

**DEPARTMENT OF DEFENSE AUTHORIZATION
REQUEST FOR APPROPRIATIONS FOR FISCAL
YEAR 2024 AND THE FUTURE YEARS DEFENSE
PROGRAM**

HEARINGS

BEFORE THE

**COMMITTEE ON ARMED SERVICES
UNITED STATES SENATE**

ONE HUNDRED EIGHTEENTH CONGRESS

FIRST SESSION

ON

S. 2226

TO AUTHORIZE APPROPRIATIONS FOR FISCAL YEAR 2024 FOR MILITARY
ACTIVITIES OF THE DEPARTMENT OF DEFENSE, FOR MILITARY CON-
STRUCTION, AND FOR DEFENSE ACTIVITIES OF THE DEPARTMENT OF
ENERGY, TO PRESCRIBE MILITARY PERSONNEL STRENGTHS FOR
SUCH FISCAL YEAR, AND FOR OTHER PURPOSES

PART 7

STRATEGIC FORCES

MARCH 14; APRIL 18; MAY 2, 9, 2023



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Part 7 STRATEGIC FORCES**

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**DEPARTMENT OF DEFENSE AUTHORIZATION
REQUEST FOR APPROPRIATIONS FOR
FISCAL YEAR 2024 AND THE FUTURE YEARS
DEFENSE PROGRAM**

TUESDAY, MARCH 14, 2023

UNITED STATES SENATE,
SUBCOMMITTEE ON STRATEGIC FORCES,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

THE UNITED STATES SPACE FORCE PROGRAMS

The Subcommittee met, pursuant to notice, at 4:46 p.m., in room 222, Russell Senate Office Building, Senator Angus S. King, Jr. (Chairman of the Subcommittee) presiding.

Subcommittee Members present: Senators King, Gillibrand, Rosen, Kelly, Fischer, Rounds, Ernst, Cramer, and Tuberville.

OPENING STATEMENT OF SENATOR ANGUS S. KING, JR.

Senator KING. Call to order the meeting of the Strategic Forces Subcommittee of the Senate Committee on Armed Services. Our hearing today is on the subject of the Space Force.

I want to thank General Saltzman for being with us today before this Committee, and the purpose of the hearing is to understand your vision and priorities for the Space Force as its second Chief of Space Operations.

While the budget for the Department of Defense (DOD) in the Space Force has just been released, we plan to have a Space budget hearing which includes the Space Force later in May. After we have had time to understand in detail the President's Budget Request, there are many and complicated topics such as missile warning and launch that will take time to understand and are not really ripe for this hearing today, but we will take up in May.

Instead, the hearing will focus on you, General Saltzman. This is your opportunity to explain to the Subcommittee and to the public how you will train and equip the Space Force as a Department of Defense separate military service and be a presenter of forces to the Combatant Commanders in order to accomplish their missions as assigned by the President.

My understanding is that today you will explain to us your three lines of effort for our Space Force Guardians. As I understand it, they are to first field a combat ready force. Second, amplify the Guardian spirit, and third, partner with the interagency allies and industry to win.

I look forward to having you explain in detail what each of these lines of effort are and give us examples, simple ones, that we can take with us and explain to our constituents and the public the importance of the work that you are doing.

Let me conclude that General Hayden said it best, there is no such thing as a conflict in space by itself. Any conflict will involve all domains, although I believe it will start in space, the land, the sea, the air, and space all together at once.

I hope that today you will explain to us how your vision for the Space Force will meet General Hayden's astute observation and enable our combatant commanders to accomplish the mission that the President has directed them to perform, if called upon.

After your opening statement, we will have questions of 5 minutes each. Senator Fischer.

STATEMENT OF SENATOR DEB FISCHER

Senator FISCHER. Thank you, Mr. Chairman. General Saltzman, thank you for being here today and for sharing your perspective with the Subcommittee, and thank you, sir, for your many, many years of service.

You are only the second ever Chief of Space Operations in a unique position to leave your mark on what is still essentially a brand new military service. An opportunity like this comes around less than once in a generation, and I am sure you feel the gravity and the expectation of this every single day.

I look forward to hearing more of your vision for this newest service branch, specifically how you are forming it into a fighting force that is ready to prosecute war as part of the United States military.

I would also like to understand how you are shaping the space acquisition enterprise to that vision enabling the Joint Force. Thank you, Mr. Chairman.

Senator KING. General Saltzman.

STATEMENT OF GENERAL B. CHANCE SALTZMAN, USSF, CHIEF OF SPACE OPERATIONS

General SALTZMAN. Chairman King, Ranking Member Fischer, distinguished Members of the Subcommittee, thank you for your continued support for the opportunity to discuss my vision and priorities for the United States Space Force.

I have been in listening mode since becoming the second Chief of Space Operations (CSO) just 4 months ago. One of my first phone calls as the CSO was to the Commander of United States European Command, General Calvelli.

My first trip as the CSO was to Colorado Springs to meet in person with the Commander of U.S. Space Command, General Dickinson. My first overseas trip was to Hawaii, where I met with the Commander of United States Indo-Pacific Command, Admiral Aquilino.

During these last 4 months, I have also prioritized visiting with Guardians performing vital missions around the world for the Space Force, for the Joint Force, and for the Nation. In December, I met in person with military space chiefs from Australia, Canada, France, Germany, New Zealand, and the United Kingdom.

In all these engagements, my goal was to better understand how the Space Force should focus its near and mid-term efforts as we integrate our capabilities to address the threats and challenges. The themes from these engagements should surprise no one.

Each combatant commander emphasized the vital role space plays in strategic competition and integrated deterrence. The guardians of the Space Force make this possible and are without a doubt the brightest and boldest America has to offer.

Because of these advantages and our shared interest in the domain, U.S. allies and international partners are eager for expanded collaboration with the Space Force, especially in areas that strengthen the effectiveness of coalition space operations and reinforce norms of responsible behavior.

In short, our mission forces, people, and partnerships make the Space Force the most formidable space organization on the planet. China and Russia know this and are accelerating their efforts to undermine United States advantages in the domain.

To meet this challenge, the Space Force will prioritize three lines of effort, as Senator King has already stated, fielding, combat ready forces, amplifying the guardian spirit, and partnering to win.

These lines of efforts are designed to deliver the forces, personnel, and partnerships required for the Space Force to preserve U.S. advantages in space. Before I expand on the Space Force lines of effort, I would like to update the Subcommittee on the emerging threats Space Forces face.

As the handout I have provided indicates, space is undeniably a contested and congested warfighting domain. When describing space threats, it is important to account for two kinds of threats. First, threats from space assets, and second, threats to space assets. Threats from space present a growing danger to the Joint Force.

[The information referred to follows:]

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VISION AND PRIORITIES

for the United States Space Force

CONGESTED SPACE DOMAIN



2021	2022
41,400	47,900

↑16%
Total Objects Tracked



2021	2022
5,200	7,100

↑37%
Active Satellites Tracked



2021	2022
135	177

↑31%
Worldwide Launches



2021	2022
1,715	2,215

↑29%
Satellites Launched



2021	2022
445	1,486

↑233%
Debris Hazard Notifications to the ISS

CONTESTED SPACE DOMAIN



347 (+107 in 2021)
Chinese satellites that can track and target U.S. military forces



2021 NOVEMBER
Russia destroys defunct satellite with a ground-to-orbit missile



52
Chinese satellites that provide navigation data for global precision strike



2022 JANUARY
China tests satellite that can grapple other satellites




2021 JULY
China tests world's first orbit-to-ground hypersonic missile



2022 NOVEMBER
Russian Foreign Ministry states commercial satellites used for military purposes "may become a legitimate target for retaliation"

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GUARDIANS PROTECT U.S. INTERESTS IN SPACE

USSF's **lines of effort** are designed to achieve this vision by providing the forces, personnel, and partnerships required for the Space Force to preserve U.S. space superiority for the foreseeable future.

1

LINE OF EFFORT

FIELD COMBAT-READY FORCES




RESILIENT, READY, COMBAT-CREDIBLE

- Investing in proliferated low Earth orbit constellations
- Emphasizing cyber security
- Building operational test and training infrastructure
- Conducting large force exercises

2

LINE OF EFFORT

AMPLIFY THE GUARDIAN SPIRIT




RECRUIT THE BEST TALENT, DEVELOP AND RETAIN AN ELITE WORKFORCE, AND EMPOWER GUARDIANS TO SUCCEED

- Constructive credit program
- Service unique accession training
- Professional Military Education at a civilian institute
- Integrate full-time and part-time career paths

3

LINE OF EFFORT

PARTNER TO WIN



JOINT FORCE, INTERAGENCY, ALLIES, AND INDUSTRY

- Service components in USINDOPACOM and USCENTCOM
- Hosted 50+ countries at training, education, and exercise events
- Partnered with 60+ countries on foreign military sales

Both China and Russia have robust space-based capabilities that allow them to find, target, and attack United States military forces on land, at sea, and in the air. Equally alarming are the threats that endanger the satellites the Nation relies on for prosperity and security. Both China and Russia continue to develop, field, and deploy a range of weapons aimed at United States space capabilities.

The spectrum of threats to U.S. space capabilities includes cyber warfare activities, electronic attack platforms, directed energy lasers designed to blind or damage satellites sensors, ground to orbit missiles to destroy satellites, and space to space orbital engagement systems that can attack U.S. satellites in space. The contested space domain shapes the enduring purpose of the United States Space Force.

Congress established the Space Force to protect U.S. interests in space. This means protecting U.S. space capabilities and defending the Joint Force and the Nation from space enabled attack.

My lines of effort are designed to achieve this vision by providing the forces, personnel, and partnerships required for the Space Force to preserve U.S. space superiority for the foreseeable future. My first priority is to build resilient, ready to combat credible space forces. To do this, we are accelerating the pivot toward resilience satellite constellations, ground stations, networks, and data links.

The space development agencies proliferated warfighter space architecture provides a prime example of these efforts. We are also emphasizing cybersecurity and preparing guardians to detect and defeat cyber-attacks against our networks, systems, ground stations, data links, and satellites.

We are developing an operational test and training infrastructure that will be the backbone of Space Force readiness as guardians prepare for a high intensity fight. This infrastructure will allow guardians to execute realistic training against simulated adversaries to validate their tactics.

Space Training and Readiness Command executed one such exercise last September with its inaugural Black Skies exercise focused on space electromagnetic warfare. Through these events, we are continuously enhancing tactics and operational concepts, thereby creating a force ready for emerging threats.

My second priority is to amplify the guardian spirit by embracing a modern talent management process that recruits the best talent, develops and retains an elite workforce, and empowers guardians to succeed.

One example is our constructive service credit program that allows experienced professionals from key fields to directly commission into the Space Force at ranks appropriate to their civilian experience. The first constructive credit board served as a pilot program in 2022 and recruited seven cyber professionals to become guardians, one of which was onboarded as a lieutenant colonel.

The second board will incorporate intelligence professionals and assess 20 additional personnel. Over the last year, we have also deployed space centric curriculum for basic military training, the Reserve Officer Training Corps, and an officer training school. In addition, our partnership with the Johns Hopkins School of Advanced International Studies for Professional Military Education begins this summer.

With congressional support, we will improve our modern talent management system by integrating the Air Force Reserve space element into the Space Force as a single component. This will allow guardians to transition between full-time and part-time duty to pursue opportunities outside of full-time military service and subsequently return to full-time duty without barriers to reentry or detriment to their career.

We will ensure that such experience is utilized in strict and careful compliance with Federal acquisition and ethics regulations, and appropriate conflict of interest statutes. The single service personnel management system will make retaining highly qualified guardians easier by facilitating flexible career paths, and we look forward to working with this Subcommittee on that important initiative.

My third and final priority is to strengthen partnerships the Space Force relies on to accomplish its mission. The Space Force will strive to eliminate barriers to collaboration, including over classification, so we can build enduring advantages with our partners.

To date, personnel from over 50 countries have participated in training, education, and exercise events hosted by the Space Force. We are also leveraging allies and partners to expand our warfighting capability.

Recent examples include deploying United States payloads on Norwegian and Japanese satellites and establishing a partnership with Luxembourg for satellite communication services. In total, we have more than 200 foreign military sales cases, with over 60 countries for a broad spectrum of space capabilities.

Commercial partners will be key as we pursue emerging technologies like advanced power promotion, propulsion technologies, artificial intelligence, and machine learning, and in-space servicing assembly and manufacturing. Space Systems Command's Commercial Services Office is building these partnerships to improve our ability to leverage more commercial off the shelf capabilities.

In conclusion, thank you for the opportunity to share these priorities with you today. The Space Force is the preeminent military space organization in the world. Our adversaries seek to surpass the United States and challenge our advantage. We cannot and will not allow this to happen.

Our guardians will out work, out innovate, and out compete our adversaries to ensure that we succeed. They will do everything they can to deter conflict and maintain stability in space. I very much look forward to your questions. Thank you.

[The prepared statement of General B. Chance Saltzman follows:]

PREPARED STATEMENT BY GENERAL B. CHANCE SALTZMAN

INTRODUCTION

Chairman King, Ranking Member Fischer, distinguished members of the Subcommittee, thank you for your continued support and for the opportunity to discuss my vision and priorities for the United States Space Force. For the last 5 months, I have had the privilege of serving as the Chief of Space Operations and leading the guardians of the Space Force. They are, without a doubt, the brightest and boldest America has to offer. The Space Force is the world's preeminent space warfighting entity because of them. We must maintain that status so that the

threats we face in, to, and from space are never able to undermine American prosperity and security. Space capabilities shape the modern way of war and the human way of life. Without space, the Joint Force's ability to project power and execute operations will be severely degraded.

The Space Force develops and trains guardians, designs and acquires space systems, and provides those personnel and systems to the Joint Force. In accordance with the strategic direction provided in the National Defense Strategy and the Department of the Air Force Operational Imperatives, we will develop a resilient space order of battle able to protect U.S. space capabilities and defend the Joint Force from space-enabled targeting and attack. Should competition turn to conflict, the Space Force will be prepared to rapidly transition to a wartime posture against a peer adversary with the appropriate systems, training, and sustainment to fight and win a long-term conflict.

To do this, I will prioritize three key efforts: (1) fielding combat-ready forces (2) amplifying the Guardian Spirit, and (3) partnering to win. Our adversaries seek to supersede our advantages in space. We cannot let that happen. Through these three efforts, the Space Force will develop a competitive mindset and warfighting culture. We will outpace and outcompete our adversaries. We will preserve stability in space.

THREAT PICTURE & OPERATIONAL ENVIRONMENT

Congested Space Domain

Our efforts to maintain stability in space must account for the increasing number of objects that congest the domain. In 2022, space launch providers around the world conducted a record 177 launches, a 31 percent increase from 2021. Those launches put 2,215 payloads into orbit, a 29 percent increase from 2021. Increasing launch cadence and payloads in orbit expands demand for space domain awareness (SDA) capabilities covering all orbital regimes. The Space Force's SDA unit, Space Delta 2, currently tracks approximately 47,900 objects in space, a 16 percent growth in objects from 2021 to 2022. Of those objects, 7,100 are active payloads, a 37 percent increase from 2021 to 2022. Expended rocket bodies, inactive satellites, and debris further congest the environment.

Proliferated mega constellations numbering in the hundreds or thousands of satellites account for a growing percentage of launches and active payloads on orbit. Of the 177 launches last year, 41 deployed satellites for mega constellations representing a 51 percent increase from 2021. Those 41 missions put over 2000 payloads into orbit. Six were rideshare missions which launched satellites for a wide variety of government and private sector space entities.

These new satellites must be effectively tracked to alert operators to prevent collisions that could generate more debris. The orbital debris problem continued to worsen in 2022. Seven spacecraft broke apart in orbit creating over 600 new pieces of debris, including one Chinese rocket body accounting for over 530. The International Space Station had 1,486 reportable conjunctions with space debris or spacecraft in 2022, a 233 percent increase from 2021. The increase was largely due to the Russian anti-satellite test in November 2021 which created 1500 pieces of trackable debris, caused over half of the conjunctions, and forced the ISS to maneuver twice to dodge debris.

In addition to the rocket that broke apart in orbit, the Chinese Government allowed uncontrolled reentries of two additional rocket bodies into Earth's atmosphere last year, while refusing to share specific trajectory information. The Chinese and Russian Governments' disregard for the safety and sustainability of space could lead to debris generation and loss of human life. We are committed to setting an example of professional behavior to ensure the space domain remains secure, stable, and accessible while the United States Government works to lead efforts to develop norms of responsible behavior in space.

Contested Space Domain

Space is undeniably a contested warfighting domain. China and Russia both define space in such a manner. China, our pacing challenge, is the most immediate threat in, to, and from space for which the Space Force must maintain technological advantage and readiness to defend vital national security interests. Russia, while less capable, remains an acute threat that is developing asymmetric counterspace systems meant to neutralize American satellites. Both states recognize the advantage space provides the United States. Both expect space to be key to future warfare by enabling long-range precision strike. Both seek information superiority through disabling an adversary's space communication and navigation systems. They are intent on targeting perceived U.S. vulnerabilities and eliminating American advantage in the space domain.

In 2015, the People's Liberation Army (PLA) created the Strategic Support Force which integrates space, cyberspace, and electronic warfare operations. China continues to aggressively invest in technology meant to disrupt, degrade, and destroy our space capabilities. Those technologies are key to their plan for a fully modernized, world class military able to project power globally and for achieving their "Space Dream" to become the foremost global space power by 2045.

China has a range of operational counterspace capabilities, including terrestrial lasers to disrupt and degrade satellite sensors, electronic warfare jammers targeting GPS and SATCOM, and anti-satellite missiles. They are testing on-orbit satellite systems which could be weaponized as they have already shown the capability to physically control and move other satellites. Their cyber capabilities are extensive and dangerous. They are likely pursuing anti-satellite systems able to destroy satellites in geosynchronous orbit. In July 2021, the Chinese Government successfully completed the first test of fractional orbital launch of an ICBM with a hypersonic glide vehicle, which traveled over 24,800 miles demonstrating a new method to hold at risk and to attack the United States.

Over the last 6 months, China conducted 35 launches adding advanced communications and intelligence, surveillance, and reconnaissance (ISR) satellites to their orbital architecture. Of China's over 700 operational satellites in orbit, 347 are PLA ISR platforms providing optical, radar, and radio-frequency capabilities which track the Joint Force worldwide. Their ISR satellites work in conjunction with positioning, navigation, and timing (PNT) and SATCOM satellites to enable Chinese kill-chains and long-range precision guided attack. These space capabilities allow China to monitor, track, target and attack United States forces in conflict.

Russia is testing and fielding orbital anti-satellite systems, extensive cyber capabilities, and terrestrial anti-satellite missiles, jammers, and lasers. They are also likely developing an air launch anti-satellite missile. Russia's ISR satellites are highly advanced, providing geospatial and signals intelligence capabilities, but are limited in number relative to the United States and China. Their ISR, PNT, and communications satellites provide the basis for space-enabled targeting and attack that must be taken seriously despite Russia's performance in Ukraine and lack of follow-through on threats to space capabilities.

The Space Force will protect the Joint Force from threats of Russian and Chinese action. The Space Force must deter aggression and, if necessary, defeat adversaries. We will do so responsibly and sustainably. We will execute my priorities with the pacing challenge, China, at the forefront of our minds.

THE VITAL ROLE OF THE SPACE FORCE

Congress established the Space Force to protect U.S. interests in space. This charge has two components. First, we must protect U.S. space capabilities so that the Nation has unfettered access to the domain. Second, we must defend the Joint Force and the Nation from space-enabled attack. Space superiority is the ability to accomplish both at a time and place of our choosing. Military services are organized around domains—air, land, and sea—because contesting a domain with military force is a complex endeavor that requires institutional specialization. Space superiority requires a similar level of specialization. This mission is why the Space Force exists and an operational outcome clearly in guardians' purview.

My lines of effort are designed to achieve this vision by providing the forces, personnel, and partnerships required for the Space Force to preserve U.S. space superiority for the foreseeable future.

LINE OF EFFORT 1—FIELD COMBAT-READY FORCES

My first priority is to build resilient, ready, combat-credible space forces. A resilient force can withstand, fight through, and recover from hostile attacks. A ready force has the training, equipment, and sustainment required to accomplish any mission in competition and high-intensity conflict. A combat-credible force has power to deter by providing the ability to conduct full-spectrum operations in a prompt and sustained manner against any adversary. Space forces must be all three, resilient, ready, and combat-credible, if they are going to outcompete adversaries, deter aggressors, and defeat the Nation's enemies.

Resilient

We are accelerating the pivot toward resilient satellite constellations, ground stations, networks, and data links. We are conducting transformational force design analysis based on current and future threats, operational needs, and costs so that we can deliver resilient, effective systems and architecture. Force design will be informed by extensive wargaming and prototyping to deliver combat and cost-effective

platforms. Satellite constellations must be proliferated, disaggregated, and distributed. The Space Development Agency's Proliferated Warfighter Space Architecture provides a prime example of those efforts.

Emphasis must be placed on cybersecurity. Cyber threats must be understood. Networks must be hardened against hostile cyber operations. The Space Force will employ highly trained guardians implementing modern sensors, software, and analytics to detect and defeat cyber operations against our networks, systems, ground stations, datalinks, and satellites. The Space Force will strive to eliminate legacy information technology to reduce cyber vulnerabilities.

Ready

To enhance our ability to field combat-ready forces, we are experimenting with organizational constructs that strengthen readiness by building tighter connections between operations and acquisitions activities. The 15th Space Surveillance Squadron is an important example of such a unit. This unit combines an operational space domain awareness (SDA) mission under Space Delta 2 and a research and development mission for SDA technologies aligned with the Air Force Research Lab. The combination of operations and acquisitions expertise accelerates technological transfer from engineers and acquirers to warfighters. As experiments like this demonstrate positive results, we will look for innovative ways to apply the lessons we learn across the force.

The Space Force requires new, modern infrastructure to train guardians, develop tactics, and validate performance. Developing Operational Test and Training Infrastructure (OTTI) will enable guardians to build readiness to fight and win high-intensity conflict. With this infrastructure, we will aggressively pursue realistic training. Guardians will execute missions with validated tactics and modern weapon systems. We are executing new, large scale training exercises including Space Flag and Black Skies. At these exercises, Guardian aggressor forces function as intelligent, highly capable opponents to force guardians to account for our real-world adversaries. Through training, exercises, and orbital experimentation, we will develop, validate, and continuously enhance tactics and operational concepts, thereby creating a force ready for emerging threats.

Combat-Credible

Only a credible Space Force can deter an adversary from extending a conflict into space. A combat-credible force requires actionable intelligence, decisive command and control, fortified networks, maintained equipment, innovative operational concepts, validated tactics, accredited facilities, and continuous sustainment. Neglecting any of these elements jeopardizes a force's ability to conduct prompt and sustained operations against an adversary. My emphasis on combat credibility ensures that we are fielding all the combat and combat support elements required to prevail against an adversary in space.

For Space Force forces to be combat-credible, they must be able to protect space capabilities and defend the Joint Force from space-enabled attack. To perform these missions, we are developing strategies, concepts, and tactics that will allow space forces to conduct prompt and sustained full spectrum operations against an adversary in the emerging threat environment. We are also accelerating the documentation of force designs related to orbital warfare; space domain awareness; battle management command, control, and communication; and other key functional areas. The Space Warfighting Analysis Center plays a role in this effort by providing the modeling and analysis to inform these activities. If the concepts we rely on to protect and defend become stale or outdated, we risk falling behind the adversary. Therefore, we are continuously evaluating the effectiveness of strategies, concepts, and tactics through a Service-wide campaign of learning.

LINE OF EFFORT 2—AMPLIFY THE GUARDIAN SPIRIT

My second priority is to unleash the spirit of creativity, innovation, determination, and patriotism of our talented workforce. Amplifying the Guardian Spirit requires the Space Force to continue to embrace modern talent management processes so that we can recruit the best talent, develop, and retain an elite workforce, and empower guardians to succeed.

Recruit the Best Talent

The size and requirements of the Space Force present unique recruiting challenges. We receive more applications than we have positions available. Our focus must be selecting the right people who will embrace the Guardian Spirit and dedicate themselves to the accomplishment of our mission. Future guardians must be recruited from across the United States, from all backgrounds ensuring selection of

high-quality people with diverse life experiences that will be critical in solving complex problems and executing difficult missions. The Space Force must outcompete the civilian market for talent by showing how attractive careers as a Guardian are for all people.

