washington, D.C.: November 30, 2018.

*B61-12 Nuclear Bomb: Cost Estimate for Life Extension Incorporated Best Practices, and Steps Being Taken to Manage Remaining Program Risks.* GAO-18-456. Washington, D.C.: May 31, 2018.

*Nuclear Weapons: NNSA Should Clarify Long-Term Uranium Enrichment Mission Needs and Improve Technology Cost Estimates.* GAO-18-126. Washington, D.C.: February 16, 2018.

*Nuclear Weapons: NNSA Should Adopt Additional Best Practices to Better Manage Risk for Life Extension Programs.* GAO-18-129. Washington, D.C.: January 30, 2018.

*Nuclear Weapons: NNSA Needs to Determine Critical Skills and Competencies for Its Strategic Materials Programs.* GAO-18-99. Washington, D.C.: November 14, 2017.

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**Related GAO Products**

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*Modernizing the Nuclear Security Enterprise: A Complete Scope of Work Is Needed to Develop Timely Cost and Schedule Information for the Uranium Program.* GAO-17-577. Washington, D.C.: September 8, 2017.

*National Nuclear Security Administration: Action Needed to Address Affordability of Nuclear Modernization Programs.* GAO-17-341. Washington, D.C.: April 26, 2017.

*High-Risk Series: Progress on Many High-Risk Areas, While Substantial Efforts Needed on Others.* GAO-17-317. Washington, D.C.: February 15, 2017.

*DOE Project Management: NNSA Needs to Clarify Requirements for Its Plutonium Analysis Project at Los Alamos.* GAO-16-585. Washington, D.C.: August 9, 2016.

*DOE Project Management: NNSA Should Ensure Equal Consideration of Alternatives for Lithium Production.* GAO-15-525. Washington, D.C.: July 13, 2015.

*Nuclear Weapons: NNSA and DOD Need to More Effectively Manage the Stockpile Life Extension Program.* GAO-09-385. Washington, D.C.: March 2, 2009.

*GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs.* GAO-09-3SP. Washington, D.C.: March 2009.

*Nuclear Weapons: Opportunities Exist to Improve the Budgeting, Cost Accounting, and Management Associated with the Stockpile Life Extension Program.* GAO-03-583. Washington, D.C.: July 28, 2003.



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Allison began her career at GAO in 2004 where she initially focused on the U.S. defense industrial base. Prior to joining GAO, she managed programs and special projects at a Washington, DC-based think tank.

Allison graduated cum laude from Dartmouth College with a Bachelor's degree in anthropology, and earned a master's degree in public administration from American University. She also completed graduate course work in national security studies at the United States Naval War College and a specialization in design thinking and innovation through the University of Virginia's Darden School of Business Executive Education program. Recently, Allison became an adjunct professional lecturer in American University's Master of Public Policy and Administration Program, where she instructs the program's capstone practicum.

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