The Space Force is implementing innovative recruitment practices to attract talent. We are expanding digital recruiting efforts to include interactions with potential recruits aimed at presenting the value of service in the Space Force, training and educational opportunities, and the importance of STEM. Recruit townhalls allow potential future guardians to ask questions in preparation for joining the Space Force and successful completion of Basic Military Training. STEM to Space is a targeted outreach effort through which guardians give presentations to elementary and high school students promoting STEM education and careers. The Space Force recently launched a website to conduct public outreach which provides information on careers, but also provides personal insights and anecdotes from enlisted personnel, officers, and civilians.

Through extremely valuable partnerships with Universities, the Space Force will recruit highly educated guardians. The Space Force University Partnership Program (UPP) creates a pipeline for future Space Force officers and civilians through ROTC and internship programs. We will recruit from a diverse group of universities to ensure the strongest possible field of future guardians and STEM talent including from underrepresented populations. We currently have 14 partner universities. Two of those universities are Historically Black Colleges and Universities (HBCUs) and four are Hispanic Serving Institutions (HSIs).

Our constructive service credit program allows experienced professionals from key fields to direct commission into the Space Force at ranks appropriate to their years of experience. The program is intended to recruit professionals in the cyber, intelligence, and space fields who are already in the workforce allowing them to skip ROTC or attendance at a service academy. The program is currently bringing critical cyber experience from the private sector. The first board served as a pilot program and recruited seven cyber professionals to become guardians including one at the rank of Lieutenant Colonel, who are now in training or already serving in operational units. The second board will incorporate intelligence professionals and intends to hire 20 personnel. The third board will incorporate space operations professionals. These and all other recruits will bring exceptional talent that will benefit the Space Force and enhance their career long development as guardians.

Develop and Retain an Elite Work Force

The Space Force will maximize Guardian talent with an innovative, modern talent management system that will train and educate the best workforce. Our approach maximizes opportunities for education and training. We are developing and implementing space centric curriculum for Basic Military Training, Reserve Officer Training Corps, at the U.S. Air Force Academy, and Officer Training School programs to ensure our guardians are well prepared for entry into the Space Force. Guardians will be provided more opportunities for and are encouraged to pursue advanced STEM degrees. Further, we will mature our relationship with the Johns Hopkins School of Advanced International Studies (SAIS) to provide mid and senior-level professional military education programs.

With congressional support, we will improve our modern talent management system by integrating the Air Force Reserve space element into the Space Force as a single component. This will strengthen our recruiting and retention efforts by providing unique, flexible career paths. The proposed talent management system update would allow guardians to transfer between full-time and part-time duty to pursue opportunities outside full-time military service and subsequently return to full-time duty without barriers to reentry or detriment to their career. Part-time guardians would bring valuable commercial industry experience back to the Space Force. Such opportunities will help us attract highly skilled, technologically inclined people in an increasingly competitive space enterprise talent market. The single service personnel management system will allow guardians to achieve their potential and drive innovation within the Space Force. The system will also make retaining highly qualified guardians easier by facilitating flexible career paths. We look forward to working with this committee on this important initiative.

Empower Guardians to Succeed

Amplifying the Guardian Spirit requires leaders at all levels to place the utmost emphasis on taking care of, trusting, and empowering their subordinates. Empowerment requires that guardians adapt to any situation and develop solutions in line with their commander's intent. Guardians must be confident in their ability to innovate and execute in the absence of orders in high-intensity conflict with or without

all requisite capabilities. Guardians must be able to figure out the how when a commander only provides the what and why.

Each new challenge we face will require big ideas thought up by bright, creative guardians. We are implementing an annual Guardian Field Forum which will showcase exceptional junior officers, non-commissioned officers, and civilians and allow them to share recommendations and innovative ideas with peers and senior Space Force leaders. The Forum will accelerate implementation of new ideas from the ground up and demonstrate each Guardian's ability to implement mission command. The intent of the

Forum is to provide open lines of communication between leaders of all ranks across the Space Force to ensure that we remain at the cutting edge technologically and tactically.

LINE OF EFFORT 3—PARTNER TO WIN

My third priority is to strengthen the partnerships the Space Force relies on to accomplish our mission. Success in space requires collaboration. The Space Force will strive to eliminate barriers to collaboration, including over-classification, so the Space Force can build enduring advantages with our partners.

Department of the Air Force

The Space Force maintains our deep relationship with the U.S. Air Force which provides critical support services enabling the Space Force to remain focused only on key mission areas. The Air Force delivers medical, legal, security, engineering, information technology, and public affairs support among a myriad of other functions to the Space Force. For example, the Air Force Research Lab is a critical partner researching and developing cutting-edge satellites, spacecraft, propellants, PNT, SDA, and power collection and beaming technologies.

Joint Force

Our partnership with U.S. Space Command remains our most important Joint Force relationship. The commander of U.S. Space Command's mission in the space area of responsibility means that the two organizations are closely entwined. One cannot succeed without the other. U.S. Space Command directs military operations in space and plans to deter or defeat potential adversaries in the domain. The Space Force makes this mission possible by providing weapon systems, equipment, personnel, expertise, and the execution of critical space operations required to accomplish military objectives.

While the Department of the Air Force presents the preponderance of space forces to U.S. Space Command, guardians are indispensable parts of military operations conducted by every combatant command. In 2022, the Space Force established service components to support United States Indo-Pacific Command, United States Forces Korea, and United States Central Command. Space Force personnel in those joint force commands are already making tangible contributions to operations, training, exercises, and international security cooperation initiatives. Strong relationships with combatant commands are critical to our success. We will use this service component model to strengthen space integration in all the combatant commands.

Allies & Partners

The current geopolitical situation demands international cooperation to deter aggression and defeat adversaries. The U.S. Space Force Campaign Support Plan details how the Space Force will expand, strength, and leverage our global partnerships. Through our allies and partners, we gain economic and national security opportunities in space otherwise impossible. We are engaging with partners to prioritize and resource space capabilities, training, and interoperability. We are building a Regional Space Advisor program to develop guardians who will establish and grow international partnerships. The Space Force is conducting or pursuing officer exchanges with key allies and partners. We will exchange personnel with an increasing number and diversity of countries over the next several years.

The Space Force is developing and executing training, exercises, and educational courses with allies and partners in mind. Space Training and Readiness Command offers a variety of courses which have had personnel from over 50 countries participate. Allies and partners are also participating in the Schriever Wargame where we identify solutions to shared challenges and Space Flag which provides tactical level training in a virtual battlefield. Educational and training opportunities build our combined space advantage over our mutual adversaries.

Maintaining that advantage requires operation of space systems in a cooperative manner. Recent cooperative efforts include deploying United States payloads on Norwegian and Japanese satellites. Our partners provide SATCOM and SDA capa-

bilities which mesh with our own to distribute costs and improve coverage. Concurrently, the Space Force has more than 200 foreign military sales cases with over 60 countries. We will further relationships with spacefaring allies and partners through additional payload sharing opportunities, personnel exchanges, training exercises, professional military education, and security cooperation initiatives. Our allies and partners remain critical to deterring adversaries and defeating our enemies.

Whole-of-Government

Spacepower is a whole-of-government endeavor, and we continue to strengthen partnerships with our vital interagency mission partners. We are building relationships with intelligence community partners to ensure national security requirements are met, including important connections with the National Reconnaissance Office. The Space Force is growing relationships with National Aeronautics and Space Administration to support human spaceflight and space exploration missions and with the Department of Commerce to support the transition of commercial and civil space traffic management mission to their Office of Space Commerce. In addition, the Space Force continues its collaboration with the Department of State, both to encourage interoperability and to leverage existing and planned space capabilities of allies and partners.

Commercial Industry

We will build and strengthen partnerships with commercial industry. All commercial partners, from small businesses and startups developing groundbreaking technologies to large defense contractors producing proven capabilities at scale, are critical to Space Force efforts to exploit what we have, to buy what we can, and to only build what we must. Once in place, the National Security Space Launch Phase 3 framework will provide a mechanism for emerging commercial launch providers to compete for national security launch contracts while also maintaining a separate mechanism for launch requirements best served by mature providers with a certified record of mission assurance. This innovative approach protects capacity for the DOD's most technically challenging missions while allowing emerging providers to compete, when ready, for the DOD's more commercial-like missions. We are also using personnel exchanges, training with industry, and reverse industry days will drive integration and a better understanding of each other's requirements. Commercial services will increasingly fill growing requirements and augment military decisionmaking. Commercial partners and services will also be key in pursuit of emerging capabilities including advanced power and propulsion technologies, artificial intelligence and machine learning, and in-space servicing, assembly, and manufacturing. Space Systems Command's Commercial Services Office will provide a means through which to leverage more commercial off the shelf capabilities with speed and agility.

CONCLUSION

The Space Force is the preeminent military space organization in the world. Our potential adversaries seek to surpass the United States and to challenge our advantage. We cannot and will not allow this to happen. Our guardians will out work, out innovate, and out compete our adversaries to ensure that we succeed. They will do everything they can to deter conflict and maintain stability in space. Semper Supra!

Senator KING. Thank you very much, General. I want to jump on the comment you made about recruiting, and particularly bringing people in mid-career and having more flexibility about leaving and coming back. That is a creative idea. Flesh that out a bit for me. It strikes me that that is really going to be necessary in today's environment, particularly in the technology field.

General SALTZMAN. Yes, sir. We currently don't have the ability, because our Reserves in the Guard are in the Air Force. They are in the Air Force Reserves, in the Air National Guard, so we don't have an option too.

If you leave full-time Active service from the Space Force, we lose your expertise, and so, we are looking for anything that can allow us to retain those people who might have priorities that shift but are still willing to contribute to the service.

Senator KING. Do we need a Space National Guard?

General SALTZMAN. I need the capabilities that are currently in the Air National Guard, I can assure you of that. I think there is a couple of different ways to do it. We assessed three different options.

We could leave things as they are, which I think is the worst solution, because as General Brown points out, as the Chief of the Air Force, he doesn't have organize, train, and equip responsibilities for space missions, yet he has those space capabilities in the Air National Guard.

It creates a little bit of a conundrum when I am trying to figure out how to train forces that are aligned under the Air National Guard. I think the status quo is the most untenable position, but there are other options, and we are going through a series of cost estimates to figure out what a preferred option might be.

Senator KING. Is one of them simply to sort of partner with the Air National Guard and have different units, have different functions? Is that one of the possibilities, rather than set up an entirely new Space National Guard structure?

General SALTZMAN. Well, we are currently partnered with the current status, so we are currently partnered to make sure we can rely on the capabilities that are in the Air National Guard. It just creates a long-term sustainment problem with the difference in organize, train, equip responsibilities between the Air Force and the Space Force.

Senator KING. Let me back up a minute again on recruiting. How are you doing on recruiting, both in terms of quality and quantity? Some of our other services are having real problems with recruiting in this economy. How is Space Force doing?

General SALTZMAN. I am almost embarrassed in front of my peers to say it, but we are doing very well. Mostly associated with the fact that we have much smaller numbers to recruit and we have the ability to hand-pick those that decide they want to join the Space Force.

Right now, we are doing okay. The problem is going to be sustainment over time and the quality of the applicants that we can pull in, and then retaining them for long enough to really benefit from their experience.

Senator KING. Turning to, you mentioned several times in your testimony, commercial assets, commercial space assets. We know that Russia is trying to jam or otherwise damage the Starlink network, which is assisting in Ukraine.

Is that precedent making it more difficult to partner with commercial satellite users? One of the strategies is proliferation and using commercial satellites. What has been the reaction to what has been going on with Starlink in Ukraine?

General SALTZMAN. Commercial augmentation is important for the Space Force for the reasons you mentioned, resiliency and diversification of our portfolio across a broader number of participants, if you will.

The commercial augmentation Space Reserve, we are trying to establish what is kind of like a craft like. If you know, the civilian Reserve air fleet that uses commercial capabilities. We are exploring options to use something along those lines.

I think the key with commercial industry is to make sure that the expectations are managed upfront. So, we are going through a series of plans.

We are going through a series of industry days, if you will, to clarify what are the policy, what are the contractual, what are the legal responsibilities and hurdles that we have to clear in order to establish this so the expectations are clear across all spectrums of conflict, crisis, et cetera.

Senator KING. So, this is an evolving kind of capability?

General SALTZMAN. It is. But I will tell you that we had significant interest. We hosted an industry day along these lines and there were 84 participants from commercial industry. So, there is interest in doing this.

Senator KING. Now, in my 45 seconds that is left, I am going to ask you a question that I get asked at home. What is the difference between Space Force and Space Command?

General SALTZMAN. I get asked that at home, too, sometimes, so I appreciate it. It is as simple as any of the Combatant Commands with the other services. If you were to think about U.S. Central Command and the U.S. Air Force, or Indo-Pacific Command and the U.S. Navy.

For the U.S. Space Command and U.S. Space Force, we simply have different responsibilities. As the Chief of the Space Force, I have responsibility to organize, train, equip, and operate the forces that are then presented to U.S. Space Command, who has the authority from the President and the Secretary of Defense to direct those operations.

Senator KING. So, you are organize, train, and equip. Space Command is operate or fight.

General SALTZMAN. They have the authority from the President to conduct those missions, and they would direct our forces that are presented to them to conduct the operations.

Senator KING. Thank you. Thank you, General. Senator Fischer.

Senator FISCHER. Thank you, Mr. Chairman. General, as we discussed last year, the NextGen OPIR [overhead persistent infrared] satellite program is one of the key components of our future missile warning architecture, along with proliferated constellations of smaller satellites operating in the lower orbits.

During your nomination hearing, you stated that having no gaps in coverage for missile warning was a high priority. The missile warning mission is the cornerstone of our strategic deterrent. You know, if we can't effectively respond—if we can't detect when our adversaries are launching nuclear weapons, we are in trouble.

So, it is very important that we continue to fund this NextGen OPIR. Given really the importance of this no fail mission, I am concerned to see that the Space Force's fiscal year 2024 budget request appears to propose cutting the third GEO NextGen OPIR satellite.

Does the Space Force intend to complete that architecture as planned? If not, how are you going to mitigate it? That is a huge loss.

General SALTZMAN. Yes, ma'am. Thank you. The real architecture that we need is the one that is survivable in a contested domain. That is the proliferated LEO [low Earth orbit] and multiple orbits to include middle Earth orbits as well.

So that is what the Space Development Agency and the SWAC analysis that we did is progressing toward, and that is the investment we made in fiscal year 2024, to make that pivot. Because that is a pretty big technical shift, we wanted to make sure that we, for this no fail mission, had some hedges to make sure that we didn't miss anything.

So NextGen OPIR, we are committed to putting that on orbit and we felt like a two by two was sufficient to ensure, one, that the mission did not have any gaps. It is a no fail mission. Two, that it was a hedge against any technical risk associated with the pivot to the more survivable missile warning, missile track architecture.

Senator FISCHER. So, you are saying that with this pivot to the two lower orbits, you have no plans then to look at the GEO now?

General SALTZMAN. We have the plans with NextGen OPIR for two GEO and two EO. That constellation we are still supporting in that fiscal year 2024 budget has those four satellites in it. That is the long-term transition to the proliferated missile warning. But GEO satellites are too much of a target.

So having them in low earth and middle Earth orbit creates a targeting problem for an adversary, which actually lowers the threshold for attack on orbit. It is more resilient and it creates a level of deterrence because they can't attack the satellites.

Senator FISCHER. Good. It seems like on the major acquisition programs that are executed by Space Force have been late. They have cost overruns or both. Does the Space Force acquisition community—I guess I would say to you, how do you plan to address that, and do you agree with my assessment?

General SALTZMAN. Well, I have been in this business a long time, so I have certainly seen the same things that you are noting there. I can't argue with the facts about cost overruns and schedules. What I will say is I have been very impressed with the way Frank Calvelli has reorganized how we are doing space acquisition.

With his appointment as the Assistant Secretary of the Air Force for Space Acquisition and Integration, he is focused on several different things. Buying small satellites, having shorter term contracts, going with well-developed technology so that we don't have as many nonrecurring engineering costs, and—

Senator FISCHER. When you say, I am sorry to interrupt you, but when you say well developed technology, you want to make sure things are proven? Would you say you are risk adverse then?

General SALTZMAN. I would say we want to make sure before we commit to putting something on orbit, if there is well-developed technology, we want to leverage it to the max extent. Otherwise, you have to build everything from scratch and it delays things, and there is requirement shifts, and it can get in that spiral where you spend more money and delay the timelines.

So, where there are well-developed technologies, we should take advantage of those. I think in satellite production, that is exactly where Mr. Calvelli's head is on that. While, again, I can't speak to all the programs that have existed since we have been putting satellites on orbit, I can certainly tell you that the acquisition community has shifted to a different mindset for how it acquires systems.

I think the space development agencies acquisition strategy for the missile warning, missile tracking, and space data transport

layer is an example where it is going, in about 4 years, from order to orbit. Which is substantially better than we have seen in other programs.

Senator FISCHER. Thank you.

Senator KING. Now I would like to call on our only Subcommittee Member who has been in space, Senator Kelly.

Senator KELLY. Thank you, Mr. Chairman. I had a couple detailed questions, and then the Chairman asked both of them, so I am going to go a little bit different approach here.

To the Ranking Member's question, you talked about that there is a little bit of a deterrent by putting something at a lower orbit, I think you said. Why is that? Why is it more likely that an adversary goes after something at GEO than it is if they are at a lower orbit?

General SALTZMAN. If this sounds at all like I am lecturing an astronaut, I promise I am not. It is more than just the orbital regime. In low-Earth orbit to provide the coverage, you have to have a vastly greater number of satellites, dozens.

Instead of from GEO, you can have a single orbit that would look at a third of the Earth. So, by going to the low earth orbit, we are buying smaller satellites and more of them.

Senator KELLY. Oh, okay. It is the number.

General SALTZMAN. More satellites create a targeting problem. Which one do you want to shoot down that you think is going to be the problem for the mission?

Senator KELLY. Yes, it is just more targets.

General SALTZMAN. Proliferated LEO.

Senator KELLY. So more—they have got to shoot more rounds.

General SALTZMAN. A lot more.

Senator KELLY. To take out the capability.

General SALTZMAN. So much more that I think the escalatory threshold is raised to the point where they probably wouldn't.

Senator KELLY. Wouldn't do it, okay. okay, that is helpful. General, of the NRO, Air Force, Space Force satellites that we put into orbit, what percentage of those is Space Force responsible for the contracting, of the management, of the operations to get these to their targeted orbit?

General SALTZMAN. Compared to the NRO?

Senator KELLY. Yes, like, what percentage do you have?

General SALTZMAN. Sir, let me get back to you with—

Senator KELLY. But the NRO—

General SALTZMAN. The NRO has a number of constellations for its mission set. I am trying to think if there are any examples. We have the vast majority of Department of Defense satellites, have now migrated those missions.

Senator KELLY. But not all of the Department of Defense satellites.

General SALTZMAN. I always hesitate to say all, but I am struggling to think of an example.

Senator KELLY. How many launch providers do you have that you contract with currently to get those satellites into orbit?

General SALTZMAN. Two.

Senator KELLY. Those are?

General SALTZMAN. United Launch Alliance (ULA) and SpaceX, and actually, for demos and other things, we have contracted other providers as well. I can get you the full—

Senator KELLY. It is to date, while you have been involved with this, are we seeing typical kind of success rates and safety records from both companies?

General SALTZMAN. Absolutely.

Senator KELLY. No identifiable problems that you feel puts our satellites at risk?

General SALTZMAN. No.

Senator KELLY. I mean, it has been a while since we have had an accident. I mean, I saw one a long time ago. An NRO satellite actually that happened to be down at the Kennedy Space Center. I watched this thing blow up right after liftoff.

General SALTZMAN. I was on console—

Senator KELLY. When that happened?

General SALTZMAN.—in California.

Senator KELLY. Yes, I had just walked out of crew quarters, saw this, wasn't even expecting it, saw this rocket launch and then explode about 15 seconds later.

General SALTZMAN. Something I never want to see.

Senator KELLY. Yes. So, it is great that we have gotten better at this. SpaceX has a, I would say a pretty remarkable record of success. ULA as well. We just need to keep that going.

I think it is important to be just constantly trying to look ahead and seeing what that next failure mode is and make sure you have the workforce that is really tracking this stuff closely.

Because some of these assets are in the billions, billions of dollars, as you know, General. So, I have got another question. Well, actually I do have about 50 seconds. Space Force has been around now for a couple of years. I think maybe 3 years, is that right?

General SALTZMAN. A little over 3 years.

Senator KELLY. A little over 3 years, and some of the guardians incurred about a 2-year commitment when they transferred from the Air Force or from another service. They are coming up on the end of that time. Are you seeing a good re-enlistment rate for the enlisted ranks and officers that are going to stay on?

General SALTZMAN. Yes, I think the final assessment is still out a little bit because I want to see it all play out, the full cycle play out before I really commit to this, but I am encouraged so far. I think we are providing the kind of challenges that the workforce is looking for, and so I am I am still hopeful that we are going to be at good retention numbers. But we probably need to let this full summer cycle play out before we judge.

Senator KELLY. Okay. Thank you. Thank you, Mr. Chairman.

Senator KING. Senator Tuberville.

Senator TUBERVILLE. Thank you, Mr. Chairman. I know you have been in your position now what, less than a year, right?

General SALTZMAN. Four months, Senator.

Senator TUBERVILLE. Four months. Give us your number one priority for Space Force.

General SALTZMAN. I need to make sure that the guardians are ready to meet the threat. I have said this from day one, the systems that we are buying are exquisite. I want to make sure that

the guardians have the training and the ability to practice their tradecraft, reps and sets, I call it. We have got to get those into the guardians so that they validate their tactics and they are trained to meet any adversarial challenges thrown at them.

Senator TUBERVILLE. So, it is more training and people than it is anything.

General SALTZMAN. There is a lot of challenges. That is what I am focused on right now, because I think it was the biggest gap. From converting—I like to use the example that we are trying to turn a merchant marine into the U.S. Navy. We have to convert this Space Force that we had for a benign environment into one that is contesting the domain.

Senator TUBERVILLE. Is this a slow process?

General SALTZMAN. Sometimes it is slower than I would like, but I like our progress. So, I need to buy them the simulators, the virtual ranges. That takes a little bit of time. But we are already building a new first-generation model so that we have established the time to do the training, we have established the new training requirements, and now we just have to get after it.

Senator TUBERVILLE. SPACECOM has an RDT&E [Research, Development, Test & Evaluation] budget of \$19.2 billion, and a proposed procurement budget of only \$4.7 billion. What is driving that difference, and do you see that change in the next few years?

General SALTZMAN. Sir, this is the way that Space Force has to do its business, because so much of our effort is spent in developing the satellites and we don't have to put a lot of satellites on orbit traditionally, so there is less procurement than there is RDT&E.

I think it is just the nature of the space business that we are frontloaded a little bit in terms of procurement to RDT&E balance relative to what you might see in some of the other services. They buy so many versions of that thing that they do RDT&E for, fighters, or tanks, or the like.

Even when we go to a proliferated constellation, our numbers will be so much smaller than what the other services have to buy.

Senator TUBERVILLE. Yes. In your mind, what cybersecurity standards minimum do you think new commercial satellites should have?

General SALTZMAN. I am worried about the ground infrastructure and how the links are protected to make sure that we have access to those capabilities that are put on orbit. So, in commercial terms, I am a little less worried about the on orbit cyber protections as much as I am the ground network.

I think those cyber protection centers are well understood and we can hold the commercial providers accountable for putting cyber defense capabilities onto the ground networks.

Senator TUBERVILLE. I have had several private companies come by my office saying they have a great idea of how to take space debris down. Have you talked to quite a few of those?

General SALTZMAN. I have.

Senator TUBERVILLE. What do you think?

General SALTZMAN. I think—

Senator TUBERVILLE. Will we privatize it at the end of the day?

General SALTZMAN. I think there is a lot of different ways to go after that sort of problem. I haven't seen demonstrated capabilities,

and I am always thinking in terms of, you know, it is one thing to have a pitch that says we can do something, it is another to have a demonstrated capability.

I will be honest, we do a lot of serious effort making sure we understand what is on orbit and preventing debris from hitting each other or things that we care about. Right now, I would say this isn't my number one challenge, but if somebody feels like they can demonstrate a capability, cleaning up debris is an important concept as well.

Senator TUBERVILLE. It is going to get worse and worse, right.

General SALTZMAN. It is not going to clean itself up.

Senator TUBERVILLE. Yes. A lot of people believe the conflict with China could very well start in space. What might that look like 1 day?

General SALTZMAN. The Chinese and the Russians have gone to school on us over the last 20 years, and they know that we have built a Joint Force structure that relies heavily on the assumption that space capabilities will be there.

Whether it is our precision navigation and timing, whether it is satellite communications, the missile warning that we rely on, and the intelligence, surveillance, and reconnaissance persistence that we have with space capabilities, they know we rely on that.

If they can blind us, if they can interfere with those capabilities or, God forbid, destroy them completely, they know that that will diminish our advantages and put the Joint Force at risk.

I can see interfering with. I can see blinding. I can see some of those gray area kinds of attacks on our capabilities to try to put us behind the eight ball.

Senator TUBERVILLE. That balloon wasn't in your purview, was it?

General SALTZMAN. No, sir.

Senator TUBERVILLE. Sixty thousand feet.

General SALTZMAN. Well, they call it near space, but I like to call it far air.

[Laughter.]

Senator TUBERVILLE. Thank you.

Senator KING. Senator Rosen.

Senator ROSEN. Well, thank you, Chairman King, and Ranking Member Fischer. Good to be here today and to holding this hearing. General Saltzman, thank you so much for everything you are doing.

I know everyone has been talking about workforce is key. We need a pipeline of qualified individuals going forward. You are just young, 3 years old, trying to get this workforce and especially, like you said, research and development, critical to protect our country and our families from the threat we feel from space.

So, STEM education, I talk about an awful lot, but I really believe that investing in STEM education is just essential to matching our adversaries' increasing capabilities, as you alluded to, and also to addressing all of our tech workforce shortages.

General Saltzman, during your confirmation hearing in September, you highlighted that Space Force has established a university partnership program, partnering with universities across the

country to provide STEM students with research opportunities and increased Guardian retention.

How is Space Force growth and retention benefited from this program? I am really excited to hear about that, and what can Congress, what can we do better to support this program specifically and maybe some national security focused STEM education initiatives at American universities generally?

General SALTZMAN. Well, thank you for that, because any opportunity I get to talk about how great our guardians are, I will take full advantage of it. You would be really impressed with the quality of the people that are joining the Space Force.

The average age of our enlisted members is 22. That is a relatively high number considering other services. We have an educated workforce, very educated. We have the luxury of handpicking the best and brightest of a large applicant pool that wants to join the Space Force.

We are really benefiting, one, from the fact that we are kind of small and we can take the cream of the crop, if you will. We are looking for diversity. We are looking for high quality STEM education, and going to the areas that maybe you don't have a chance to get to in some of the other services.

A remarkable set of opportunities that we have taken full advantage of. Every time I go out in the field, I am just impressed with the quality and capabilities of the guardians that I see doing the job.

Senator ROSEN. So, we should help expand these programs to make it a little—make your job a little better.

General SALTZMAN. Well, as long as you expand the number of people that help me select. I think there were 42,000 hits of interest to join the Space Force, and we have about 1,000 slots.

So, culling that down to who is eligible, who can meet the requirements, and, you know, there is a lot of effort there, too. So, I am really happy with the way the recruiting team has done. I am really happy with the standards that we have set. I am really happy with the quality of guardians we are getting in.

Senator ROSEN. That is great because as a Senator Tuberville talked about, cyber-attacks in space. It is a war fighting domain and cyber is really, probably more effective there or as effective there as it would be anywhere else.

Last week, we discussed with General Dickinson during Space Command's Posture hearing that both Russia and China are developing, rapidly investing in developing and fielding these technologies that will provide timing—that will threaten us, and so we need to be sure that we are stopping that.

So, these sophisticated cyber-attacks are going to include the threat of stealing data, jamming satellite signals, hacking satellites, disrupting internet services. I know the proliferation concept is really good because there is just so many, it makes it not worth their while. So that resilient space architecture, particularly in low-Earth orbit, as you have alluded to, is really important.

What other kinds of things besides what you mentioned to Senator Kelly and Senator Tuberville, how are you keeping our most advanced space assets safe from cyber-attack by Russia, China, and others, and increasing their resiliency?

General SALTZMAN. I would like to talk about two particular areas that we are doing. First is I want to avoid operational surprise. That is a tenant in my maybe theory of success, if you will, for the Space Force's primary missions.

By avoiding operational surprises, what I mean is do we have all the sensors in all the right places to see what is going on, and that is cyber and space. Do we recognize hostile activities, aggressive activities, irresponsible activities the minute they occur? Can we attribute them to the bad actors?

That is the kind of avoidance of operational surprises that I am talking about. Then second, we have to establish norms of responsible behavior. What are the norms of behavior that are acceptable, and developing a coalition of like-minded space nations that supports those norms of behavior.

It is a powerful motivator to do the right things and call out irresponsible behavior. All of that, I think, protects our capabilities as well.

Senator ROSEN. Well, that is great. I know my time is up, but my next question was on international partnerships and how this potentiates that. We will take it off the record, these hunt forward operations to avoid operational surprise with our allies and partners around the globe. We will submit that for the record, but you were leading me right there. So, thank you very much. I yield back.

Senator KING. General, as one Member of this Subcommittee who probably had more than—more to do with the founding of the Space Force early and vocal supporter, and that is Senator Cramer. Senator Cramer.

Senator CRAMER. Thank you, Mr. Chairman, Ranking Member, and General, good to see you again. I don't think you were lecturing Senator Kelly at all. He asked you the easiest question he could, and you answered it brilliantly.

I think the issue of redundancy as a tool, it should answer Senator Rosen's question in terms of how you secure them, as well as how well they work as a kill web, if you will, versus a kill chain. So, I thought it was brilliant. I also think you are too humble.

You brag about the Guardians. But let's face it, you seem to be the employer of choice in the service. You have that luxury, and it is because I think of the mission. I think because it is an important mission that particularly younger people realize and they are attracted to it and it gets to stretch them.

My hope is that the Space Force is so cool, it just automatically creates more STEM students because they all want to be part of the next big thing. Senator Fischer asked you about the gap issue with regard to eyes in the sky and whatnot, and we did see a little bit of a gap in defense when we learned that our radars couldn't see everything. They could only see what they were tuned to see. In terms of like PARCS radar as an example, and we see some money coming for that. I would presume that means that it will be upgraded, it will be modernized.

As you know, it is a high priority for me since we have one that you are the landlord of up in North Dakota. Maybe speak a little bit to the role of the PARCS radar and modernization, and how that will help you and the other, the Joint Force in terms of particularly early warning.

General SALTZMAN. Well, it is a two-part answer because I don't want to be too distracted by the balloon issue because that is not where those radars are looking. It is, you could easily build radars that would look in that area, but that is not our mission.

The mission that is being done in North Dakota and the other ground-based radars is two fold. It is missile warning and it is space surveillance, primarily, and those radars are really good at those jobs.

So, the real challenge is, how do I go to a rapid assessment and decision quality information of the data that those radars are pulling in? That is my responsibility, is to figure out how to take all that massive amount of data in and quickly turn it into decision-making information.

We have got some work to do there, but it is more associated with the latency of the data than—you know, I can tell you where something was, but I can't tell you where it is precisely at that moment, and we are getting better and better at that.

Senator CRAMER. With regard to some of things, the issues that we have already talked about. The partnerships that you started out talking about, that Senator Rosen asked about, academic partnerships, alliances, obviously commercial partnerships, one of the things when we stood up the Space Force and we had this discussion many times, and your predecessor certainly grabbed on to it. That is, make sure it is lean, agile, fast, right?

How many times did you hear General—say lean, agile, fast. Do you feel like you are still lean, agile and fast? Does the budget help you be more lean, agile, and fast? I don't mean cheap. I mean lean, agile, and fast.

Again, those relationships are so important. How valuable is that and difficult is that balance to make sure you maintain those characteristics?

General SALTZMAN. Well, there is no question we are still lean, and there is no question we are going as fast as we can. That is a tough standard for me to say we are fast. I am always looking to go faster, I am always looking to be more agile.

So, I am going to be probably our toughest critic going forward, trying to ensure that we stay as fast as possible. Being small does offer some advantages. We can move rapidly through a smaller bureaucracy than maybe some of the other organizations can. But it also comes with, you know, that means there is fewer eyes on ideas.

That means there is fewer opportunities to catch mistakes. That means there is fewer opportunities. So, we have got to have good, solid processes. We have to have good, innovative technology that supports us.

There is no question we are still lean and now we are trying to become optimized based on that size to make sure that we are still producing high quality capabilities for a high-quality workforce.

Senator CRAMER. Well, that is a great point because the bureaucracy can gobble you up and slow you down as well. We like oversight. We are all about that. But we want you to be as agile as you need to be to keep up with, well at the speed of China, as I like to say, which is really important.

One last thing, just, I just want to make sure that you are getting the type of the right policies that don't restrict your offensive abilities. We have heard a lot about that. You have spoken to it at some points.

Again, whether it is the budget, or the Administration or chain of command, do you feel like you have the right policies in place to both protect and in attack, if necessary?

General SALTZMAN. I can assure you there are no policies that prevent us from exploring a full spectrum of operations. It is just about doing the work, establishing the, what I would call understanding of what the capabilities can and can't do. Then we test and we learn from our experiences.

Senator CRAMER. Thank you. Well done. Thank you.

Senator KING. Thank you, Senator Cramer. Your lean, agile, fast reminds me of my high school football coach who said he wanted us to be mobile, agile, and hostile.

[Laughter.]

Senator KING. I am not going to go into our record, but our team motto was we are small, but we are slow. That was our problem. Senator Gillibrand.

Senator GILLIBRAND. Thank you, Mr. Chairman. Your budget request this year includes a goal of increasing the number of Space Force launches.

As you look to maintain and modernize launch ranges and facilities in support of our space launch needs, can you speak to how the ability to leverage commercial funding sources to grow space, transportation, infrastructure, and service capacity would impact the Space Force's space launch efforts?

General SALTZMAN. Yes, ma'am. Thank you. As we have talked before, we have grown our capacity on our national launch ranges, national space launch ranges from what I remember to be 10, 12 launches to, we are going to hit getting close to 100 launches a year now.

Most of that is commercial launches, and so, the infrastructure that we are providing is being used and it needs to be refurbished on a more regular basis than it did what I would call the old days. So, I think the commercial industry understands this and they are trying to figure out the best ways to help support.

Now we just have to look for the contractual and legal mechanisms to make sure that we can maintain that infrastructure. Our investments in the range of the future start us down that path, but we have still got a lot of work to do over the FYDP [Future Years Defense Program], I think, to make sure we maintain the kind of infrastructure we need to support the commercial industry.

Senator GILLIBRAND. As you have said, your mission is very technical. Ensuring guardians are properly trained and able to execute their missions requires access to advanced ranges. Do you currently have the training resources you need to provide fully trained guardians to combatant commanders? Are any additional resources required to ensure we have a Space Force fully capable of operating in the space domain?

General SALTZMAN. The fiscal year 2024 budget submission includes about \$340 million dedicated to operational tests and training infrastructure. I think that is sufficient for this year because

we have got a lot of study to do to make sure we are building the right kind of ranges, the right kind of simulators, and we are learning as we go a little bit. So, I am really comfortable with the level of investment we are at this year for fiscal year 2024.

Senator GILLIBRAND. Last week, you spoke about the concept of competitive endurance. From reporting, it appears to center on space domain awareness, resilience to deter attack, and responsible counter space activities. Can you speak to how the Space Force's budget proposal will help to achieve competitive endurance through each of these three core tenants?

General SALTZMAN. For avoiding operational surprise, that is the Space Domain awareness tenant. We are investing heavily in new sensors. We are investing in capabilities with our allies and partners to also increase the dataset associated with space domain awareness.

Perhaps most importantly, we are investing in space command and control capabilities, which is kind of military talk for how do you take that data in and rapidly turn it into operational decisions.

I think we have good software investments to make sure that we are doing the decision support tools that go with that space domain awareness, and—go ahead—

Senator GILLIBRAND. Go ahead and finish.

General SALTZMAN. Well, the resiliency piece is also important. This budget definitely invests in shifting to a more resilient space architecture. We have started that pivot now in earnest.

Senator GILLIBRAND. So, looking on your documents, you have this contested space document about what China is doing. The PRC [People's Republic of China] has developed counterspace and anti-satellite weapons, including demonstrations of anti-satellite missiles, which you say are launching orbit to ground, and the ability to move a defunct satellite. Can you speak to our ability to defend against these counterspace assets and exercise space superiority?

General SALTZMAN. The transition to a proliferated LEO missile warning, missile tracking architecture includes the capacity to find, fix, and track hypersonic capabilities. So that is why that is such an important transition that we are making.

With regards to grappling satellites and pulling them out of orbit, much tougher to deal with when you have less than maneuverable, older legacy satellites. So again, shifting to a proliferated LEO constellation where you don't have the, what General Hayden called the big, juicy target sitting there at GEO makes that a much tougher proposition for them to execute against.

Senator GILLIBRAND. That makes sense. What lessons are you learning from the war in Ukraine about the role of the space domain in large scale military operations?

General SALTZMAN. Well, the most important observation is that space is critical to modern warfare. We have seen the Russians attack satellite communications. We have seen cyber-attacks trying to dismantle.

We have seen GPS [global positioning system] jamming. They recognize that space is a force multiplier and they are willing to attack it. The fact that we have to defend against cyber-attacks on the ground networks reminds us that ground is also a part of space and that those networks are critical assets.

But I think we are also seeing the power of commercial augmentation, that there is a viable path for commercial augmentation to provide capabilities. Then I have been kind of harping on it through the testimony here, but proliferated LEO.

That is what we are seeing used to support Ukraine, and it is turning out to be a much tougher target for the Russians to take apart.

Senator GILLIBRAND. Great. Thank you, Mr. Chairman. Thank you, Madam Ranking Member.

Senator KING. Senator Rounds.

Senator ROUNDS. Thank you, Mr. Chairman. General, thank you for your service. There have been efforts, General, driven by political decisions regarding the shared use of the 3.1 through 3.45 gigahertz or S-band portions of the spectrum. Can you confirm that you have systems critical to our national security that reside on this portion of the spectrum?

General SALTZMAN. Yes, Senator, we have a space surveillance radar that is currently in development that does occupy that portion of the spectrum.

Senator ROUNDS. Would it be not just radar, but perhaps communications that are in that portion as well?

General SALTZMAN. As it turns out, I think the key emergency kinds of communications live just outside of that band. So as long as we manage very narrowly that strip, we would avoid those particularly.

Senator ROUNDS. Okay, so it is primarily radar.

General SALTZMAN. It is primarily radar for that for the Space Force.

Senator ROUNDS. Okay. So, the communications portion is not part?

General SALTZMAN. Well, I wouldn't want to talk to the other services' capabilities. So, from a Space Force perspective.

Senator ROUNDS. Okay, thank you. Can you provide your professional military advice on how detrimental that would be to your mission and the security of our Nation if you lost the use of this portion of the spectrum?

General SALTZMAN. I think the most important thing I can say is I am not exactly sure, because we haven't done the technical analysis of exactly what vacating or sharing any of that spectrum would look like in terms of cost and technical performance.

But we do have a study ongoing, and so we would hope that any legislative decisions or decisions along these lines would wait for that study to come out later this fall so that we could make the decision with data informed analysis.

Senator ROUNDS. Have you been given the opportunity to provide your professional military advice on the DOD's use of this portion of the spectrum?

General SALTZMAN. Yes.

Senator ROUNDS. Thank you. I presume you have expressed your concern with regard to the sale prior to the September study being completed.

General SALTZMAN. I have described my concern is not knowing exactly what the impacts will be until I receive that study.

Senator ROUNDS. Thank you. I would also like to go on record saying that I am concerned about the DOD's approach to providing space-based ground moving target indication capabilities, the GBMTI, to warfighters following the divestment of the JSTARS [Joint Surveillance Target Attack Radar System] platform.

It is my understanding that this capability is being moved under the funding authorities of the intelligence community. We do not have really to get into the fine details here. But can you share with me how you are assuming that the validated requirements are captured in the acquisitions process of a platform owned by the IC [intelligence community]?

General SALTZMAN. Because of the way the funding is has been moved, we are focusing on two areas where we think we can provide some detailed level of collaboration. The first is in milestone decision authority, which still there are some decisions which reside at the OSD level and could be delegated to Secretary Calvelli.

We are looking into what those options are, what the possibilities might be. That is for program management acquisition purposes. The other side is the operational concepts. This is still a DOD mission, the Space Force mission, to do this for the Joint Force.

We have the responsibility to provide the operational concept for how this would work, and we will have to work closely with the program managers and sensor developers to make that happen.

Senator ROUNDS. Yes. With JSTARS, the tactical capabilities to track these moving targets was available to our soldiers on the ground. We just want to make sure that that same capability is still found in a space-based system. That is what we are really talking about here, isn't it?

General SALTZMAN. Yes, sir, and the beauty of the sensors that are being developed is they are more survivable relative to the current threats facing, and we are going to do it at a global scale as opposed to a very small AOR [area of responsibility], the way the JSTARS—

Senator ROUNDS. We just don't want to get lost and this needs to be made available for title 10 operations.

General SALTZMAN. These are direct operational support activities. The mission falls to the Space Force and the Department of Defense.

Senator ROUNDS. Thank you. I understand it that there is a legislative proposal in the works to integrate the Reserve elements of the Space Force. This seems like a logical move as your service matures and embraces its organized train and equip roles.

It is also my understanding that the Space Force is residing within the Guard element, still reside within the Air National Guard, and is organized, trained, and equipped by the Air Force. From your perspective as the Chief of Space Operations, what should the Subcommittee consider to provide the most seamless oversight of these forces as the Space Force matures?

General SALTZMAN. First, let me describe the reserve integration. I think this is a very important legislative proposal that I hope you will give due consideration to. It gives us the flexibility to have both part time and full time guardians in the Space Force.

It is going to give incredible career flexibility and hopefully serve as an innovative way to retain the kind of expertise that we know

we are going to need moving forward. I think we have done a much better job of capturing kind of the key details that are needed in legislation to make that proposal work, and I hope that we can continue to work with this Committee and others to make that happen.

From the Guard standpoint, I have been clear from the beginning, the critical capabilities that are living in the Air National Guard for space are must haves for the Space Force. That is the most important thing.

I don't believe because of the way we organize, train, equip authorities, reside with the Chief of Staff of the Air Force and my responsibilities, that General Brown feels like he can organize, train, and equip space capabilities inside the Air National Guard.

It creates a little bit of a disconnect, and so, the current status quo is the toughest to figure out how to do it properly. Other than that, I think there might be some options that are worth exploring that are based on cost estimates and the like.

Senator ROUNDS. Thank you, and Mr. Chairman, I would just like to commend the General. He has taken a very direct and strong approach with regard to advocating for our airmen and guardians on the subject of the missile community cancer study.

This is a case of where they are finding cancers in areas where these guys that are basically working underground for extended periods of time. The General has taken a very direct and personal interest in seeing that this be pursued and that anybody that is out there, any one of these airmen or guardians, that they get help, they find out and they keep track of.

I just want to commend him and I would hope that the Committee would make available time for him to be able to share with us moving forward just exactly what he has found with regard to any health concerns surrounding the cancers that seem to be more prevalent with these folks that are working underground in these missile silos. Thank you, Mr. Chairman.

Senator KING. Thank you. General, a couple of followup questions. Several times you have mentioned the possibility of norms, developing international norms. Expand on that. Is that a realistic possibility? Will the Chinese and the Russians talk about international norms in space?

General SALTZMAN. Unfortunately, the norms that they talk about are not ones that we would support. They have kind of shown a propensity to not support the ones we want to support. This is a battle of narratives over international norms.

What I can tell you is when I talk to my counterparts in the other nations, they are interested in this. The Secretary of Defense issued his tenants for responsible behavior, and U.S. Space Command followed up with even some more details.

Those are all widely viewed from my peers as helpful in establishing what it means in a like-minded set of nations with responsible behaviors in space. We have an initiative called the Coalition Space Operations Initiative, which is seven countries that have also detailed what responsible behaviors in space means. Very consistent with the Secretary of Defense's tenants.

I think this is kind of a widespread understanding that we have to behave a certain way in order to maintain a safe, secure, sus-

tainable space domain. I believe there is widespread agreement for that.

Senator KING. Is the State Department engaged in this discussion as well?

General SALTZMAN. They are.

Senator KING. I think that would be an important aspect of moving this forward, very important initiative.

General SALTZMAN. They are.

Senator KING. Just a comment. You have mentioned cyber protection several times. It seems to be the experience that most major cyber-attacks start with a sub, not the general contractor, but some small company, the smaller firm that is working for a general contractor, and then they get into the system.

I hope that is something, when you are talking about the protection of your assets, and very rightfully you have talked about ground and space, that you worry as well about those small companies that might act as a gateway for a cyber-attack.

General SALTZMAN. Yes, sir. I have talked to my cyber defenders at length. I am not really a cyber professional myself. I don't understand all the technical details. But one of the most important things that they start with is mapping the cyber terrain.

In other words, understanding exactly what the network looks like, where it might be vulnerable, and how they might best censor it to rapidly detect any kind of intrusions. So, to your point, understanding how all of the companies fit together in the cyber terrain is an important foundational aspect of cyber defense.

Senator KING. Final question. Is Space Force in charge of defensive—you have talked a lot about proliferated LEO. Are you also in charge of developing the capability of maneuver and otherwise defending our space assets? Is that part of Space Force's mission?

General SALTZMAN. I would say it is important that as we develop our DOD capabilities through the Space Force, that we make sure we are applying all of the right concepts for active and passive defense to meet the requirements so that we have a survivable architecture on the U.S.'s worst day.

Senator KING. Well, this is a relatively new concern. We owned space for a long time, but the Russians and the Chinese have been very active in anti-satellite technology, so we need to be developing counters to that in order to maintain a credible deterrent. Is that correct?

General SALTZMAN. Absolutely, and I think it is about how fast can we go. Again, my weak analogy is converting the Merchant Marine and the U.S. Navy.

We have got a little bit of a ways to go before we can take our legacy platforms that we have got so much utility out of and so much capability from but convert them to providing the same or better capabilities, while being able to perform in a contested domain. We will have to make that transition as rapidly as possible.

Senator KING. Thank you. Other questions? Thank you very much, General. This has been a very illuminating hearing. I appreciate your forthright responses to our question and your leadership, and your long career of service to the United States. Thank you.

General SALTZMAN. Thank you, sir.

Senator KING. Hearing is adjourned.

[Whereupon, at 5:46 p.m., the Subcommittee adjourned.]

[Questions for the record with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR JACKY S. ROSEN

INTERNATIONAL PARTNERSHIPS

1. Senator ROSEN. General Saltzman, can you discuss the importance of international collaboration when working on critical Space Force projects and how we can continue to build on and expand existing partnerships?

General SALTZMAN. International space security cooperation advances our national security strategy, provides political and military options, and enables the U.S. to expand all-domain capabilities needed for today and for any future fight. My Line of Effort (LOE) #3, "Partnering to Win," is critical to the USSF's ability to field Combat-ready Forces. The USSF needs robust joint, coalition, and international partnerships to be more effective and resilient. Space architectures which include the full array of U.S., ally, and partner security, civil, and commercial capabilities help protect all of us and strengthen integrated deterrence. The Department of the Air Force will continue frank conversations with Allies and partners on the pacing threat, national strategies, capabilities, and RDT&E efforts to build upon existing partnerships.

Currently, the Wideband Global Satellite Communications (WGS) program enables interoperability with 10 partner nations. The addition of WGS satellite vehicle 12 will allow the USSF to seek additional partnerships for wideband and protected communications. The Department of the Air Force established a new satellite communications framework agreement under NATO called the Global Commercially Contracted Satellite Communications Support Partnership (GCC SATCOM SP). This new agreement allows the U.S. DOD to pool financial resources with key Allies and partners to procure commercial satellite communications.

2. Senator ROSEN. General Saltzman, how does the Combined Space Operations Vision 2031 initiative influence Space Force priorities and objectives?

General SALTZMAN. The Combined Space Operations (CSpO) 2031 Vision amplifies USSF's own priorities and objectives; providing the USSF opportunities to further cultivate enduring operational advantages that expand the capacity, capability, and resiliency of our space forces in line with the Chief of Space Operations' Lines of Effort (LoEs) #1, "Fielding Combat-Ready Forces," and #3, "Partner to Win." USSF participation in CSpO Steering Committees, Principal Boards, and Working Groups alongside other DOD organizations ensures that we both shape CSpO's work and that CSpO's objectives are incorporated back into USSF corporate planning and strategy processes. For example, USSF continues to incorporate Vision 2031 LOEs, including, "Develop and operate resilient, interoperable architectures to enable space mission assurance and unity of effort, through identification of gaps and collaborative opportunities," and "Enhance command, control, and communications capabilities and other operational linkages among CSPO Participants to support unity of effort and the ability to conduct combined and synchronized operations throughout the spectrum of military operations." With CSPO Vision 2031 embedded throughout our Service's planning and strategy, guardians at all levels of command and across areas of expertise implement specific activities that amplify our ability to conduct combined operations that ensure the United States remains a leader within the initiative.

SATELLITE INTERFERENCE

3. Senator ROSEN. General Saltzman, our Nation continues to experience significant growth in commercial space wireless services. The number of Low Earth Orbiting (LEO) satellites is expected to rise to over 20,000 over the next decade. With this growing number of satellites orbiting the Earth, can we expect Space Force to face emerging challenges, such as coordination, harmful radio interference, and security? How should the U.S. Government increase coordination to address these issues?

General SALTZMAN. The rapidly increasing number of satellites in LEO will require the Space Force and its civil, commercial, and international partners to field new capabilities and improve coordination to respond to significant new challenges in the space domain.

The USSF currently tracks approximately 47,900 objects in space, a 16 percent growth in objects from 2021 to 2022. Of those objects 7,100 are active payloads, a 37 percent increase from 2021 to 2022. Expended rocket bodies, inactive satellites

and debris further congest the environment, and small satellite technology is enabling larger constellations. For example, Starlink is projected to have over 12,000 satellites in its constellation.

New capabilities are coming online within the current Future Years Defense Program (FYDP) to greatly increase our ability to track and identify small satellites. These include Deep-space Advanced Radar Capability (DARC) (projected full operational capability by 2027), Ground-Based Optical Sensor System (GBOSS) (projected full operational capability by 2027), and SILENTBARKER (projected full operational capability by 2026). In conjunction with the existing space surveillance network, including the world's most precise sensor, Space Fence, the USSF is prepared to identify, track and maintain custody of satellites in space which will enhance security and mitigate harmful radio interference.

The USSF and US Space Command are working with the Dept of Commerce/NOAA to implement Space Policy Directive-3 to enable the DoC to provide basic space situational awareness and space traffic management to ensure a safe and secure environment as commercial, civil, and governmental space traffic increases.

SPACE LAUNCH SERVICES

4. Senator ROSEN. General Saltzman, a 2022 study commissioned by the U.S. Space Force, the Defense Innovation Unit, and the Air Force Research Laboratory states: "The procurement of space launch for national security systems should be expanded to include a broad range of space launch services—Diversity of launch options improves the resiliency of national security space systems." As we look to improve both launch capacity and capability, what is the national security value expanding the Department of Defense's procurement of space launch systems and providers, to include a broad range of space launch services?

General SALTZMAN. The national security value in expanding DOD's procurement of space launch systems and providers is found in the improved flexibility, resilience, capacity, and affordability that comes with having a greater number of commercial companies able to provide both large and small national security space launch services.

The innovative National Security Space Launch (NSSL) Phase 3 Launch Service Procurement Strategy consists of a dual-lane approach that fosters competition and maintains assured access to space. NSSL Phase 3 Lane 1 is for more risk tolerant missions and provides on-ramping opportunities for emerging Launch Service Providers (LSPs); providing opportunities to grow the NSSL Launch provider industry base. Lane 1 will award multiple Indefinite Delivery, Indefinite Quantity (IDIQ) contracts open to qualified bidders. Lane 2 is for our more risk adverse National Security Space missions that require full mission assurance.

The Rocket Systems Launch Program (RSLP), the Space Force's small launch program established in 1972, complements NSSL to serve the full spectrum of orbits and provides flexible access to space for national security. RSLP hosts 11 LSPs on its Orbital Services Program-4 IDIQ contract for small and medium launches to low earth orbit and provides annual on-ramping opportunities for emerging LSPs through 2028. The Rapid Agile Launch Initiative (RALI), a Space Test Program congressionally funded initiative, is another small launch avenue the RSLP supported to procure and launch five RALI missions.

Finally, the Space Force is evaluating the readiness and utility of commercial space mobility and logistics capabilities and developing business case approaches to incorporate emerging solutions into space system architectures. Specific to improving launch capacity and capability, on-orbit logistics and mobility services could potentially enable increased launch capacity by allowing satellites to launch partially or fully empty, if the satellite is designed to be refueled on-orbit. This capability may further open the aperture for new mission designs with increased resiliency supported by on-orbit logistics.

**DEPARTMENT OF DEFENSE AUTHORIZATION
REQUEST FOR APPROPRIATIONS FOR
FISCAL YEAR 2024 AND THE FUTURE YEARS
DEFENSE PROGRAM**

TUESDAY, APRIL 18, 2023

UNITED STATES SENATE,
SUBCOMMITTEE ON STRATEGIC FORCES,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

**THE DEPARTMENT OF ENERGY'S ATOMIC ENERGY DE-
FENSE ACTIVITIES AND DEPARTMENT OF DEFENSE
NUCLEAR WEAPONS PROGRAMS**

The Subcommittee met, pursuant to notice, at 4:49 p.m., in room 222, Russell Senate Office Building, Senator Angus S. King (Chairman of the Subcommittee) presiding.

Subcommittee Members present: Senators King, Gillibrand, Warren, Rosen, Fischer, Rounds, and Cramer.

OPENING STATEMENT OF SENATOR ANGUS S. KING

Senator KING. We call today's hearing to order, and I thank the witnesses for appearing, as well as their services to our Nation. Before we get going, I want to thank Admiral Caldwell, the Director of Naval Reactors, who will retire after 42 years of service.

You are only the 7th Director of Naval Reactors, starting with Admiral Rickover in 1949. You stand in this fearsome giant's shoes upholding his unparalleled tradition of service and excellence that is second to none.

You are responsible for the force projection of our aircraft carriers and our submarines, which are the envy of every military in the world. In fact, under AUKUS [Australia, United Kingdom, United States], we know that they are trying to duplicate that capability.

For any nuclear-powered vessel that is ready for sea trials. You are the senior officer that goes to sea with her. I want to thank you and your wife, Kim, for your service. Our Nation owes you a debt of gratitude that only six other Navy officers and their spouses can fully understand.

Today's hearing has two panels to review the budget request for defense nuclear activities in the Department of Energy (DOE) and the Department of Defense (DOD). We are undertaking our third nuclear modernization.

The first two in 1960 and 1980, notice they were 20 years apart. The third this time some 43 years apart. Unlike the other two, we now have not one but two nuclear armed near-peer competitors.

This is an entirely new paradigm in the defense of our Nation. Now more than ever, we are relying on modernizing our triad to perform the essential deterrence mission under this new two near-peer paradigm.

I expect not only to hear what is going right, now in this modernization cycle. Admiral Rickover would expect no less. But importantly, I also expect to hear what is not going right and how Congress can help.

Mr. White, you perhaps have the toughest of all jobs with the largest backlog of cleanup in the Federal Government from Cold War defense activities. Which in 2020 was estimated at a cost of \$512 billion.

I will want to know what you are doing to work your way through this backlog of clean-up, which is a commitment to the communities nearby these sites. After our opening statements from each of our witnesses, we will have 5-minute rounds of questions.

Senator Fischer.

STATEMENT OF SENATOR DEBRA FISCHER

Senator FISCHER. Thank you, Mr. Chairman, and thank you to our witnesses for being here today. Admiral, I, too, want to thank you for your many, many years of service and commitment and dedication to this country. You are an example of a true, true patriot and public servant.

All of you have a solemn responsibility of ensuring that our nuclear deterrent remains safe, reliable, and effective. Our nuclear deterrent, the weapons themselves, and the delivery systems remains the indispensable backbone of United States National Security.

The geopolitical threat environment has significantly degraded since 2010, when our current nuclear force and modernization plan was determined. We need to consider whether the plan remains sufficient to address future threats, and we have to rebuild the capability across the nuclear enterprise to deliver faster.

The status quo is not tenable, and I look forward to working with you all in the coming months to find creative solutions to the significant challenges that we face. Thank you, Mr. Chairman.

Senator KING. Ms. Hruby.

STATEMENT OF THE HONORABLE JILL M. HRUBY, ADMINISTRATOR, NATIONAL NUCLEAR SECURITY ADMINISTRATION

Ms. HRUBY. Thank you, Chairman King, Ranking Member Fischer, Members of the Subcommittee for the opportunity to present the President's Fiscal Year 2024 Budget Request for the Department of Energy's National Nuclear Security Administration (NNSA).

Chairman King, a written statement has been provided and I respectfully request that it be submitted for the record. NNSA's fiscal year 2024 budget request is \$23.8 billion, an increase of \$1.7 billion over the fiscal year 2023 enacted level. This budget request responds to today's challenging global security environment.

The Weapons Activities budget request of \$18.8 billion supports the five ongoing weapon modernization programs and continues significant investment in our infrastructure. Infrastructure needs are acute at our production plants as we continue to refurbish and reestablish capabilities.

In addition, the request supports two Phase 1 exploratory efforts, enhance physical and cyber security, and digital assurance of our weapons and enterprise. It also continues investment in our stockpile research and advances stockpile stewardship. We are actively addressing our biggest challenge in weapon activities, the cost and schedule delays, and large construction projects.

Supply chain delays, labor shortages, labor productivity, combined with inflationary pressures, have plagued the uranium processing facility and the plutonium pit production efforts, both at Los Alamos and Savannah River.

As a result, we are implementing nationwide trade union recruiting, incentives for labor, housing, and transportation, early starts on long lead procurements, and introduction of new project management models.

The Defense Nuclear Nonproliferation budget request is \$2.5 billion, and invest in our nonproliferation, emergency response, and counterterrorism programs. We continue important work to reduce global nuclear risk, progress international partnerships, and advance associated research.

To be prepared for the future, programs responsive to nuclear energy expansion and future arms control verification technologies are requested. We remain committed to the Ukraine incident response training and information sharing to detect and respond to a nuclear or radiological emergency.

Work to assure allies who might be thinking about the need for nuclear weapons. We work to assure them that we will be with them and we keep our eye on threats from other weapons of mass destruction with our bio-assurance program.

The challenges for NNSA are real but not insurmountable. With your continued support, I am confident we will succeed. Thank you. I look forward to your questions.

Senator KING. Admiral.

STATEMENT OF ADMIRAL JAMES F. CALDWELL JR., USN, DEPUTY ADMINISTRATOR FOR NAVAL REACTORS, NATIONAL NUCLEAR SECURITY ADMINISTRATION

Admiral CALDWELL. Chairman King, Ranking Member Fischer, first off, thank you for your nice remarks. It is an honor to serve. Distinguished Members of the Subcommittee, thank you for the opportunity to testify today.

Your consistent support of naval reactors allows my team to provide the Navy with unmatched power and capability of nuclear propulsion, which provides all of our submarines and all of our aircraft carriers the reliability, mobility, and endurance to carry out National Security missions around the world.

Today, nuclear powered warships are operating alongside allies and partners on a global scale, providing forward presence in a world that is increasingly polarized. We recently completed the AUKUS consultation period and have set out on a generational

change in sharing critical technologies directly supporting United States, United Kingdom, and Australia trilateral commitment to a free and open Indo-Pacific region.

Naval Reactors' investment in research and development (R&D) over decades has enabled the advanced technology that gives our fleet a competitive advantage in the maritime environment. Now we must step up our research and development to sustain and exploit that advantage.

Our future will be built on a solid foundation of our people, our technology, and our facilities. My budget request for fiscal year 2024 is for \$1.96 billion and invests in each of these three key areas and two national priority projects. First, my request supports our most important resource, our people.

The talented and dedicated people at our headquarters and our field offices are absolutely essential to the strong centralized management and oversight of the important work we do for the Nation.

Second, the budget request reflects continued investment in research and development to achieve our goals of substantially lowering costs, reducing construction timelines, and adding fleet capability.

My request also focuses on investments to modernize our critical infrastructure at my Department of Energy laboratories where this important work is executed and to reduce our legacy environmental liabilities.

I am also seeking your support for two national priority projects. The first is the continued development of the reactor plant for the *Columbia*-class ballistic missile submarine, directly supporting the Navy's number one acquisition priority.

The second project is the continued construction of the naval spent fuel handling facility in Idaho, which enables long term, reliable processing and packaging of spent fuel from the Navy's nuclear fleet.

In closing, your strong and enduring support allows me to carry out Naval Reactor's mission of delivering a nuclear-powered fleet that is unrivaled around the world. I respectfully urge your endorsement of our fiscal year 2024 budget request, and I thank you for your support.

[The prepared statement of Admiral James F. Caldwell follows:]

PREPARED STATEMENT BY ADMIRAL JAMES F. CALDWELL

Chairman King, Ranking Member Fischer, and distinguished Members of the Subcommittee, thank you for the opportunity to appear before you today and present the President's Fiscal Year 2024 budget for Naval Reactors. Your strong support for the work we do ensures our nuclear Navy can carry out vital missions around the world with agility and endurance.

This year marks the 75th anniversary of the Naval Nuclear Propulsion Program and is the final year of my 8-year tenure as Director of Naval Reactors. As I reflect upon the decades of our Program's history, one of our core principles that has enabled our Program's success is "challenge what's possible."

In 1948 despite having no nuclear-trained submariners, no nuclear industrial base, and no nuclear shipyards, the Navy promulgated the formal requirement for a nuclear-powered submarine. Just 7 years after the creation of the Naval Nuclear Propulsion Program, under the leadership of Admiral Hyman Rickover, and with tremendous congressional support, Naval Reactors developed an industrial base in a new technology, pioneered new materials, designed, built, and operated a prototype reactor, established a training program, and took a nuclear-powered submarine to sea. In less than 7 more years, Naval Reactors designed and built the world's

first nuclear-powered aircraft carrier, USS *Enterprise*, forever changing our Nation's power projection.

Since then, follow-on classes of more capable U.S. nuclear-powered submarines and aircraft carriers have ensured our warfighting edge over potential adversaries. Congress' strong and enduring support of our past efforts has allowed the Navy to maintain our advantages. Your partnership with the Navy is needed now, more than ever, as we work on current and future endeavors in naval nuclear propulsion that are required to improve the capability of our nuclear fleet and protect the national security of the United States.

Today's strategic environment is dynamic and complex, characterized by a rapidly changing global balance of military capabilities, requiring us to once again challenge what is possible. As stated in the National Security Strategy, the world is at an inflection point, and how we respond today will impact the security and prosperity of our Nation for generations. As I serve in my final year at Naval Reactors, I want to ensure that we sustain and build an enduring naval warfighting advantage to maintain our dominance of the maritime battlespace. Furthermore, we have the opportunity to reinforce our strength by building the strongest possible coalition of allies to shape the global strategic environment.

Our Nation took a new step when the President announced the AUKUS enhanced tri-lateral security partnership. This historic agreement demonstrates U.S. commitment to revitalizing our alliances and strengthening them to take on the challenges of the 21st century. Furthermore, the AUKUS partnership bolsters existing Navy initiatives to strengthen our own shipbuilding capability and build the additional industrial and vendor base capacity our Nation and our allies need. Given the global threats we face, it is imperative that we ensure our closest allies remain highly capable in the undersea domain.

As stated in the National Security Strategy and the National Defense Strategy, it is vital for the Navy to maintain and expand our competitive advantage by aggressively investing in emerging technologies. The principal strategic issues driving the need for technological advancement are the growing threats from China and Russia. China is rapidly advancing and establishing a global naval presence with the purpose of projecting power and challenging U.S. maritime superiority. Meanwhile, Russia poses an immediate threat to the free and open international systems, relying on coercive or unfair practices to gain an edge over the United States and our allies. To properly defend against these threats, increased numbers of nuclear-powered submarines and improved capabilities for our submarines and aircraft carriers will be required. To enable Navy efforts targeted to combat these threats, Naval Reactors needs to develop and insert technologies that will provide increased power and energy to support increased speed, reduced noise signatures, and enhanced warfighting capabilities. Additionally, our efforts are focused on identifying technologies and processes that can substantially reduce the build-span times and costs of these platforms to meet Navy needs.

Naval Reactors' historical investment in advanced technologies has given the Nation an enviable position in the maritime environment; however, further investments today are necessary. Our ships need to retain their advantage against future threats across multiple domains, but must also be affordable. Designing and building our propulsion plants for improved operational capability and availability through lifecycle maintenance enhancements and improved performance will ensure the Navy stays ahead of increasing demands while continuing to deliver the most capable, cost effective future force. Our success in the future will rest on the foundation of what we build today while we continue to challenge what's possible.

NAVAL REACTORS OVERVIEW

Naval Reactors' budget request for fiscal year 2024 is \$1.96 billion. This committee's support has enabled the safe operation of the nuclear fleet, substantial progress on our key projects, and our continued oversight and regulation of all areas across the Naval Nuclear Propulsion Program. Your past support has allowed significant progress on our three major Department of Energy funded projects—*Columbia*-class propulsion plant development and production, the refueling overhaul of our research and training reactor in New York, and the construction of the Naval Spent Fuel Handling Facility in Idaho. When I first arrived at Naval Reactors in 2015, these three projects had not yet hit their peak funding. Over the course of the past several years we have reached a point where I can highlight substantial progress of the first *Columbia*-class propulsion plant in support of lead ship construction. In addition, the refueling overhaul of our research and training reactor will complete later this year. The Program also continues to make significant progress amid numerous challenges during construction of the incredibly important Naval Spent Fuel

Handling Facility. While we are staying focused on completing these efforts, we cannot simply rest on prior success as we continue to develop and pursue innovative technologies.

MAJOR PROJECTS

Columbia-class Propulsion Plant

The *Columbia*-class ballistic missile submarine remains the Navy's number one acquisition priority. Naval Reactors is delivering the life-of-ship reactor core and the electric drive propulsion system for the *Columbia*-class. To date, multiple lead ship reactor plant components have been delivered, and the reactor core is on track to support lead ship delivery in 2027. The fiscal year 2024 budget includes \$52.9 million to continue reactor plant design, fabrication, and safety analysis work required for lead ship reactor testing. Additionally, Naval Reactors will start the lead ship motor module testing of the electric drive propulsion system at the compatibility test facility in Philadelphia, PA.

S8G Prototype Refueling Overhaul

The fiscal year 2024 budget request does not include additional funding for the refueling overhaul of the New York land-based prototype, as previously provided funding will be sufficient to complete the project. With strong oversight from Naval Reactors, the overhaul is on track to complete in late 2023. Consistent support from the committee has enabled the project to work through upgrades, maintenance and performance testing challenges, and meet key milestones. As an example of the impact of Naval Reactors efforts, this reactor core, called the Technology Demonstration Core, will not only train future operators for 20 years but also includes *Columbia*-class type fuel modules. This has helped to prove out production scale manufacturing for *Columbia*. I look forward to ensuring my relief is able to deliver the final update on this multi-year project in next year's appearance before the Committee as we resume training on this site.

Spent Fuel Handling Recapitalization Project

Naval Reactors is continuing construction of the Naval Spent Fuel Handling Facility at the Naval Reactors Facility in Idaho. The Naval Spent Fuel Handling Facility is essential to our mission to manage naval spent nuclear fuel and support aircraft carrier and submarine fleet requirements. The fiscal year 2024 budget request includes \$199.3 million for continuation of this project through near-term key milestones. During the last several years, the project has encountered several challenges. Specifically, the COVID-19 pandemic introduced work delays and additional costs for final design activities and active construction subcontracts. The discovery of unexpected bedrock conditions upon completion of site excavation work resulted in additional effort to remediate the bedrock and begin construction of the massive concrete foundations for the facility. More recently, we worked through subcontractor performance issues and continuing significant volatility with economic conditions resulting in a revised acquisition plan for the Project and additional funding requirements. Consistent with the revised acquisition plan and funding need, I approved a revision to the Project's Performance Baseline in October 2022. Funding in fiscal year 2024 will be vital to implementing our revised construction sequence and achieving the project milestones in the Performance Baseline revision. Naval Reactors remains committed to keeping the Committee informed of progress on this complex and large-scale infrastructure project.

TECHNICAL BASE FUNDING

In addition to our three priority projects, Naval Reactors maintains a high-performing workforce across the technical base and supporting functions. The technical base is the set of fundamental skills and capabilities necessary to safely and effectively support the nuclear Navy. It includes a foundation of specialists in nuclear materials, nuclear physics, thermal-hydraulics testing, acoustics, electronics, software development, systems integration, and other specialized skills, along with the associated facilities and laboratories to conduct our work. Specifically, the technical base: 1) addresses emergent, daily needs and challenges of our globally deployed nuclear fleet, 2) executes cutting edge nuclear reactor technology research and development that supports improving today's reactor fleet and assessing future reactor capabilities, and 3) modernizes critical infrastructure and equipment while reducing the Program's legacy environmental liabilities.

Attracting and retaining top talent in our government civilian and contract workforce is critical to our ability to fulfill and mature our mission amidst a wide array of challenges and new demands. The broad range of talent in our organization is

in high demand from all areas of our economy. We remain focused on recruiting and retaining a well-trained, highly qualified workforce and continue to work with the leadership of our labs, private shipyards, Navy, and DOE to stay competitive in this aggressive talent market.

Program Direction

Our lean and highly skilled Federal workforce is critical to the execution of our responsibilities. With the fiscal year 2024 Program Direction request, we remain highly focused on attracting, developing, and retaining a talented and diverse workforce to oversee and manage a wide array of work across the Naval Nuclear Propulsion Program to enable mission success. The talented and dedicated people at our Washington, DC headquarters and field offices around the world report directly to me and are absolutely essential to our strong centralized management and oversight of the important work we perform every single day for our Nation.

Building, maintaining, and deconstructing ships with over forty years of expected life requires staffing continuity and longevity to ensure the Nation has a workforce with the deep technical knowledge to execute Naval Reactors' cradle-to-grave responsibilities. I must have sufficient Federal staffing to meet the demands of sustaining and improving today's fleet while simultaneously growing our future capabilities. Diverse, complex systems, new and innovative research efforts, and growing cyber and other vulnerabilities will require additional expertise and new perspectives that can only be gained through reaching our full personnel requirements.

The market demand for our highly skilled and experienced workforce introduces challenges to recruit and retain a top-tier workforce. In concert with our ongoing focus on research and development that I have highlighted over the last several years, we need to find new ways to bring in and retain the Nation's top talent into Naval Reactors and give them resources to introduce technical innovations into our submarines and aircraft carriers. I respectfully request Congress' support of the fiscal year 2024 Program Direction budget request, which will allow me to recruit, select, develop, and retain a highly skilled workforce to support mission requirements.

Research and Development

Our research and development strategy remains focused on reversing an eroding capability advantage over strategic adversaries like China and Russia. Technology investment must be prioritized today to have new technologies ready for future classes of ships and to reduce costs, long lead times, and construction timelines. These investments have the added benefit of enhancing and improving the performance of today's fleet. Throughout the United States, important research and development is conducted by the dedicated and talented teams of people at our Naval Nuclear Laboratory sites—the Bettis Atomic Power Laboratory in Pittsburgh, the Knolls Atomic Power Laboratory and Kesselring Site in greater Albany, and the Naval Reactors Facility in Idaho.

Our first priority is to support today's fleet of nuclear powered forces. Our labs perform an extensive amount of technical evaluations annually that enable Naval Reactors to thoroughly assess and respond to emergent issues, keeping our ships mission-ready, safely operating and available for response to any global crises. These efforts are essential to realizing the key advantages of nuclear propulsion that allow our ships at-sea to operate abroad for longer periods of time, our carrier strike groups to engage in any region, and ballistic missile and attack submarines to respond at any time and place.

Two years ago, in the fiscal year 2022 budget, at my direction, Naval Reactors embarked on a concentrated path to identify and develop new technologies for inclusion in the next generation of nuclear powered ships and submarines, including the Navy's next generation attack submarine, SSN(X). We are pursuing advanced reactor core and fuel systems, advanced manufacturing and inspection techniques, next-generation instrumentation and control architectures and sensors, and asymmetrical applications of emerging technologies. These advancements have traditionally taken time to materialize but we are focused on delivering greater capability in shorter order at lower acquisition and lifecycle costs to improve and expand our advantage. I invite you to visit our facilities with your staffs, talk with our experts onsite, and enhance your understanding of where naval nuclear propulsion is headed with respect to our technological advancements. I take great pride in highlighting our innovative and new technologies and how we can responsibly transition them into meeting requirements for the Fleet of tomorrow.

I want to assure the Committee that our investments are supported by a comprehensive and rigorous planning effort we undertake with our partners at the Naval Nuclear Laboratory. While we continue to develop and execute our research and development strategy, we are confronting a range of challenging economic con-

ditions that demand additional resources to counteract price inflation, a tight labor market, and other factors. This year's budget request will help us get closer to our required investment needs to stay ahead of our adversaries.

Facilities and Infrastructure

Our Naval Nuclear Laboratory facilities and infrastructure are essential in carrying out Naval Reactors' mission. This year's budget request supports recapitalization of Naval Nuclear Laboratory facilities and infrastructure systems, many of which have supported the Program since its inception. Specifically, this budget supports construction of a new Medical Science Complex at Naval Reactors Facility located in Idaho to create professional space and efficient integration of radiological, medical, and quality assurance capabilities. Additionally, this year's budget supports recapitalizing the Knolls Laboratory site steam and condensate system that has exceeded its useful service life. Without these and similar recapitalization efforts, we will be unable to effectively meet mission requirements at the level required to support the next 75 years of naval nuclear propulsion.

Decontaminating and decommissioning (D&D) older facilities that have been in existence since the early 1950's is also part of our facilities and infrastructure request. We have approximately \$8 billion in environmental liabilities requiring D&D efforts. Over one-third of this estimate is associated with the cost to remediate and demolish inactive facilities and infrastructure at each of the Naval Nuclear Laboratory sites. We continue to retire these liabilities in an environmentally responsible and cost-effective manner to support the best use of our funding. This is an exciting opportunity for us, and I look forward to future engagements with the Committee to discuss our specific actions and tangible examples of Naval Reactors' long-term plan to reach our goals. Through our established partnership with the Department of Energy Office of Environmental Management (DOE-EM), we are leveraging their experience in efficient, safe, and cost-effective remediation of environmental liabilities across the enterprise. Within only 3 years under the new partnership, we have identified ways to shorten the schedule to eliminate all of the legacy liabilities and identified opportunities for cost avoidance.

AUKUS

In September 2021, President Biden announced an enhanced trilateral security partnership between Australia, the United Kingdom, and the United States (AUKUS). The three governments have recently completed an 18-month consultation period to seek an optimal pathway for delivering a conventionally armed, nuclear-powered submarine capability to Australia at the earliest achievable date. Naval Reactors has been integral in informing discussions to ensure that our Nation's preeminent expertise is applied to the nuclear-powered submarine initiative.

As announced by the trilateral leaders on March 13, we are now beyond the 18-month consultation period and are focused on ensuring Australia establishes the full scope of capabilities necessary to design, build, operate, and maintain a nuclear navy. Additionally, we are concurrently beginning the process to provide a proportional uplift in technology to the United Kingdom. We will increasingly utilize the trilateral partners' existing regulatory frameworks; educational, industrial, and technical capabilities; and capacities to collectively strengthen each nation's defense. Along with a team of subject matter experts from Naval Reactors and the United Kingdom, I have traveled to Australia and the United Kingdom and routinely meet with senior government officials from each nation. The three nations fully understand that this is a generational commitment and will require Australia to develop the stewardship necessary for owning and operating nuclear powered submarines. Naval Reactors is strongly committed to supporting Australia in developing this stewardship and acquiring a nuclear powered submarine capability.

Let there be no doubt—AUKUS is a tremendous addition to my existing mission. The pace and urgency for action has had an undeniable impact on the Naval Reactors program over the past year and a half. My Program will be a key element of the success of AUKUS, and it will require a generational investment in people, nuclear propulsion technologies, and facilities to ensure the Naval Nuclear Propulsion Program is resilient and adaptive in order to meet its objectives.

CONCLUSION

The Navy's ability to maintain mastery of the undersea domain and sustain a formidable forward presence with its resultant value for national security and defense cannot be assumed; we are being actively challenged on a global scale. As I have said repeatedly, naval nuclear propulsion is an incredible but unforgiving technology, and must be treated with a constant focus on safe operation. Naval Reactors'

cradle-to-grave responsibility to manage this technology is paramount. I assure this Committee that I will balance investments in today's fleet with the requirements of the future fleet, steer future cooperation efforts, and preserve the focus on effective naval nuclear propulsion for the U.S. Navy. I appreciate the strong support of Congress for this program and respectfully urge your full support for our fiscal year 2024 budget request.

Senator KING. Mr. White.

STATEMENT OF WILLIAM WHITE, SENIOR ADVISOR FOR ENVIRONMENTAL MANAGEMENT, DEPARTMENT OF ENERGY

Mr. WHITE. Chairman King, Ranking Member Fischer, and Members of the Subcommittee, it is an honor to appear before you today. The Environmental Management Mission reflects the commitment to cleaning up the environmental legacy of national defense programs that helped end World War II and the Cold War.

While our mission is tied to the environmental legacy of the past, we are also focused on the future. The cleanup program of today is empowered to support ongoing National Security and science missions, as well as strengthen local communities.

Cleanup accomplishments are boosting the clean energy economy in Tennessee and helping the Oak Ridge National Laboratory and the Y-12 National Security Complex prepare for expanding National Security and research missions. Our Idaho team just marked a historic achievement with the startup of a new tank waste treatment capability that has been decades in the making.

With support from Congress, the Integrated Waste Treatment Unit is now operational in Idaho. The Office of Environmental Management (EM) has treated over 400,000 gallons of tank waste at the Hanford site, and at Savannah River in South Carolina we are processing record amounts of tank waste.

More than 200 transgenic waste shipments from five generator sites were received last year at the waste isolation pilot plant. The budget request for this year positions us for success as we drive risk reduction, progress, skyline changes, and ramp up efforts to tackle tank waste.

EM will operate tank waste treatment systems in South Carolina, Idaho, and Washington State. Hanford's 56 million gallons of tank waste represent our greatest environmental risk and financial viability.

Treatment and disposal are the only way to permanently address the risks posed by this waste. Recognizing that additional delays bring greater risk, exacerbate the impacts of already aging infrastructure, and increase cost, we are focused on moving the entire Hanford tank waste mission forward.

We are advancing the system that will stabilize Hanford's low activity waste in glass. The request also ramps up work on the high-level waste facility so that we will be able to address that portion of the Hanford tank waste as well.

The waste isolation pilot plant will be modernized to meet the needs of legacy cleanup and ongoing National Security programs. Waste shipments will continue and we will ensure there is no backlog of shipments from Los Alamos National Laboratory.

We will address excess contaminated facilities and contaminated groundwater across the enterprise. This includes work in Nevada,

where we will demolish four buildings this year and further reduce the clean-up footprint for fiscal year 2024.

As we deliver on these priorities, we are committed to continuous improvement, whether it is investing in R&D, analyzing options to save time and money, achieving regulatory alignment, upgrading infrastructure, or building a pipeline of talent for the future, we are preparing for the future.

The budget request for this year supports these efforts. It also supports communities and tribal nations impacted by the environmental legacy of the past. I appreciate the Subcommittee's support for the EM mission. I thank you for your time, and I look forward to your questions.

[The prepared statement of Mr. William White follows:]

PREPARED STATEMENT BY MR. WILLIAM "IKE" WHITE

Chairman King, Ranking Member Fischer, and Members of the Subcommittee, it is an honor to appear before you today to represent the Department of Energy's (DOE) Office of Environmental Management (EM).

EM's mission represents the Government's strong commitment to cleaning up the environmental legacy of the national defense programs that helped end World War II and the Cold War. EM's vital mission does not just address past legacy, though, it also helps to support and enable DOE's ongoing national security and scientific research missions.

The fiscal year 2024 budget request of \$8.3 billion for EM reflects the Biden Administration's strong commitment to advancing the cleanup mission and preparing for sustained success, maintaining national security priorities, and supporting communities most impacted by the environmental legacy of the past.

RECORD OF RESULTS FOR THE ENVIRONMENT

Over the last 30 years, EM has made significant progress. From an original 107 sites, today EM is down to just 15 with legacy cleanup work at the Brookhaven National Laboratory in New York completed last year. EM's significant accomplishments to date have included completing demolition of the Plutonium Finishing Plant, a facility that produced two-thirds of the Nation's Cold War-era plutonium at the Hanford Site in Washington state; completing the removal of the former uranium enrichment complex at Oak Ridge in Tennessee; opening the world's only deep geological repository for transuranic waste generated from atomic energy defense activities at the Waste Isolation Pilot Plant in New Mexico; and completing construction on the entire tank waste treatment system at the Savannah River Site in South Carolina, enabling significant progress in how the Department tackles one of its largest environmental and financial liabilities at that site.

DELIVERING RESULTS FOR DOE SITES AND COMMUNITIES

While the mission is rooted in the environmental legacy of the past, EM is also focused on the possibilities for the future. The EM program of today is empowered to strengthen local communities and the Nation as a whole.

Enabled by the significant investments Congress has made in the program, EM has ushered in tangible results for communities and the environment in a safe, effective, and responsible manner. Over the past year, EM has cocooned the seventh reactor along the Columbia River at the Hanford Site in Washington State, leaving just one more to go. EM has also treated over 400,000 gallons of radioactive and chemical waste from large underground tanks at the Hanford Site where work is progressing toward initiation of the Direct Feed Low Activity Waste (DFLAW) project that will convert this waste into glass for disposal. At the Savannah River Site in Aiken, South Carolina EM is now processing record amounts of tank waste with more than 2.1 million gallons treated last year alone.

More than 200 transuranic waste shipments were received last year at the Waste Isolation Pilot Plant (WIPP) in New Mexico from five generator sites. This includes shipments from the Los Alamos National Laboratory, where the EM team certified and completed 52 shipments to WIPP last year, surpassing goals by over 70 percent.

This spring, EM met a key commitment to the State of Idaho by completing the transfer of EM-owned spent nuclear fuel to onsite dry storage. Last week, workers safely and successfully started up the Integrated Waste Treatment Unit. This new

tank waste treatment capability has been decades in the making and will ultimately help address one of the EM's greatest challenges in Idaho.

In addition, EM has launched demolition of the West Valley Demonstration Project's Main Plant Process Building, a priority that will continue this year and will further advance under the fiscal year 2024 budget request. The Nevada National Security Site is preparing to demolish four Test Cell C buildings this year and will continue to reduce the cleanup footprint there in fiscal year 2024.

EM continues a deliberate and broad view on the future of cleanup sites while contributing to national security priorities, investing in the next generation workforce and aiding Tribal and community efforts to build strong economies, grow jobs and prepare for a clean energy future.

Perhaps nowhere is this more evident than in Oak Ridge, Tennessee where historical cleanup accomplishments support national security priorities and are building up the clean energy economy in Tennessee. Following successful cleanup in the area, a commercial pilot fuel manufacturing facility is now open at the East Tennessee Technology Park. By putting DOE developed nuclear fuels research to work, this is a cleanup to clean energy success story. With the first-ever demolition of a reactor in the central campus area at the Oak Ridge National Laboratory (ORNL) and work continuing at the Y-12 National Security Complex, EM's steady progress is a part of a broader vision focused not only on cleaning up the past, but also advancing the ORNL and Y-12 research and national security research missions.

STEADY PROGRESS PLANNED FOR FISCAL YEAR 2024

The fiscal year 2024 budget request reflects the Administration's strong commitment to cleaning up the environment in communities that supported or continue to support weapons programs and government-sponsored nuclear research. Key investments position EM for sustained achievement as the program continues to drive risk reduction, progress skyline changes and ramp up efforts to tackle tank waste while enabling DOE's vital national security and scientific research missions.

Protecting the environment by addressing radioactive waste stored in underground tanks at Hanford, Savannah River and the Idaho National Laboratory is a top priority for EM. The budget request advances commissioning and startup of the Direct Feed Low Activity Waste system. After decades of support from the local community, Congress and the workforce, this transformational accomplishment is within sight.

As we prepare to begin operating Hanford's low-activity tank waste vitrification capabilities, the budget request also invests \$600 million to ramp up work on the Waste Treatment Plant's High Level Waste facility to be able to tackle that portion of Hanford's tank waste inventory. In parallel, EM continues to identify safe, effective, and viable options for the treatment of all Hanford's tank waste.

Hanford's 56 million gallons of radioactive and chemical waste stored in 177 aging storage tanks represent EM's greatest environmental risk and financial liability. Recognizing that additional delays bring greater environmental risks, exacerbate the impacts of already aging infrastructure, and increase costs, we are focused on moving the entire Hanford tank waste mission forward. EM has also developed a Research and Development Roadmap to guide investments in additional technology options to accelerate the Hanford high-level tank waste mission. EM is also taking the next steps on the Test Bed Initiative Demonstration project, which could have the potential to safely pretreat low-activity waste from Hanford tanks, solidify the waste, and dispose of it offsite in a manner that is protective of the workers, the public and the environment.

In addition to helping solve the challenges of Hanford tank waste, the request will enable EM to continue meaningful cleanup progress to transfer radioactive capsules to safer dry storage, progress 324 Building waste excavation and treat another 2 billion gallons of contaminated groundwater.

In South Carolina, the fiscal year 2024 budget request supports continued utilization of capabilities to process tank waste. This advances work at the Savannah River Site to complete the bulk of its tank waste treatment mission.

At the Idaho National Laboratory, the request supports continued operations of the Integrated Waste Treatment Unit which will ultimately treat about 900,000 gallons of liquid waste by turning it into a granular solid.

SUPPORT FOR NATIONAL SECURITY MISSIONS

In addition to reducing environmental risks at these and other sites across the complex, the EM mission benefits the Department's broader national security and scientific research missions.

Building on last year's successful demolition work, EM recently completed the transfer of the 18-acre Biology Complex at the Y-12 National Security Complex to the National Nuclear Security Administration (NNSA) which will use the area for a new Lithium Processing Facility. The budget request supports additional cleanup of high-risk excess facilities at the Oak Ridge National Laboratory and the Y-12 National Security Complex. It also supports work to advance the Mercury Treatment Facility and a second On-Site Waste Disposal Facility, both of which are pivotal to future efforts to reduce risks, stabilize facilities, advance cleanup and ultimately provide land for research and national security missions.

EM is in the midst of a significant infrastructure and modernization campaign at WIPP. Work continues on mining the West Access Drifts and sinking the utility shaft that is critical for ventilation upgrades needed to improve air quality in the underground portion of the site. Commissioning of the new Safety Significant Containment Ventilation System (SSCVS) is slated to begin this year. Along with providing for continued WIPP operations, as well as waste characterization and transportation programs, the budget request supports the continued infrastructure recapitalization projects, as well as mine modernization activities and safety upgrades in fiscal year 2024. Taken together these projects will help ensure EM has the infrastructure in place to support disposal operations for years to come.

At the Savannah River Site, where EM's role is decreasing as cleanup work progresses, a joint process to transition primary authority for the site to NNSA in fiscal year 2025 is underway. EM and NNSA are committed to a successful transition that keeps national security priorities as well as the long-term outlook for the site and community front of mind.

INVESTING IN DIVERSE WORKFORCE AND COMMUNITIES

The talented and dedicated men and women across EM are the program's greatest assets. While significant progress continues across the DOE complex, the EM mission will span several decades at some sites. With that in mind, EM is increasing efforts to foster, build and maintain a next-generation workforce that promotes diversity, equity, inclusion, and accessibility. A program-wide succession plan has been developed to help identify and develop the next generation of program leaders. EM has expanded the Minority Serving Institutions Partnership Program to increase internships, develop a new technology curriculum, and boost research activities. Funding has been provided to participants across the country in states like Washington, Nevada, Tennessee, South Carolina and others. The budget request provides \$56 million to continue the Minority Serving Institutions Partnership Program.

The Advanced Manufacturing Collaborative facility, to be constructed in South Carolina, will be another tool to help meet the needs of the EM cleanup mission and create an environment to develop a diverse and talented next generation workforce. In addition, EM is putting DOE's Justice40 Initiative to work by expanding outreach and grants to include support for STEM and Community Based Education programs.

The Justice40 Initiative has also provided new opportunities to boost engagement with stakeholders and ensure the voice of those most impacted by the EM mission is heard. In addition, EM has increased stakeholder outreach and engagement across the complex, with particular emphasis in New Mexico, where we have partnered with NNSA to hold multiple public forums and prioritize meetings with State, local, and Tribal leaders.

The fiscal year 2024 request represents a significant investment in helping the communities that played such an important role in U.S. history continue to grow and thrive in the future. The request includes Payment in Lieu of Taxes funding for communities near Hanford and Savannah River to support schools, roads and other local priorities. In addition, \$40 million is provided for the Community Capacity Building initiative. This grant program will provide assistance to those communities around EM sites and will be developed in consultation with community stakeholders to address their needs. By partnering with local communities, prioritizing stakeholder engagement and implementing environmental justice initiatives, EM is helping to foster successful visions for the future.

CONCLUSION

The fiscal year 2024 budget request is the latest sign of this Administration's strong support for EM's vital mission. As the mission is carried out, EM is committed to continuous improvement and making further advancements to ensure that cleanup activities are conducted in a safe, efficient, and cost-effective manner.

Across mission areas, EM utilizes science-based advancements that provide opportunities to meet cleanup commitments safely, sooner and more efficiently. EM is leveraging the expertise of the Savannah River National Laboratory and the Network of National Laboratories for Environmental Management and Stewardship to develop innovative solutions in the fields of environmental cleanup, national security and science and energy security that will benefit EM, the NNSA and other DOE missions. Our goal is a fully integrated technology program that enables EM to better meet the most complex challenges of today and tomorrow.

Whether it is investing in R&D, analyzing disposal options, reaching decisions about remaining waste streams, achieving regulatory alignment, or upgrading infrastructure, EM is preparing for the future. These multi-faceted activities are laid out in EM's annual priorities list and 10-year strategic vision as part of EM's ongoing efforts to improve prioritization, planning and mission execution.

As EM makes steady cleanup progress, EM is committed to working in a collaborative manner with workers, unions, Tribal Nations, states, local communities, and Congress on opportunities to achieve shared goals of protecting the environment and preparing for continued cleanup success.

Senator KING. Thank you. Did you say you processed 400,000 gallons last year?

Mr. WHITE. At Hanford through our tank side cesium removal system. Which is the system we have in place to pre-treat the tank waste that is going into the direct feed low activity waste vitrification plant.

Senator KING. But there is something on the order of 150 million gallons, isn't there—in various tanks?

Mr. WHITE. There are currently—there are 56 million gallons of tank waste. But when you think about the processes required to treat the tank waste, it ends up resulting in about 150 million gallons of liquid needing to be treated over the course of the program.

Senator KING. I will follow up on that for—in a couple of minutes. Admiral Caldwell, a couple of questions. Back when the Navy stopped, or when we stop producing additional uranium for fuel back in the 1990's, it was assumed that we had enough stockpiled until the 2060. Is that assumption still true in light of *Columbia* and other programs that are now underway?

Admiral CALDWELL. Sir, we have looked at this over many years and even recently as we have embarked on this AUKUS consultation period, and currently we have enough fuel stock to support the program out through the 2050's, mid to late 2050's.

That will depend, of course, on the Navy shipbuilding plan and we will continue to evaluate that going forward. Ms. Hruby and I have frequent dialogs on this. It is going to be a topic we continue to talk about.

Senator KING. But the projection hasn't changed radically?

Admiral CALDWELL. Not radically, no, sir.

Senator KING. A different question. Did I hear in your testimony you are developing a new reactor for the *Columbia*? Is this a brand-new reactor or is it a modification of existing?

Admiral CALDWELL. Sir, to clarify, we have been working on the reactor for *Columbia* for many years now, and it is a reactor that has been funded by the support of this Subcommittee. It will have a—the result is a 42-year reactor core to power *Columbia* through life. That—

Senator KING. No refueling?

Admiral CALDWELL. No refueling, and that is important. That allows us to do the mission with 12 versus 14 SPNs [Simplified

transport Core], and that fact alone saves refueling costs and saves the Nation about \$40 billion.

So, it is a remarkable achievement. We are building that core right now, and we are on track to deliver that core on schedule.

Senator KING. But this is a developed technology. You are not inventing something.

Admiral CALDWELL. We are taking technology that has been built on decades worth of research and work. In fact, we took the step to design the core for the S8G prototype, a training and research reactor up in Kesselring.

We took the step to develop some *Columbia* components for that core. This was a decision made over 10 years ago. That proved to be a very important decision because it allowed us to de-risk the manufacturing techniques and make sure we had that down before we actually started the *Columbia* core.

So those two projects are actually integrated and both supported by this Subcommittee.

Senator KING. I am sure there is an answer to this question. I also serve on Energy and Natural Resources, where all the talk is about small modular reactors. Why aren't the naval reactors models for that? Is there an utterly different technology or is it cost? What—why couldn't you park a submarine in the bay and power the city?

Admiral CALDWELL. Well, first off, the requirements for a warship are significantly different from the requirements for a commercial reactor. We have to be able to withstand shock. We have to be ready to operate in battle damage conditions. We have to be responsive in speed.

A lot of the time the submarine or the carrier might be going relatively slow and we have to accelerate rapidly. For power generating reactors, the technology and the requirements for that are very different.

I don't think that the submarine core would be the right path for some of these small modular reactor concepts.

Senator KING. Thank you. Mr. White, as I mentioned, there is plenty of work left to do. I understand in Savannah River there are going with a concrete solution as opposed to a glass solution. Is that proving to be feasible, a, and b, is it a more cost-effective solution that could be used at the Hanford site?

Mr. WHITE. So, at Savannah River, the capability we have there can ultimately treat about 6 million gallons of the 9 million gallons of tank waste a year. So, I think it is something we should definitely be looking at, at Hanford.

In fact, we are doing that. One of the things that we just did was move forward with the test bed initiative, something that Congress funded over the last couple of years. So as part of that effort, we made a waste determination of about 2,000 gallons of tank waste at Hanford that we are planning to treat commercially offsite with grouting technology and then dispose of it at a commercial facility.

Right now, we are working on putting a permit together to submit that to the State of Washington, and then once they have approved that, about a year after that, we should be able to move forward with this pilot effort.

If you think about the cumulative amount of waste we have at Hanford, the vitrification capabilities we are putting in place with the low activity waste vitrification plant and the high-level waste plant, would treat about 40 percent of the tank waste that we have at Hanford to treat.

That leaves about 60 percent of the supplemental waste that we don't have a clear path forward on. In large part at the urging of this Subcommittee, we have had the national laboratories studying the best alternative for treating that supplemental waste, that 60 percent of the waste that isn't covered by those vitrification plants.

The National Academies recommended that we consider grouting, that the technology is effective at treating the waste, and it is by far the most cost effective and timely way to deal with the waste, the bulk of the waste at Hanford.

So, as we move forward on the vitrification capabilities that we need for the parts of the waste streams that have to be vitrified, while simultaneously working on options to expand our grouting capabilities as well to deal with the bulk of the waste.

Senator KING. Thank you. Senator Fischer.

Senator FISCHER. Thank you, Mr. Chairman. Welcome, Administrator. While the NNSA has many competing missions, delivering nuclear weapons to the Department of Defense remains the top priority. With narrowing window time for our current wave of modernization, can you identify your largest source of concern? How are you going to meet those milestones?

Ms. HRUBY. Yes, thanks for the question. They are—undoubtedly our most challenging programs are our large nuclear construction projects. I say that because our weapons programs are certainly challenging, but we are on track.

We understand the long lead, the places where we really need to increase our regular timelines, start timelines to meet those. But the construction activities have been more fluid in terms of what the issues are, and in part because we started them pre-COVID and have needed to come out of that, and it is the first time in many generations that we—this is really the first rebuild of our enterprise since the Manhattan Project.

To answer your question, we are pulling out all the stops. We are having external reviews. We are implementing recommendations from those reviews. We are changing our approach to procurements to not only start them earlier, but to have them move along faster.

We are breaking projects into chunks. We are pausing some projects in order to focus on others. We have a long list of things that we are doing to try to bring those as far to the left, if you will, as we can.

Senator FISCHER. If you have any suggestions on how Congress can help you do that to meet those requirements, please let us know.

Ms. HRUBY. Thank you. I would just, I know this is a big ask, but the most important thing on some of these projects is going to be timely budget appropriations.

Senator KING. Yes. It shouldn't be a big ask. It will be routine.

Senator FISCHER. It should be what we do, yes. Meeting the requirement of the 80 plutonium pits per year remains a challenge.

Can you provide us with an update on NNSA's efforts to achieve that full production as close to 2030 as possible?

Ms. HRUBY. Absolutely, thanks. We, as you know, we are proceeding with our two-site solution at Los Alamos and Savannah River. Los Alamos is the first up, if you will. We started it earlier, but also is an existing plutonium facility that we are modifying for the pit production activity that we have.

We have completed a lot of equipment installation. We are aiming to get to—the first project we are calling 30 base, making 30 pits per year. We have done about 40 developmental pits over the time we have been doing this project.

We are getting closer to WR [war reserve] certification, to weapon certification—

Senator FISCHER. You say, developmental pits. So those aren't certified?

Ms. HRUBY. Those are not yet certified and they are not going to get certified for—

Senator FISCHER. How long a process to get them certified? What do you have to do?

Ms. HRUBY. We are expecting that we will have our first certified pit at the end of 2024, and so then let me also cover Savannah River. So, we are about 50 percent way through the design of the Savannah River pit production facility.

We are also doing parallel activities to modify the MOX [mixed oxide] facility and take out equipment that we don't need. We are doing site preparation work. We are preparing to build a high-fidelity training center there.

The point of the training center is to make sure that as soon as we have the construction complete, we can go as fast as possible to get to making certified pits. That will be a few years, even if we are really fast.

We are doing a lot of pre-buys of equipment. We are staging our design so that the equipment is designed first so we can get those out for procurement while the rest of the facility design is being done.

Senator FISCHER. Has the pre-buying equipment, has that been an effective tool for you to be able to have that capability and to continue to move along so you don't have to wait months or a year or two and a half years for—?

Ms. HRUBY. Yes, absolutely. It is particularly important for gloveboxes, which is, there is a limited capability in the United States and all of our facilities need them.

Senator FISCHER. Thank you. Thank you, Mr. Chairman.

Senator KING. Senator Cramer.

Senator CRAMER. Thank you, Mr. Chairman. Thank you to the witnesses. Administrator, first of all, thank you for this morning's briefing as well. Very, very informative. Appreciate the detail of it all.

But when we talk about modernization, we always talk about, of course, our own, and then we talk about our biggest adversaries, but we rarely talk about allies or other places other than Russia and China and the United States.

Can you enlighten us a little bit with what might be going on in other places, if anything, that, you know, might be instructive to

how we view the future with regard to us, plus, if that makes sense?

Ms. HRUBY. Well, I will say that by far our closest ally on things nuclear is the UK. Not only are we doing what Admiral Caldwell talked about in terms of the AUKUS program with them, we are also working on the W93 program with them, and we are working on materials availability with them.

So that—by far our strongest ally. We do work nonproliferation programs with all of our other allies, both NATO [North Atlantic Treaty Organization] allies and Pacific allies. That is useful not only for the purpose of the nonproliferation program, but it keeps us in close coordination and communication with those allies in terms of their nuclear capabilities, so I consider those very important programs.

Senator CRAMER. Along those lines, and maybe you could comment or you, Admiral, for that matter too, on how, with regard to that relationship that you just outlined—I guess I can say I worry a little bit about the reputational risk that has been associated with the events of the last, you know, some say a couple of years, us being seen as once the reliable umbrella ally that we are—am I wrong to be concerned about that or—and again Admiral, maybe you want to speak to that a little bit as well.

Ms. HRUBY. I will start and then let Admiral Caldwell talk about the naval part. I am fond of saying if anybody ever asked you if you want a Russian, a Chinese weapon, or a United States weapon, say United States.

We still have, despite—we are very transparent about our issues, but we still have an incredible capability in this country. Our weapons are second to none and we are making sure that they stay that way. So, I would say the NATO allies are actually here this week.

They will be at Lawrence Livermore on Friday. I will be with them for that meeting. We are doing a lot of assurance meetings and they are always very impressed to see what capabilities we have and to see the commitment to the enterprise that we have.

Senator CRAMER. Admiral, anything you would add to that?

Admiral CALDWELL. Sir, I want to make sure I understand your question. Is your question about our sharing and relationship with the UK in particular, or how our allies and partners view the viability of our nuclear—?

Senator CRAMER. Yes, so I think it is—I would add a third category and that is that their trust that we have the political will as well as the capabilities to continue to be—to provide that umbrella that helps you control some of the issues you have talked about, Administrator.

Admiral CALDWELL. I don't have as many interactions maybe as some of the other Navy leaders with those key allies. I can tell you we have a strong interaction with the UK. I think there is absolutely trust there.

I just returned from a trip to Japan where I spoke with Japanese leaders. Clearly, if you look at their National Defense Strategy and National Security strategy, the United States plays a huge role in their future as they have laid it out in clear language.

I think there is a lot of faith and confidence in the U.S. war plan, and our ability and commitment to follow through on that.

Senator CRAMER. Maybe, Mr. Chairman, I am more concerned about our ability to persuade our own constituents sometimes of this. But thank you, both of you, for your answers. Thank you, Mr. Chairman.

Senator KING. Senator Gillibrand.

Senator GILLIBRAND. Thank you. Admiral Hruby—Administrator Hruby—yes, just, sorry. It would be nice to be an Admiral. Administrator Hruby, inertial confinement fusion facilities, including the Omega Laser facility at the University of Rochester’s Laboratory for Laser Energetics have not had major infrastructure investment since the 2000’s.

The demand on these world’s leading high energy density science facilities continues to grow. Is the fiscal year 2024 budget request sufficient to cover critical sustainment activities while meeting increased operational demand on the facilities? Are you including sustainment costs in your 5-year future budget plan?

Ms. HRUBY. Well, thank you for that question. The Omega facility, the Laser Energetics lab, is a very impressive facility and frankly, has made just very important contributions to our programs, including ignition at NIF [National Ignition Facility], because we are able to do many experiments faster there and try things out.

We have produced a report which we have submitted that talks about all the investments we need to make at all of our fusion sites in the U.S., and it is a significant amount of money.

We are trying to execute that plan in this budget and our 5-year budget, our request for Rochester is higher this year than it was last year. But it will be a journey, a long-term journey to make the investments in science and technology that we need, including at this facility.

Senator GILLIBRAND. Thank you. Admiral Caldwell, the breakthroughs in December at the National Ignition Facility have significant implications for nuclear energy production. What are the implications of inertial confinement fusion on the future of the U.S. nuclear fleet?

Admiral CALDWELL. My team pays close attention to development in the nuclear field, but as we see it, the viability of nuclear fusion is still many decades away.

As we think about putting ships to sea, I need to make sure that the reactors and the components and things we build into the submarine are absolutely reliable. We are a proven technology.

When you when you build a ship and you put the reactor in and it is going to stay there for 30 plus or 40 years for *Columbia*, it has got to work correctly first time and every time. We are just not there with fusion. But we keep close tabs on what is going on in science and technology throughout the United States.

Senator GILLIBRAND. Thank you. Mr. White, we are increasingly looking toward expanded nuclear capacity and small modular reactors for energy production as we try to meet our net-zero goals.

At the same time, we are still struggling to figure out how to manage existing radiological waste. As we balance our energy needs and our defense needs, what policies or mechanisms do we

need to adopt to ensure that we are properly disposing of nuclear waste products?

Mr. WHITE. Certainly, when I think about the importance of the clean-up program—and I mentioned earlier that, I think it is extraordinarily important for our National Security and scientific research missions.

Part of the reason for that is, I think our ability to safely and effectively dispose of nuclear waste and treat that waste underlies our ability to also move forward in the nuclear security and nuclear energy realms.

From a policy perspective, certainly for the clean-up program, the biggest thing outstanding is our ability to dispose of high-level waste. We have an inventory of high-level waste in the cleanup program that we manage for the Energy Department, and the absence of a capability for disposal of that waste certainly impacts our cleanup program.

Senator GILLIBRAND. Thank you, and, Administrator Hruby, your agency is tasked with the managing nonproliferation efforts. Where do you foresee nonproliferation efforts trending in the next decade now that Russia has withdrawn from the New Start? What effect will China's expansion of nuclear capabilities have on our current nonproliferation regime and the Nonproliferation Treaty?

Ms. HRUBY. Yes, well, the nonproliferation efforts, and this is a little bit to the question addressed earlier, we are doubling down with our allies on nonproliferation activities to make sure that we are collectively supportive of nonproliferation programs, including the programs around the hot zones right now.

Obviously, Ukraine, but there are other regions that we want to make sure that we still have detection of materials that could be lost or stolen from countries that have nuclear materials. With Russia and China we would really like to be in strategic stability dialogs, but we aren't.

What we are doing in the Department, in NNSA is working on verification technologies so that when we—for these new weapons, many new weapon systems, so that when there is a window open again for discussion, which hopefully someday there will be, there won't be a barrier associated with not having proper verification technologies developed.

Senator GILLIBRAND. Thank you. Thank you, Mr. Chairman.

Senator KING. Senator Rounds.

Senator ROUNDS. Thank you, Mr. Chairman. and thanks to all of you for your service to our country. This is an unclassified discussion and I appreciated the opportunity that we have had to have classified discussions on this.

I kind of got to thinking the vast majority of folks that are probably watching or listening to this discussion, they are wondering kind of maybe some of the basics. I would like to take a few minutes, just kind of work our way through the basics of why this is so important to our country.

I must start with Administrator Hruby. Let's talk about, we are talking our national defense is really based upon a nuclear deterrence. But the nuclear deterrence means not just land based. It means submarine based, and it means air carried weapons that

have a nuclear weapon on them, whether it be a bomb or a missile tip.

Can you talk a little bit about what it means when we—we are talking here about plutonium pits and so forth. Can we just take a minute here and perhaps explain a little bit about the concern that we have got about the number of plutonium pits that we actually do per year and so forth?

Talk to us a little bit and maybe explain that in a level that I could understand, about third grade level or so, here.

Ms. HRUBY. Well, I know you understand more than that, because I know you—I have been in our model room with you and you asked great questions. So, but let me try to address your question.

To make a nuclear weapon, which is the core of our deterrence in the United States, we have to be able to work with nuclear materials, both plutonium and enriched uranium, and many other materials that are difficult to work with.

We have to be able to have physics packages that we are absolutely confident will work when we want them to and not work at any other time. That requires a lot of engineering of non-nuclear components.

We use in the United States a captive production complex where we do buy parts from commercial supplies, but mostly these materials—this is something we have to do ourselves. It is perhaps the only captive production complex in the United States, make sense, the way you make nuclear weapons.

We have to have a very strong understanding of the science. We have to turn that into manufacturing capabilities and we have to deliver weapons on time to the Department of Defense (DOD).

Senator ROUNDS. The different weapons that we have, they basically have a system inside of them that, when triggered, create a nuclear reaction that is the bomb or the missile tip.

What sizes—can you talk a little bit about what that means to somebody in the American public about the size? How huge these weapon systems are?

Ms. HRUBY. The physical size of the weapon system?

Senator ROUNDS. Not so much the physical size, but the impact—the size of the blast, sort to speak.

Ms. HRUBY. Yes. Well, we have weapon systems that have yields from tens of kilotons—

Senator ROUNDS. Tens of kilotons, meaning in high explosive, like a big bomb that you would—a conventional bomb—

Ms. HRUBY. Right, right—

Senator ROUNDS. That would be the size of how big of a bomb? Ten kiloton?

Ms. HRUBY. Let's—maybe the easiest way to say this is our lowest yield weapons today are about the size of the weapon at Hiroshima.

Senator ROUNDS. Our smallest, and they move up from there.

Ms. HRUBY. They move up from there.

Senator ROUNDS. These are both fission and fusion.

Ms. HRUBY. They are thermonuclear weapons, right.

Senator ROUNDS. Now, I think there is a question out there about what that means. Let's just—I have got a minute left, but let's walk our way through that a little bit.

Ms. HRUBY. The physics.

Senator ROUNDS. Yes, let's talk about that.

Ms. HRUBY. Yes, the plutonium pit and the weapons is imploded by high explosives. It produces a blast that is captive inside the weapon that goes to the secondary, and implodes the secondary, and the secondary makes the large yield from the weapon.

Senator ROUNDS. When you just say the secondary, you mean the actual material that surrounds a—or that is next to a plutonium pit. The plutonium pit is really the trigger mechanism.

Ms. HRUBY. The plutonium pit is a trigger mechanism. The secondary is a uranium base.

Senator ROUNDS. When we do that, we are concerned about plutonium pits because we have to have those in order to make every one of these new weapons systems, these modern weapons systems that we want to deploy.

Ms. HRUBY. Right.

Senator ROUNDS. We can't make a lot of those per year, can we?

Ms. HRUBY. No, but we do have pits that can be reused. Not all of them, but some of the pits that we already have can be reused.

Senator ROUNDS. But it is still—that is a critical component—

Ms. HRUBY. Absolutely.

Senator ROUNDS. In terms of our national defense, when we are talking about new facilities to modernize or to be able to do those, it is a critical part of our national defense in terms of deterrence.

Ms. HRUBY. Yes.

Senator ROUNDS. Thank you. My time has expired. Thank you, Mr. Chairman.

Senator KING. Senator Warren.

Senator WARREN. Thank you, Mr. Chairman, and thank you to our witnesses for being here today. Thank you for the work you do. A key component of modernizing our nuclear weapons involves the construction of new plutonium pits. These pits are the central cores of nuclear weapons that are used to trigger the nuclear explosion.

Congress mandated that NNSA produce at least 80 of these pits by 2030. However, it is clear, perfectly clear that NNSA will not be able to meet this requirement. NNSA has a terrible track record of waste and mismanagement over the years and failing to come even close to budget estimates.

It is important to me that we not see taxpayer dollars wasted again. Now, the Government Accountability Office, GAO, recently released a report in January. They found that NNSA has still failed to establish even a cost estimate for the production of these pits.

Administrator Hruby, last year, when you came before the Subcommittee, you may remember you and I had this conversation. We talked about how there were no clear cost estimates for this program.

The GAO is now estimating that at least part of the program will cost \$18 to \$24 billion, and that the total program will be much higher if, and I want to underline the word if, it ever even ends up being completed.

I am glad that GAO is working hard to try to keep you honest on this, but it is NNSA's job to estimate these costs. Why have you not established a lifecycle cost estimate for this program?

Ms. HRUBY. Well, thanks for your question. We agree with the GAO report, and we also have agreed in our response to the GAO report that by April of this year we will have our initial lifecycle cost estimate. This is the cost for everything. That is the whole point of—

Senator WARREN. Wait, April of this year? That is like two more weeks?

Ms. HRUBY. Oh, April—I am sorry, April of 2024. I am sorry, April of 2024—April of 2024, we will have—we are in 2024 budget request. So, it is April of 2024, we will have the initial cost estimate. Then in 2025, we will have an improved cost estimate.

Senator WARREN. Okay. So let me just say, you didn't have the numbers last year. You don't have the numbers this year.

The best answer I can get is we are going to have them a year from now, which means that Congress and the public has to wait just for another year before we even get a basic cost estimate on what this program is going to cost?

Ms. HRUBY. There are many elements of the overall plan. Most of those elements have had cost estimates released. The life cycle cost estimate referred to in the GAO report is the total cost for everything involved with making pits. Some of those are still pretty immature designs and therefore it is very difficult to do the entire cost estimates—

Senator WARREN. Okay, so I get it. This is hard. I understand that it is hard, but this is a long time and we keep allocating money into this program.

It looks like we are not going to know how much this staggeringly expensive program is going to cost us for a while, so let me ask you a different question. Let's look at whether NNSA has a good plan to control costs in the meantime.

Best practice for budgeting these types of complex programs is to develop what is called an integrated master schedule, an analysis that is going to break down the project into steps, resources, and budget needed to complete it. Sort of budgeting 101.

The GAO first raised this in 2020, that is 3 years ago, and found that NNSA did not have such a plan in place. GAO now put out a new report saying that NNSA still does not have such a plan in place. According to GAO, the plan you do have is, "not a reliable plan."

We see here again that NNSA is not following just basic budgeting standards and planning for this program. So, with total program costs running somewhere in the tens of billions of dollars, we are talking about significant cost risks if things get off schedule or run into problems.

The plan you have doesn't even tie budget resources to activities. Administrator Hruby, when will NNSA have an IMS [integrated master schedule] that meets budgeting 101 requirements?

Ms. HRUBY. Again, on the individual projects we have IMS. The GAO report is looking at their overall plan. We have improved our overall planning for the items that we know there is a tight connection like gloveboxes.

But within the Los Alamos pit production facility plan, it is a highly integrated plan. We are still working on developing the plan across the entire—

Senator WARREN. So, I am sorry. So, what was the answer to my question? When will NNSA have an IMS that meets basic budgeting requirements—when?

Ms. HRUBY. The plan—it will go along the—around the same time as the life cycle plans, because we are still in the design phase of the Savannah River pit production—

Senator WARREN. Can I just suggest that it is not a plan if you are making it up as you go along and just kind of integrating this. You know, you have information on this program because you are making budget requests for it.

So, you must know something because you are coming to us asking us for money. But the current plan doesn't even have the information on the resources that you will be using for the few activities that you have included and asked for money for.

I just have to say, I am concerned that this looks like it is just hiding information from the public and from Congress. Either you don't know or you do know when you are not telling us and that is a problem. I will just wrap up because I know I am over time.

I just want to say here that the Defense Department is full of a lot of really high-priced items. But even in that rarefied environment, NNSA run some of the most shockingly expensive programs. It is deeply concerning when just basic budgeting is out of whack here.

At a minimum, we need to know how much resources we need for a project before we start implementing it, and I am deeply concerned that we are just going to use this as an excuse to drag out the timeline even further and jack up the cost overall.

It is not unreasonable for Congress to ask you to tell us how long a project is going to take and how much it is going to cost in exchange for our forking over billions of dollars. I suggest that that is what NNSA be required to do before we give them another penny. Thank you. Sorry for going over.

Senator KING. Thank you, Senator. I would point out that Northrop Grumman has given us a fixed price contract for the entire rebuilding of the Sentinel program, one of the most complex undertakings in the history of the world.

I understand the point that the Senator is making, that having this vague assurances with no real firm cost estimates or timeline is not—this is a difficult challenge, I understand, but I don't think it is more complicated than rebuilding the entire Sentinel program. Any further questions on this round? Yes, sir, Senator Rounds.

Senator ROUNDS. When you submit the budget for the production facilities, does it go through Energy or does it go through DOD? Where does that come through at?

Ms. HRUBY. The appropriations go through Energy and Water.

Senator ROUNDS. I am sorry?

Ms. HRUBY. Energy and Water.

Senator ROUNDS. Yes. So, it would come under the Department of Energy. But the products that you are producing are critical to the national defense because this is the location where the pits, a

significant number of these pits would be produced for the Department of Defense.

Ms. HRUBY. Well, the responsibility for making nuclear weapons is with the Department of Energy. Has been since the Atomic Energy Commission, since the Manhattan Project, and philosophically, the reason for that is so the weapons are not produced by warfighters.

They are produced by people with deep scientific and technical knowledge of the weapons and the materials in them.

Senator ROUNDS. So, and if I could just—I will wrap up. If the Department of Energy had a similar access or could use a management plan similar to what was designed for the Sentinel program, but also for the B-21, where there was a fixed price basically involved in it, has that been something that has been discussed within the Department of Energy?

Ms. HRUBY. We discussed this with the Department of Defense all the time. We do have cost estimates and independent cost estimating capabilities. We review this with the Nuclear Weapons Council in detail on a regular basis.

We are quite transparent in what we know and what our uncertainties are. What we don't have in the GAO report is the total cost for the entire enterprise, because we are still in the process of designing a major part of that enterprise.

We have cost ranges and we have completion date ranges because we don't yet have the amount of information, we need to nail down a projected cost.

Senator ROUNDS. Thank you. Thank you, Mr. Chairman.

Senator KING. One quick followup question, Mr. White. Are we processing waste on an ongoing basis, or are we adding to the backlog? In other words, is the waste that is being produced being processed as it comes, or is the backlog growing larger?

Mr. WHITE. Make sure I understand your question, Senator. For a specific site or just in general?

Senator KING. No, just in general, the waste that is being produced by the entire enterprise. There is waste being produced on a year-to-year basis. Is it being processed or is it being processed on a current year to year basis, or is it going into a repository for processing at some later date?

Mr. WHITE. When we look at this, the terms we use are newly generated waste and our legacy waste. For the most part, I think we are keeping on top of our newly generated waste at the same time that we are bringing down the inventory of our legacy waste.

Senator KING. So, we are not digging the hole deeper.

Mr. WHITE. Right.

Senator KING. Correct.

Mr. WHITE. Right.

Senator KING. Thank you. Go ahead, Senator Fischer.

Senator FISCHER. Thank you, Mr. Chairman. Admiral, I am curious on the AUKUS. The agreements that we are reaching there and really the outstanding potential, I think, that we are going to see. It is a tremendous opportunity that we can increase the capabilities of one of our closest allies.

It, I believe, also strengthens deterrence in the Indo-Pacific, that we are able to do that. Can you provide us with an update on how

discussions with the Aussies and the Brits are going, and how that looks since this 18-month consultation period is concluded?

Admiral CALDWELL. Yes, ma'am. I can—can you hear me?

Senator FISCHER. Yes.

Admiral CALDWELL. I can talk about our experiences over the 18 months, and then tell you that, and where we are headed now. Over the 18 months, we have had incredible interactions with both of our allies.

One of the foundational dialogs has been stewardship, to make sure that we understand this incredible technology, but we treat it with respect. That has been just inherent in every part of the dialog that we have had.

As we think about the different phases of AUKUS, we built the optimal path so that Australia could learn, grow. That includes embedded opportunities here in the United States and in the UK, and eventually grow toward where they not only understand the technology, but they are ready to own and operate. It includes governance and regulatory structures as well.

I want to leave you with the view that these dialogs have been rich. They have been strong. We have a lot of work ahead of us. I think we have laid an excellent groundwork. But to give you some sense, I have right now six Australian officers attending nuclear power school down in Charleston.

They will graduate from that program and then they will go into our U.S. fleet and they will serve initial junior officer tours there, qualify as engineer officer, and then we are going to find opportunities for them to continue to serve in our Navy.

Likewise, we are considering embedded opportunities in our squadrons, in our squadrons, and other areas where we can continue to teach, mentor, train, develop their leaders, and they are absolutely committed to this.

The same thing is true with the UK. So, we have completed the consultation period. We have described the optimal path. Now we are after the details to really make this happen. It is exciting, but there is also a lot of work ahead of us.

Senator FISCHER. Thank you, and Administrator, before the next panel, I would like to highlight the phenomenal work by the men and women at Lawrence Livermore to achieve that ignition last December.

I recall being there and visiting NIF in I think it was 2014, and this is a huge accomplishment. Can you share with the Committee really the significance of the breakthrough?

I know the Admiral said it is going to be a long time, and we have all read the articles. It is going to be a long time before we can really put this into practice. But gosh, how cool. Tell us.

Ms. HRUBY. Yes, thank you for that. It was very cool. It speaks to the ingenuity of the scientists and engineers, and frankly just the grit. There were a lot of people that didn't think it could be done.

Not only did we do it, but we did it first. I think it provides evidence of the power of science and technology in the United States of America. For us in the NNSA, this allows us to reach regimes, physics regimes for—to study nuclear weapons in ways we haven't been able to do in the lab before.

That is our interest. Of course, the interest of the American public and others is the ability to produce boundless energy. There is still a lot of work to do to get there, but this gives us hope.

Senator FISCHER. Thank you very much. Thank you, Mr. Chair.

Senator KING. Thank you. This concludes the first panel, and we will not take a break. We will have the second panel come to the table and move forward. Thank you all very much. Dr. Adams, you are in the center. You want to lead us off?

Mr. ADAMS. I would be happy to.

Senator KING. Thank you.

STATEMENT OF THE HONORABLE MARVIN L. ADAMS, DEPUTY ADMINISTRATOR FOR DEFENSE PROGRAMS, NATIONAL NUCLEAR SECURITY ADMINISTRATION

Mr. ADAMS. Chairman King, Ranking Member Fischer, and distinguished Members of the Subcommittee, thank you for the opportunity to discuss the President's Fiscal Year 2024 Budget Request for NNSA.

As Deputy Administrator for Defense Programs, I am committed to working closely with you, our other partners in Congress, and the DOD to advance the nuclear security mission. The fiscal year 2024 budget request for Weapons Activities is \$18.8 billion. This is a \$1.7 billion increase over fiscal year 2023 enacted levels.

This budget will enable us to continue fielding safe, secure, reliable nuclear warheads, and an effective nuclear deterrent force. NNSA is executing five nuclear warhead modernization programs. Two of them are in full rate production now and delivering on schedule to the Navy and the Air Force.

The other three are making steady progress while remaining aligned with the DOD platform programs. These modernization programs address weapon aging, technology obsolescence, and changes in delivery platforms.

As you know, much of this country's infrastructure for manufacturing nuclear warheads has atrophied or disappeared, and NNSA is engaged in a massive effort to rebuild this infrastructure, an effort that will determine our capabilities for decades to come.

As Administrator Hruby says, we have to get this right. Our budget request will enable this rebuilding to proceed at an aggressive but executable pace. NNSA's world class computational, experimental, and test capabilities are used every day to execute our mission. We can't do without them.

They also attract outstanding individuals and help them develop the expertise and judgment that we need in our stockpile stewards. They add credibility to our nuclear deterrent by demonstrating world leading expertise, as with the recent fusion ignition experiment at the National Ignition Facility.

They enable us to maintain confidence in our weapon performance without nuclear explosive testing. Our budget request will allow us to keep these vital capabilities up to date. Our tasks are urgent and challenging, but with continued support from Congress, we will succeed.

Our mission is vital and our workforce is determined. Thank you and I look forward to your questions.

[The joint prepared statement of The Honorable Jill Hruby and The Honorable Marvin L. Adams follows:]

JOINT PREPARED STATEMENT BY THE HONORABLE JILL HRUBY AND THE HONORABLE
MARVIN L. ADAMS

Chairman King, Ranking Member Fischer, and Members of the Subcommittee, thank you for the opportunity to present the President's fiscal year 2024 budget request for the Department of Energy's (DOE) National Nuclear Security Administration (NNSA). NNSA appreciates the Subcommittee's ongoing bipartisan support for our mission and workforce.

NNSA is making significant progress across the entire portfolio. The weapon modernization programs are delivering to the Department of Defense. The production modernization and infrastructure initiatives are advancing with noticeable progress all around the nuclear security enterprise. Nonproliferation and counterterrorism activities continue to make the world safer, help Ukraine, and prepare for future threats and opportunities. Naval reactors, in partnership with NNSA nonproliferation and others across the government, successfully completed the 18month consultation period for AUKUS. Our workforce recruiting and retention programs have helped us turn the tide of attrition post-Covid. Although there are plenty of challenges, it is clear that the NNSA enterprise is delivering and creating new approaches to accelerate delivery going forward.

NNSA's priorities, as outlined in the fiscal year 2024 budget request, reflect a deteriorating international security environment, expanded mission demands, and challenges in building unique large nuclear facilities.

Russia is changing the global nuclear landscape in multiple dimensions. As it has for several years, Russia continues development of new strategic nuclear weapons delivery systems and renewal of its tactical nuclear weapons inventory. Its unjustified full-scale invasion of Ukraine has also presented several new nuclear threats—the potential for a radiological release from a nuclear power plant due to active combat or operational missteps, or the use of a nuclear weapon in war. In addition, the invasion of a country that voluntarily relinquished its nuclear weapons by a nuclear weapon State sends an unfortunate signal to the world. Russia's recent decision to suspend its participation in New START has no valid legal basis and lends uncertainty to the future of arms control and fuels stability concerns. Russia's nuclear behavior is irresponsible, and its actions will impact global conditions for some time to come.

In addition, China's advancing and growing nuclear capabilities, its reimagined minimum deterrence requirements, and continued lack of transparency or interest in arms control dialog are deeply troubling. Therefore, the U.S. must prepare for China as a future peer nuclear adversary.

Contending with two peer nuclear adversaries at once will take us into uncharted territory and require breaking from strategies we relied upon during and after the Cold War.

Furthermore, North Korea and Iran are destabilizing and present persistent nuclear proliferators. North Korea actively tests missiles and diversifies its nuclear delivery capabilities and expresses its intent to threaten the U.S. and our allies. Meanwhile Iran continues to enrich uranium to higher levels and expand its nuclear program far beyond JCPOA limits.

This environment reinforces the need for both continued efforts at nuclear arms control and nonproliferation and for the U.S. nuclear deterrent as the cornerstone of our national defense and as assurance for our allies. As our weapons and infrastructure exceed their design lifetimes, we continue to simultaneously execute five weapon modernization programs and refurbish significant parts of the NNSA production and scientific enterprise to maintain a safe, secure, reliable, and effective deterrent for today and into the future.

NNSA remains acutely aware of the need to increase the pace of our modernization efforts while retaining confidence in our nuclear stockpile. We also realize this is a once-in-a-several-generation opportunity to reform our enterprise. NNSA is using the weapon, production, and infrastructure modernization programs to intentionally create a more flexible and resilient enterprise that can respond to unforeseen changes in mission requirements at the pace of the threat. This is a significant undertaking, and we have strong headwinds in our construction activities. Difficulties in construction are being felt across the United States and being studied by economists. Although initially thought to be caused by Covid, NNSA projects have continued to experience supply chain and craft worker shortages, exacerbated by higher-

than expected inflation. We must adjust our cost estimates, delay starting additional large projects, and find innovative ways to successfully deliver.

The challenging security environment, and the demands it places on our nuclear weapons enterprise cannot distract us from progress on nonproliferation, terrorism prevention, partnering with the international community, and keeping pace with new technologies and threats. We are facing an increased international demand for nuclear energy as a response to the climate crises. As new nuclear energy programs emerge, a heightened burden is placed on the nuclear nonproliferation regime to prevent nuclear energy programs from becoming latent nuclear weapon capabilities or targets for terrorists.

Excellence in naval propulsion continues to provide the U.S. with a competitive advantage. Sustaining, modernizing, and advancing the naval propulsion efforts is a priority for NNSA. We will continue to stay focused on building the spent fuel handling facility, delivering *Columbia*-class propulsion, and developing next generation capabilities. The AUKUS activities have increased the intersection of the naval reactors program with nonproliferation and nuclear material production activities, and we will continue to stay tightly coordinated.

The NNSA nuclear security enterprise is meeting today's requirements and building for the future. We have a challenging mission in a challenging time and are committed to its near-and long-term success. Continuous support from this Administration and Congress is essential to that success.

NNSA SIGNIFICANT ACCOMPLISHMENTS IN 2022

Life Extension and Weapons Modernization Programs: In 2022, NNSA transitioned both the B61-12 Life Extension Program (LEP) and the W88 Alteration (Alt) 370 Program into Phase 6.6, Full-Scale Production and met the deployment requirements set by the Department of Defense.

National Ignition Facility (NIF): In December, the Lawrence Livermore National Laboratory's (LLNL) NIF reached ignition in a controlled fusion experiment resulting in a net energy gain for the first time after six decades of global effort. Achieving ignition allows new regimes relevant for stockpile understanding to be studied and represents an important step toward laser fusion as a potential abundant clean energy source.

Plutonium Pit Production: Los Alamos National Laboratory's Plutonium Facility manufactured ten W87-1 development pits in 2022. Progress on build rates and quality has been excellent.

Ukraine: NNSA has provided a wide range of equipment, training, and technical aid to Ukraine to help prevent and respond to the dangers of a nuclear emergency at Ukraine's nuclear power plants. Equipment provided includes emergency diesel generators and generator fuel. We also continuously monitor radiation sensor data in Ukraine and the region to provide independent results for early warning, and regularly practice emergency communications with the Ukrainians.

Surplus Plutonium Disposition: In December, NNSA completed its first shipment of downblended surplus plutonium from the Savannah River Site (SRS) in Aiken, South Carolina to the Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico. NNSA has converted a cumulative total of 1,298 kilograms of plutonium to an oxide form in preparation for final disposition.

Nuclear Material Reduction: In 2022, NNSA removed more than 55 kilograms of weapons-usable nuclear material from partner countries in Asia, Europe, and North America, achieving permanent threat reduction. The third nuclear research reactor in Kazakhstan was converted from highly enriched uranium (HEU) to low-enriched uranium (LEU) fuel and Japan transferred HEU from Kyoto University to the United States for permanent disposition.

Global Material Security: NNSA removed 101 cesium blood and research irradiators from U.S. facilities, the largest number in a single year; 93 were replaced by radioactive source-free alternative technologies. We are on track to meet the statutory requirements of replacing all cesium-based blood irradiators in the United States by 2027.

Counterterrorism: NNSA participated in Cobalt Magnet 2022, the latest in a series of full-scale exercises with Federal, State, and local stakeholders to test concepts of operations and methods for assessing, interpreting, and communicating the impacts of a release of radioactive material. NNSA also assumed the role of vice chair of the Nuclear Forensics Executive Council and helped develop the Nuclear Forensics and Attribution Strategic Plan that establishes milestones and requirements to shorten timelines to support Presidential decisionmaking during a crisis.

Infrastructure Innovation: NNSA completed construction of an Emergency Operations Center (EOC) at LLNL in California under the innovative Enhanced Minor

Construction and Commercial Standards (EMC2) initiative for streamlining non-complex, non-nuclear construction projects. This project finished 13 months after receiving construction funding, ahead of schedule and under budget.

Workforce Recruitment: NNSA expanded recruitment efforts for top talent in the sciences, engineering, and skilled crafts and trades in coordination with our M&O partners. This has resulted in the highest Federal staffing levels since 2013 and over 11,000 people hired in the enterprise. Additionally, NNSA continues to develop the next-generation workforce through its Minority Serving Institutions (MSI) and Tribal Educational partnership programs and supported 84 MSI interns in 2022.

Workforce Retention: In response to high attrition, a mid-year salary adjustment was granted at our laboratories, plants, and sites to better pace inflation and changing employee expectations. More flexible benefit packages were also implemented. These timely actions have helped lower attrition to levels closer to normal.

NNSA'S FISCAL YEAR 2024 BUDGET REQUEST

The President's fiscal year 2024 budget request for NNSA is \$23.8 billion, an increase of \$1.7 billion, or 7.6 percent, above the fiscal year 2023 enacted level.¹ This funding request reflects the requirements in the nuclear weapons program of record, the National Security Strategy, the Nuclear Posture Review, and other national security strategies and requirements. The funding request supports expanded mission due to the global environment and takes into account increased costs and delays in construction projects. We are mindful and deeply appreciative of the sustained support from Congress, multiple administrations, and the American people.

Fiscal year 2023 enacted levels throughout this document do not reflect the mandated transfer of \$99.7 million from Naval Reactors to the Office of Nuclear Energy for operation of the Advanced Test Reactor.

WEAPONS ACTIVITIES APPROPRIATION

The fiscal year 2024 budget request for the Weapons Activities account is \$18.8 billion, an increase of \$1.72 billion, or 10 percent, above the fiscal year 2023 enacted level. The request will be supplemented with prior year balances of \$61.6 million.

The budget request represents the Administration's firm commitment to a safe, secure, reliable, and effective nuclear deterrent underpinned by world-class science and modern resilient infrastructure and protected with advanced physical and cybersecurity measures. The fiscal year 2024 request reflects the increased urgency needed to modernize weapons and refurbish, revitalize, and reinvest in the nuclear enterprise and workforce.

STOCKPILE MANAGEMENT

The fiscal year 2024 budget request for Stockpile Management is \$5.2 billion, an increase of \$251 million, or 5.1 percent, above the fiscal year 2023 enacted level. Activities include: (1) weapons modernization, (2) stockpile sustainment, (3) production operations, (4) weapons dismantlement and disposition, and (5) nuclear enterprise assurance.

Weapon Modernization Programs

The Weapon Modernization Program request is \$3.1 billion, an increase of \$200 million, or 6.9 percent, above the fiscal year 2023 enacted level.

W88 Alt 370: The W88 Alt 370 program has entered Phase 6.6, Full-Scale Production, and is currently on schedule to meet Department of Defense (DOD) deployment schedules. The budget request of \$179 million is \$17 million higher than the fiscal year 2023 enacted level, with the increase needed to mitigate risks encountered in Pantex production.

B61-12 LEP: The B61-12 LEP has entered Phase 6.6, Full-Scale Production. The B61-12 LEP consolidates multiple variants of the B61 gravity bomb and improves the safety and security of the weapon. Production is currently on schedule to meet DOD deployment schedules. The budget request of \$450 million, \$222 million lower than the fiscal year 2023 enacted level, is informed by carryover and reflects completion of production of many components.

W80-4 LEP: The W80-4 LEP has entered Phase 6.4, Production Engineering. NNSA revised the first production unit (FPU) schedule in response to COVID-19 impacts, slower than planned hiring and increased attrition, and increased component technical challenges. NNSA's revised schedule is fully aligned with the U.S.

¹Fiscal year 2023 enacted levels throughout this document do not reflect the mandated transfer of \$99.7 million from Naval Reactors to the Office of Nuclear Energy for operation of the Advanced Test Reactor.

Air Force's (USAF) Long Range Standoff Missile's schedule for initial and full operating capability. The budget request of \$1.01 billion is \$123 million lower than the fiscal year 2023 enacted level, consistent with long-standing plans and with typical warhead program profiles, with expenditures ramping down from the current peak as the program moves through its remaining phases.

W87-1 Modification Program: The W87-1 will replace the aging W78 warhead using a modification to the existing W87-0 design. The W87-1 will deploy new technologies that improve safety and security, address obsolete designs and materials, and simplify warhead manufacturability. The W87-1 has entered Phase 6.3, Development Engineering, and expenditures are ramping up accordingly. The fiscal year 2024 request of \$1.07 billion is \$389 million higher than the fiscal year 2023 enacted level. This request fully supports the increased activity needed to execute Phase 6.3 in fiscal year 2024. The request is informed by the recently completed Weapon Design Cost Report, the associated Independent Cost Review by the Office of Cost Estimating and Program Evaluation, and analysis of achievable execution rates by the enterprise.

W93 Program: The W93 is a third warhead for our submarine launched ballistic missiles and is a new warhead. The key nuclear components will be based on currently deployed and previously tested nuclear designs that will not require nuclear explosive testing to certify. The W93 program is a separate but parallel program to the replacement warhead program in the United Kingdom. In February 2022, the W93 entered Phase 2, Feasibility Study and Design Options. The budget request of \$390 million, an increase of \$149 million over the fiscal year 2023 enacted level, reflects the ramp-up associated with Phase 2 and is informed by improved cost estimates.

Stockpile Sustainment

Sustaining today's stockpile is the top priority for NNSA. The Stockpile Sustainment program executes warhead maintenance, limited life component exchanges, minor alterations, surveillance, assessments including annual assessments and significant findings investigations, surety studies and capability developments, and management activities for all weapons systems in today's stockpile. The fiscal year 2024 budget request for Stockpile Sustainment is \$1.28 billion, a decrease of \$44.6 million, or 3.4 percent, below the fiscal year 2023 enacted level. Most of the decrease is due to completion of certain sustainment activities for the W78 and W80 and reduced program requirements for the B83.

Production Operations

Production operations maintains capabilities for warhead manufacturing and surveillance that are not specific to "tail numbers". The budget request of \$711 million is \$80 million higher than the fiscal year 2023 enacted level. Activities supported by the request budget include full rate production of the B61-12 and W88 Alt 370, capability support for Power Sources and Energetics at Sandia National Laboratories, capability support for production of neutron generators and detonators, expansion and equipment relocation at Kansas City, maintenance of production and dismantlement equipment, and recruitment and development of skilled personnel to perform production activities.

Weapons Dismantlement and Disposition

Warhead modification and alterations since the end of the Cold War have relied heavily on reuse of components from dismantled warheads, and this will continue at least through the W80-4 program. Warhead programs, Naval Reactors, the tritium program, and Defense Nuclear Nonproliferation's research-reactor programs all depend on recycled material from dismantled warheads. The fiscal year 2024 request of \$53.7 million, a decrease of \$2.3 million from the fiscal year 2023 enacted level, supports the dismantlements and dispositions that are needed in fiscal year 2024 for B6112 production, W88 Alt 370 production, naval-reactor material, research-reactor material, and uranium to fuel the Watts Bar nuclear reactors in which tritium is produced.

Nuclear Enterprise Assurance (NEA)

The NEA program assists the nuclear security enterprise in actively managing subversion risks to the nuclear weapons stockpile and associated design, production, and testing capabilities from subversion threat pathways. The fiscal year 2024 budget request of \$66.6 million, an increase of \$17.7 million, or 36.2 percent, over the fiscal year 2023 enacted level, represents the planned ramp-up of this new program that began in its current form in fiscal year 2022. The requested funding is needed to establish cross-site, multi-disciplinary assurance capabilities; address highest priority subversion risks at each of the eight NNSA sites; institute cybersecurity of nu-

clear weapon policy, requirements, and oversight processes; and establish, update, and expand NEA training and qualification programs.

PRODUCTION MODERNIZATION

The production modernization program re-establishes and modernizes the manufacturing capabilities for nuclear weapons that degraded or were eliminated after the Cold War. The fiscal year 2024 budget request for Production Modernization is \$5.6 billion, an increase of \$439 million, or 8.6 percent, above the fiscal year 2023 enacted level. This funding is focused on the timely establishment of nuclear weapon production capabilities for primaries, secondaries, tritium and depleted uranium, and non-nuclear components.

Primary Capability Modernization

Pit Production: NNSA's most pressing recapitalization effort is reconstitution of plutonium pit production. NNSA is statutorily required to produce no fewer than 80 pits per year (ppy) by 2030. The Secretary of Energy and the Nuclear Weapons Council have previously notified Congress that NNSA will not meet the 80 ppy by 2030 requirement. However, NNSA remains firmly committed to achieving 80 ppy as close to 2030 as possible. Through close coordination with DOD, NNSA will maintain the reliability and effectiveness of the nuclear stockpile until pit production capabilities are fully established.

NNSA is proceeding with the two-site approach for producing at least 80 ppy, with the Los Alamos National Laboratory Plutonium facility set to produce 30 ppy and the Savannah River Plutonium Processing Facility (SRPPF) set to produce at least 50 ppy. The two-site approach is a key component of NNSA's development of a modern nuclear security enterprise, with an emphasis on flexibility and resilience. The fiscal year 2024 budget request for the Los Alamos Plutonium Pit Production Project (LAP4) is \$670 million, an increase of \$82 million, or 13.9 percent, over the fiscal year 2023 enacted level. For SRPPF, the fiscal year 2024 request is \$858 million, a decrease of \$342 million, or 28.5 percent, over the fiscal year 2023 enacted level. This decrease reflects the use of projected fiscal year 2023 carryover for long lead time equipment purchases that will not need to be repeated in fiscal year 2024.

At Los Alamos, production processes continue to mature. Forty development pits have been built, and build rates and quality are increasing. NNSA expects the first war reserve (WR) pit to be produced near the end of calendar year 2024 and an increasing number of WR pits to be produced each subsequent year. The fiscal year 2024 budget request for LAP4 will support an increase in engineering evaluations and certification activities to produce WR plutonium pits in tandem with increased equipment purchases and installation activities. NNSA believes the fastest path to reaching 30 WR ppy at LAP4 involves balancing the priorities for production maturation and equipment installation so that both are ready for rate production. The budget request also supports the hiring, training, and qualification of additional staff necessary for WR pit production.

The fiscal year 2024 request for SRPPF will continue to support design activities and the work started in fiscal year 2023 on early site preparation, demolition and removal of old equipment and materials from the main process building, and long-lead procurements.

High Explosives and Energetics (HE&E) Program: The HE&E program focuses on modernization of high explosives processing facilities across five NNSA sites. The HE&E program enables the production of high explosives and energetic materials required for nuclear weapons, including the main charge, boosters, detonators, actuators, timer/drivers, and spin rockets.

The fiscal year 2024 budget request for the HE&E program is \$195 million, a decrease of \$53.4 million, or 21.5 percent, below the fiscal year 2023 enacted level. The decreased budget reflects the decision to put the High Explosives Synthesis, Formulation, and Production project at Pantex and the Energetic Materials Characterization Facility at Los Alamos on hold, while prioritizing the High Explosives Science and Engineering (HESE) facility at Pantex, including capital equipment purchases, construction, and transition to operation, as well as other key projects currently under construction throughout the nuclear security enterprise. The request also reflects prioritization of a partnership that began in fiscal year 2022 with Naval Surface Warfare Center Indian Head to manufacture and supply insensitive high explosives equipment purchases and process development.

Secondary Capability Modernization

The fiscal year 2024 request for Secondary Capability Modernization is \$1.64 billion, an increase of \$522 million, or 46.8 percent, above the fiscal year 2023 enacted level. NNSA is restoring, modernizing, and enhancing its enriched uranium, de-

pleted uranium, and lithium manufacturing processes needed to meet requirements for nuclear weapon secondary stage production. This request includes an additional \$398 million for the Uranium Processing Facility (UPF) and other investments needed to support overall secondary stage production.

Enriched Uranium Capability Modernization: NNSA's enriched uranium manufacturing modernization strategy includes the relocation of enriched uranium processing capabilities into UPF at the Y-12 National Security Complex (Y-12) and other enduring facilities to reduce mission dependency on Building 9212, which is over 75 years old. UPF will provide for the long-term viability and security of enriched uranium processing while improving worker and public safety and promoting environmental stewardship. Ongoing supply chain issues, delayed equipment delivery, contractor performance, inflation, and shortages of qualified labor have contributed to cost growth and schedule delays beyond the originally scheduled completion date of December 2025. UPF is just over 50 percent complete with the first four non-nuclear subprojects concluded.

In addition to UPF, NNSA is refurbishing buildings 9215, 9204-2E, and 9995 to establish modern processes and extend their operational lifetimes into the 2040's. A key change will be the establishment of electrorefining to provide purified uranium metal and eliminate the current high-hazard chemical process. To reduce overall mission risk during the transition, NNSA has a service contract with Nuclear Fuel Services in Erwin, TN for converting uranium oxide to metal.

Depleted Uranium Modernization: Along with revitalized enriched uranium processing capabilities, NNSA continues to advance its depleted Uranium (DU) modernization program. Established in fiscal year 2021 to meet mission requirements to produce radiation cases and other DU components, this program will reconstitute lapsed DU alloying and component manufacturing capabilities at Y-12 while investing in new technology to improve efficiency, reliability, and capacity. The equipment at Y-12 formerly used in this process has been inoperable for the last 15 years, and its reconstitution is a critical component of successful weapons modernization. The timely introduction of new technology will allow rebuilding a limited capacity for the former processes.

Lithium Modernization: The NNSA Lithium modernization strategy includes restarting processes while constructing the Lithium Processing Facility to address increased mission demand in the future. LPF will replace the lithium manufacturing processes within Y-12 buildings 9204-2 and 9202, which are lithium recovery, purification, component fabrication operations and salvaging. These buildings are in disrepair and do not possess the capabilities or capacity to meet demands beyond 2035. LPF will provide modern technologies and a safer environment for both workers and the public.

Tritium and Domestic Uranium Enrichment Modernization

The fiscal year 2024 budget request for the Tritium and Domestic Uranium Enrichment Modernization effort is \$593.0 million, an increase of \$13.0 million, or 2.2 percent, above the fiscal year 2023 enacted level.

Tritium Modernization: The Tritium modernization program provides tritium supplies for nuclear weapon requirements, including recycling tritium gas and sustaining reliable supply chain infrastructure and equipment. Multi-year modernization plans reflect increasing future demand. NNSA is already increasing production levels at the Tennessee Valley Authority and extracting the produced tritium at the Savannah River Site (SRS). NNSA is designing and initiating site preparations for the Tritium Finishing Facility (TFF) at SRS, which will replace a 1950's-era facility. The TFF site preparation subproject began in fiscal year 2023 using carryover funds from prior years. The fiscal year 2024 budget request reflects a prioritization decision to complete the site preparation subproject but move the remainder of the project out in time, as we focus resources on SRPPF and other higher-priority construction projects.

Domestic Uranium Enrichment: Tritium production relies on enriched uranium. The Domestic Uranium Enrichment (DUE) program is responsible for providing sufficient capacity of unobligated enriched Low Enriched Uranium (LEU) for tritium production and Highly Enriched Uranium (HEU) for naval propulsion fuel, as well as obligated or unobligated High Assay LEU (HALEU) for research reactors. The fiscal year 2024 budget request for the DUE program is \$258.3 million, an increase of \$113.4 million, or 78.3 percent, above the fiscal year 2023 enacted level. The fiscal year 2024 budget request continues support for HEU downblending that will extend the need date for unobligated LEU for tritium production to 2044. The funding request also supports ongoing enrichment technology development and acquisition activities to meet future unobligated enriched uranium needs. New funding is requested to leverage the Office of Nuclear Energy's procurement of HALEU from in-

dustry to support defense needs and to begin conceptual design activities for an unobligated enrichment technology pilot plant. Such efforts complement the investments provided in the Inflation Reduction Act to the Office of Nuclear Energy for HALEU to help the private sector establish domestic uranium enrichment capabilities for the long term, so we will be able to reduce our dependence on Russia and address a critical strategic vulnerability.

Non-Nuclear Capability Modernization (NNCM)

The NNCM program funds the capability and capacity for non-nuclear components (external to the primary or secondary stage of the nuclear explosive package) in weapon systems. Nonnuclear components provide arming, fuzing, and firing functions and safety and use control features, among others. Providing these functions requires a wide range of technologies and components including radiation-hardened microelectronics, neutron generators, gas transfer systems, power sources, electrical assemblies, cables, connectors, structural elements, pads/cushions, and a multitude of other parts that are incorporated into the systems that support or weaponize the nuclear explosive package. NNCs make up more than half the cost of weapons due to the number and complexity of the elements, and the need for qualification in extreme environments over the warhead life. The fiscal year 2024 budget request is \$167 million, an increase of \$44 million over the fiscal year 2023 enacted level. The request includes funding to provide equipment for increased manufacturing capacity at the Kansas City National Security Campus (KCNSC); reconstitute thermal spray capability at Sandia National Laboratories; recapitalize radiation and major environmental test facilities at Sandia National Laboratories for design and qualification; and provide tools and equipment for the Microsystems Engineering, Science, and Applications (MESA) Complex at Sandia National Laboratories as the only approved source of trusted, strategically radiation hardened microelectronics.

Fiscal year 2024 funding will also be used to develop production modernization strategies for weapon staging and warhead assembly operations at Pantex.

INFRASTRUCTURE AND OPERATIONS

A well-organized, well-maintained, and modern infrastructure system is the bedrock of a flexible and resilient nuclear security enterprise. NNSA's infrastructure consists of \$134 billion in assets and facilities. More than 60 percent are beyond their life expectancy, with some of the most important dating back to the Manhattan Project. Modernization and recapitalization of deteriorating infrastructure will allow NNSA to meet expanded mission needs, provide a safe and up-to-date work environment to attract and retain a high-quality workforce, and incorporate new technologies and techniques to make the nuclear security enterprise more efficient, reliable, secure, and environmentally responsible. NNSA must accelerate infrastructure delivery while also balancing investments to optimize execution capacity and value delivery. NNSA is challenging its traditional mindset to shift to agile delivery methods, such as focusing on minimal viable projects, phased delivery, and whole site approaches.

When the Cold War ended NNSA was left with large and aged buildings, environmental contamination, and the need to close facilities for some key weapon components such as plutonium pits. Going forward, we need to be creative in facility design and cultivate capabilities that can rapidly scale up or down depending on the international environment and mission need while being minimally disruptive to contracts, workforce, facilities, and the environment. This includes developing strategic partnerships with industry and using new acquisition approaches to purchase facilities rather than pursuing traditional Federal construction projects. NNSA is increasingly exploring the use of its real eState authority to achieve timely acquisition of modern, non-complex infrastructure to support the mission.

The fiscal year 2024 budget request for Infrastructure and Operations is \$2.77 billion, an increase of \$164.5 million, or 6.3 percent, above the fiscal year 2023 enacted level. This increase will enable NNSA to operate and modernize NNSA's infrastructure to support expanded mission objectives and future enterprise resilience. The increase also enables NNSA to address external factors such as supply chain delays, inflation, and labor shortages which have raised costs and extended timelines for projects, making it difficult to deliver projects within the baselines established. To address these challenges, NNSA is focused on improving early stage project and portfolio level planning, identifying and applying lessons learned through independent project reviews, and taking actions to streamline project delivery and increase buying power.

A significant portion of the requested increase will support the Kansas City Non-Nuclear Expansion Transformation (KCNEt) plan. NNSA is currently pursuing acquisition of 245 acres of land immediately adjacent to the KCNSC because the cur-

rent KCNSC manufacturing capacity is inadequate to support the Program of Record. Since its initial conception, the KCNEXT strategy has shifted from a land acquisition with government construction to a lease-purchase acquisition with land-owner construction. The execution of the lease-purchase agreement in fiscal year 2024 will allow for immediate construction using commercial building standards and accelerate completion of the first major phase of the expansion. Funding in fiscal year 2024 will protect NNSA's interests in the property and accelerate overall completion of KCNEXT.

Funding is also requested to initiate three new mission enabling construction projects at the site.

NNSA continues to refine innovative solutions developed over the last several years to streamline low-risk, non-nuclear construction projects to save time and money. Consistent congressional support has been invaluable in bringing these innovations to fruition. NNSA is grateful for the additional authority in the National Defense Authorization Act (NDAA) for fiscal year 2023, which raised the minor construction threshold from \$25 million to \$30 million and provided a 3-year pilot program to raise the threshold to account for inflation. This will make a critical difference in NNSA's ability to further innovate minor construction and complete low-risk projects on time even during a period of higher-than-normal inflation.

Using data-driven risk-informed tools, NNSA pinpoints when and where infrastructure investments are needed and develops innovative execution initiatives to streamline processes, accelerate delivery, and increase buying power. For example, in fiscal year 2019 NNSA established the EMC2 pilot program to streamline commercial-like construction projects. The initial program quickly expanded from four projects to ten in 2021, including the addition of five office buildings at LANL to support plutonium pit production. In fiscal year 2022, NNSA completed the LLNL's Emergency Operations Center in just 13 months after receiving full construction funding, the first project under this pilot program. This year, NNSA held the ribbon cutting for the Y-12 Fire Station and the Y-12 Emergency Operations Center. Both projects began construction in 2021 and were ready for full operations in just 2 years.

STOCKPILE RESEARCH, TECHNOLOGY, AND ENGINEERING

For Stockpile Research, Technology, and Engineering, the fiscal year 2024 budget request is \$3.2 billion, an increase of \$246.6 million, or 8.4 percent, above the fiscal year 2023 enacted level. Approximately \$100 million of the requested increase is for the Z-pinch Experimental Underground System (Zeus) Test Bed Facilities Improvement Project and the Advanced Sources and Detectors Scorpius radiography capability, which provide the main capabilities within Enhanced Capabilities for Subcritical Experiments at the Nevada National Security Site (NNSS).

The Stockpile Research, Technology, and Engineering portfolio covers activities that serve as the foundation for science-based stockpile activities, including the capabilities, tools, and components that are used every day to assess the active stockpile and to certify warhead modernization programs without the need for underground nuclear testing. NNSA's unparalleled science and technical capabilities, and commitment to their constant improvement, helps cultivate the knowledge and expertise to maintain confidence in the stockpile. The major activities in the Stockpile Research, Technology, and Engineering portfolio are described here.

Enhanced Capabilities for Subcritical Experiments (ECSE)

The fiscal year 2024 budget request for ECSE is \$292.3 million, an increase of \$15.1 million, or 5.5 percent, above the fiscal year 2023 enacted level. ECSE will produce experimental data in underground tunnels at the NNSS that enables high fidelity assessment of the current stockpile and certification of the future stockpile without the need to return to underground nuclear explosive testing. ECSE experiments are designed to remain subcritical throughout the experiment to adhere to the current U.S. policy of a "zero yield" nuclear testing moratorium. Funding in fiscal year 2024 will support the continued preparation and implementation of ECSE.

Stockpile Responsiveness Program (SRP)

The fiscal year 2024 budget request for SRP is \$69.8 million, an increase of \$6.1 million, or 9.6 percent, above the fiscal year 2023 enacted level. SRP is responsible for exercising and enhancing capabilities through the entire nuclear weapons lifecycle to improve the responsiveness of the United States to future threats, technological trends, and international developments not addressed by current warhead modernization programs. SRP is investing in efforts to address issues in design for manufacturability, digital engineering, component, and system prototyping and testing.

Weapons Technology and Manufacturing Maturation (WTMM)

The fiscal year 2024 budget request for WTMM is \$327.7 million, an increase of \$41.5 million, or 14.5 percent, above the fiscal year 2023 enacted level. The WTMM program invests in system-agnostic technology development and advanced manufacturing capabilities to reduce the technological risks and life-cycle costs of maintaining and enhancing the stockpile. Technology and manufacturing maturation enables the development and delivery of design-to-manufacturing capabilities to meet the current programs of record and future nuclear weapons design and production needs of the nuclear security enterprise.

Inertial Confinement Fusion Program (ICF)

The fiscal year 2024 budget request for ICF is \$601.6 million, a decrease of \$28.3 million, or 4.5 percent, below the fiscal year 2023 enacted level, reflecting the use of projected carryover for fiscal year 2024 requirements. The ICF program provides high energy density (HED) science capabilities and expertise that support research and testing across the breadth of the Stockpile Stewardship Program. Its twofold mission is to meet immediate and emerging HED science needs to support the deterrent of today, and to advance the R&D capabilities necessary to meet those needs for the deterrent of the future. In a breakthrough on December 5, 2022, the ICF Program reached fusion ignition and achieved net energy gain for the first time in history. The fiscal year 2024 request supports ICF research and facilities, enabling access to experimental data that underpins the safety, security, and effectiveness of the nuclear stockpile and building on the success of last year's achievement.

NNSA Advanced Simulation and Computing (ASC)

The fiscal year 2024 budget request for ASC is \$782.5 million, a decrease of \$7.5 million, or 1.0 percent, below the fiscal year 2023 enacted level. ASC will provide NNSA with leading edge simulation capabilities to support weapons design, science-based stockpile stewardship, and stockpile certification activities. The fiscal year 2024 budget request will continue funding maturation of next-generation simulation and computing technologies. Additionally, El Capitan, the first exascale computer for national security, is expected to come online at LLNL for classified computing in 2024. At over two exaflops, it will be the world's fastest supercomputer.

ACADEMIC PROGRAMS AND COMMUNITY SUPPORT

For Academic Programs and Community Support, the fiscal year 2024 budget request is \$152 million, an increase of \$40 million, or 36 percent, above the fiscal year 2023 enacted level. This budget increase includes the addition of \$30 million for the new Community Capacity Building Program.

Starting in fiscal year 2024, NNSA is proposing to elevate Academic Programs from a congressional-control level within SRT&E to a stand-alone Government Performance and Results Act (GPRA) Unit/control level, and to also establish a Community Capacity Building Program to provide benefits to disadvantaged communities, including Tribal Nations and rural communities, that are affected by activities at NNSA's sites. These changes will enable improved program integration, agility, development, and alignment to critical workforce needs, promote the President's goal of advancing diversity, equity, inclusion, and accessibility through the Federal Government, and bolster underserved communities affected by activities at the NNSA sites in the areas of job creation, community restoration, infrastructure projects, and educational resources.

The challenges of modernizing our nuclear stockpile demand a strong and diverse base of national expertise in specialized technical areas that uniquely contribute to nuclear stockpile stewardship. Academic Programs supports educational capacity building in unique disciplines, such as nuclear science, radiochemistry, materials at extreme conditions, high energy density science, advanced manufacturing, and high-performance computing. This budget supports our key objectives to strengthen these fields of research through scientific advancement, drive academic innovation that can be leveraged by our national laboratories, ensure that a diverse and robust cadre of experts are trained in these key fields and recruited into careers in the nuclear security enterprise, and maintain U.S. preeminence in these disciplines to ensure that nuclear deterrence remains effective. This budget supports managing academic solicitations and competitive awards in these disciplines, enabling connections between these academic research communities and the nuclear security enterprise, and attracting and retaining this pipeline of developed talent to ensure the future workforce of NNSA can meet the evolving needs of the enterprise. NNSA is also building the pipeline for technicians and skilled craft trades to meet ongoing and emerging needs at national laboratories, plants, and sites. The Apprenticeships for Complete and Committed Employment for Specialized Skills (ACCESS)

program outlined in the fiscal year 2020 NDAA—was motivated by the need to support apprenticeships for specialized skills that are vital to the nuclear security enterprise. A Funding Opportunity Announcement was issued late last year and the first awards for this program were distributed in February 2023.

SECURE TRANSPORTATION ASSET

The fiscal year 2024 budget request for Secure Transportation Asset (STA) is \$357.1 million, an increase of \$12.6 million, or 3.7 percent, above the fiscal year 2023 enacted level. STA supports the safe and secure transportation of nuclear weapons, components, and special nuclear material throughout and across the nuclear security enterprise to meet nuclear security requirements. Multiple activities critical to the successful execution of NNSA's missions, including weapon modernization programs, limited-life component exchanges, surveillance, dismantlement, nonproliferation activities, and experimental programs, rely on STA for safe, secure, and on-schedule transport.

The Office of Secure Transportation's (OST) priorities for fiscal year 2024 include the sustainment and ongoing modernization of operations and equipment. This includes the Safeguards Transporter life extension program until it can be replaced by the Mobile Guardian Transporter (MGT). The FPU for the MGT is planned in fiscal year 2028. Additional funding is requested to support minor construction projects essential for replacement and refurbishment of aging facilities and mission requirements.

OST remains focused on recruiting and retaining a well-trained, highly qualified Federal Agent and staff workforce to support mission requirements. OST has implemented strategies to increase the Federal Agent workforce by offering higher incoming pay, recruitment incentives, and the creation of ladder positions for high performers.

DEFENSE NUCLEAR SECURITY

Defense Nuclear Security's fiscal year 2024 budget request is \$1.02 billion, an increase of \$144.7 million, or 16.6 percent, above the fiscal year 2023 enacted level. The Office of Defense Nuclear Security's primary mission is protecting the facilities, assets, and people responsible for successfully carrying out NNSA's national security missions. Growth in NNSA's mission portfolio, and the associated growth in projects in secure areas such as LAP4, UPF, and SRPPF, along with increased resources necessary to meet core security requirements, has led to increased program requirements for Defense Nuclear Security.

Full funding of the fiscal year 2024 budget request will support these larger requirements as well as high-priority initiatives for the Physical Security Center of Excellence and the Center for Security, Technology, Analysis, Response, and Testing. Additionally, this increase includes additional funding for the West End Protected Area Reduction (WEPAR) project at Y-12 to address cost increases associated with contractor performance, delays in other projects outside WEPAR's scope, and external factors affecting projects enterprise wide.

INFORMATION TECHNOLOGY AND CYBERSECURITY

The fiscal year 2024 budget request for information technology and cybersecurity is \$578.4 million, an increase of \$132.7 million, or 29.8 percent, above the fiscal year 2023 enacted level. This request funds current operations and continues investments across NNSA to modernize both unclassified and classified systems and the execution of a robust and effective cybersecurity capability.

The fiscal year 2024 budget request supports the cost necessary to maintain a secure and resilient cyber program. The request invests in operations, mission support, infrastructure modernization, labor growth, and associated investments to execute statutory requirements, Executive Order 14028, policy requirements, and Office of Management and Budget memorandums. The fiscal year 2024 requested increase reflects investments in endpoint detection and response, zero trust architecture, operational technology, enterprise cybersecurity tools and services, and cyber workforce growth at the labs, plants, and sites.

The request funds cybersecurity programs at NNSA's laboratories, plants, and sites to address the significant increase in technology use and keep pace with expanded NNSA mission requirements. The funding increase supports the ongoing modernization of NNSA's network architecture and classified systems, including the Emergency Communications Network. The fiscal year 2024 request includes the costs associated with classified infrastructure and capabilities, implementation of cloud infrastructure, and unclassified IT services. These improvements reflect NNSA priorities in improving both unclassified and classified collaboration tools and

network services, as well as providing redundancy and improved performance for mission partners around the world.

DEFENSE NUCLEAR NONPROLIFERATION

The fiscal year 2024 budget request for the Defense Nuclear Nonproliferation account is \$2.51 billion, an increase of \$19 million, or 0.8 percent, above the fiscal year 2023 enacted level. The request will be supplemented with prior year balances of \$20.0 million. Reducing nuclear risks and supporting a robust nonproliferation regime and partnerships improves the effectiveness of our deterrent and enhances U.S. and global security. Expanding priorities include support for Ukraine with our allies and partners, preparing for a growing and evolving nuclear power fleet, assuring allies who might be rethinking the need for nuclear weapons, and getting ahead of biological threats.

This account funds all nonproliferation-related activities in the offices of Defense Nuclear Nonproliferation (DNN), Emergency Operations (EO), and Counterterrorism and Counterproliferation (CTCP). The activities carried out by these offices support the Administration's 2022 National Security Strategy, 2022 Nuclear Posture Review, Presidential Strategy to Counter Weapons of Mass Destruction, and the recently signed National Security Memorandum to Counter Weapons of Mass Destruction Terrorism and Secure Nuclear and Radioactive Material. NNSA's defense nuclear nonproliferation programs are part of a whole-of-government approach to extend U.S. defenses against nuclear threats far beyond our borders. They help prevent adversaries from acquiring nuclear weapons or weapons-usable materials, technology, and expertise; develop monitoring technology for arms control and early detection of proliferation activities; counter adversary efforts to acquire such weapons or materials; and respond to nuclear or radiological incidents and accidents worldwide.

DEFENSE NUCLEAR NONPROLIFERATION

From its inception, DNN has developed and implemented policy and technical solutions to minimize or eliminate proliferation sensitive materials and limit or prevent the spread of materials, technology, and expertise necessary for nuclear and radiological weapons. Longstanding and growing cooperation with partner governments; international organizations such as the IAEA, the World Customs Organization, and INTERPOL; and the private sector help develop and implement solutions. These programs work side-by-side with both NNSA's Weapons Activities and Naval Reactors programs to implement best practices for nonproliferation and materials security in our own programs.

The fiscal year 2024 budget request will allow DNN to work in a global landscape that has radically changed in the last 12 months. Russia's unprovoked full-scale invasion of Ukraine; the expansion and diversification of Russian and Chinese nuclear arsenals; the destabilizing activities of Iran and the Democratic People's Republic of Korea (DPRK); the expected growth in nuclear material, technology, and technical expertise resulting from the global expansion of nuclear power and nuclear technology adoption; and the associated risk of illicit smuggling and procurement networks all complicate nuclear nonproliferation missions and demonstrate the need for additional resources and deeper engagement with allies and partners. DNN will utilize these resources to improve capacity and capabilities, develop and incorporate cutting-edge technology required to address future threats, and deepen cooperation with partners.

Material Management and Minimization (M3)

The M3 program's fiscal year 2024 budget request is \$446 million, a decrease of \$18.3 million, or 3.9 percent, below the fiscal year 2023 enacted level. This reduction reflects the availability of prior year balances to fund planned activities for fiscal year 2024.

M3 programs are focused on the reduction and, when possible, elimination of weapons-usable material globally. The fiscal year 2024 budget request supports the conversion or shutdown of research reactors fueled by HEU. The program will build on the success of the molybdenum-99 (Mo-99) program, which last year enabled the Secretaries of Energy and Health and Human Services to jointly certify that a sufficient supply of non-HEU-based Mo-99 is available to meet the needs of patients in the U.S. The request further supports the optimization of proliferation resistance in new reactor designs, the recovery of critically needed high-assay low-enriched uranium (HALEU), the removal and disposal of weapons-usable material located abroad, and the removal of HALEU from a partner country. Finally, the budget request supports the downblending of the removed HEU in the United States, and the downblending and removal of surplus plutonium from South Carolina per the settle-

ment reached in August 2020. As previously noted, at the end of 2022 the first shipment of downblended surplus plutonium was shipped from K Area at SRS to WIPP in New Mexico. Additionally, to date, M3 has removed or confirmed the disposition of nearly 7,300 kilograms of weapons-usable nuclear material from 48 countries and Taiwan and has eliminated the need for weapons-grade material at 108 civilian research reactors and isotope production facilities.

Global Material Security (GMS)

The GMS program's fiscal year 2024 budget request is \$524.0 million, a decrease of \$8.7 million, or 1.6 percent, below the fiscal year 2023 enacted level. The fiscal year 2024 request supports program efforts to prevent terrorists and other non-State actors from acquiring the nuclear and radioactive materials, equipment, and technical expertise for the construction and use of an improvised nuclear device (IND) or radiological dispersal device. This work is carried out in coordination with domestic and international partners to improve the security of vulnerable materials and facilities and build partner capacity to detect, disrupt, investigate, and interdict illicit trafficking of these materials. This workload is expected to increase with the anticipated growth in nuclear material acquisition and usage. Nuclear and radioactive materials have widespread power generation, agricultural, medicinal, and industrial applications. In 2021 alone the IAEA's Incident and Trafficking Data base recorded over 120 incidents of attempted theft and/or smuggling of such materials. GMS maintains 84 bilateral partnerships and works with multilateral organizations such as the IAEA, INTERPOL, and the United Nations Office of Drugs and Crime (UNODC) to counter theft and smuggling networks and improve security of vulnerable assets. Finally, as part of an ongoing strategic analysis process, GMS is exploring innovative approaches, technologies, and tools to adapt to emerging threats and the growing demand for nuclear energy and technology. This includes ongoing efforts to replace all 400 cesium-137 based blood irradiators in the United States by 2027 as mandated in the fiscal year 2019 NDAA and further contributions to find alternatives for Cobalt-60 in the recycling and reuse of plastic waste.

Nonproliferation and Arms Control (NPAC)

The NPAC program's fiscal year 2024 budget request is \$212.4 million, a decrease of \$18.3 million, or 7.9 percent, below the fiscal year 2023 enacted level. The reduced request reflects a planned decrease in annual budget required for the International Atomic Energy Agency (IAEA) test bed because the peak budget year has passed. It also reflects successful efforts to accelerate the Advanced Reactor International Safeguards Engagement (ARISE) program in fiscal year 2023. Activities funded under this request support NNSA efforts in two critical areas: (1) preventing nuclear and dual use technology from becoming nuclear proliferation concerns; and (2) bolstering the international verification regime by technology development and implementation for safeguards, arms control, and emerging challenges. Ensuring the highest nonproliferation standards for AUKUS while protecting naval nuclear propulsion technology has become an added dimension to our nonproliferation efforts.

The greater use of nuclear technology is an issue of increased salience for NPAC. In particular, nuclear energy programs are rapidly expanding as countries seek sources of zero-carbon electricity to combat climate change. Promoting stringent safeguards and security policies, and developing new monitoring and verification technologies are key to preventing proliferation. NPAC also supports the development and implementation of section 123 agreements and the regulation of nuclear technology exports through part 810 authorizations.

The fiscal year 2024 request supports IAEA and partner countries' efforts to implement international safeguards obligations and builds domestic and international capacity to implement export control obligations. The request also supports the Arms Control Advancement Initiative (ACAI) to maintain expertise and technology development during a period when new arms control agreements are less likely and to be prepared for future opportunities. NNSA also continues development of approaches and strategies to address emerging nonproliferation and arms control challenges and opportunities.

During the 18-month consultation period on AUKUS, we participated in an international working group tasked with developing nonproliferation and safeguards aspects of the AUKUS program fully consistent with our status as a responsible nuclear power and our obligations as a nuclear-weapon State Party to the Nuclear Non-Proliferation Treaty (NPT). NNSA provided technical advice to the interagency and our AUKUS partners on the full suite of requirements that underpin nuclear stewardship to implement the strongest possible safeguards and verification measures and achieve the overall objectives of AUKUS. NNSA looks forward to taking

the next steps in the process of helping a key ally improve both its security and the security of the Indo-Pacific region, while maintaining the highest nonproliferation standards. The fiscal year 2024 request supports the foundation of our nonproliferation and safeguards work on AUKUS.

Defense Nuclear Nonproliferation Research and Development (DNN R&D)

DNN R&D is vital in the development of technical capabilities which support nonproliferation, counterterrorism, and emergency response missions. In addition, DNN R&D sustains and develops the foundational nonproliferation technical competencies that promote the agility needed to support a broad array of nonproliferation missions and potential threats. These include the detection of nuclear detonations; foreign nuclear weapons programs' activities; and the presence, movement, or diversion of special nuclear materials.

The DNN R&D program fiscal year 2024 budget request is \$728.2 million, a decrease of \$39.7 million, or 5.2 percent, below the fiscal year 2023 enacted level. The decrease is a result of the early completion of Phase 1 of the Uranium Science and Technology Center testbed at Oak Ridge National Laboratory.

The fiscal year 2024 budget request supports planned activities for the early detection of proliferation-related R&D and the continued production of nuclear detonation detection satellite payloads. The request also supports continued efforts to sustain and develop foundational nonproliferation technical competencies by providing targeted, long-term support for enabling infrastructure, science and technology, and an expert workforce. The request also continues to develop and maintain advanced technical nuclear forensics analysis capabilities at the U.S. national laboratories that can support time-critical decisions in the event of a nuclear or radiological incident and assist in determining the origin of interdicted materials or nuclear devices.

NNSA Bioassurance

The bioassurance program's fiscal year 2024 budget request is \$25 million, an increase of \$5 million, or 25 percent, above the fiscal year 2023 enacted level. NNSA appreciates Congress' support in the establishment of this program. The program focuses on developing core capabilities at the U.S. national laboratories, such as high-performance computing for accelerated threat assessment and rapid countermeasure design; surveillance and detection capability development; safeguards and export controls; and forensics to support attribution. NNSA coordinates closely with the DOE's Office of Science in leveraging national laboratory capabilities and technical expertise by making complementary investments in biological sciences and engineering, computational capability, and classified workspaces to advance fundamental understandings of biology and adapt those understandings to bio-resilience. The fiscal year 2024 request supports the establishment of the initial operating capability and coordinated DOE programs in biosciences, including phased science plan implementation with exploratory research and equipment purchases.

Nonproliferation Construction

The nonproliferation construction program fiscal year 2024 budget request is \$77.2 million, an increase of \$5.4 million, or 7.6 percent, above the fiscal year 2023 enacted level. This program consolidates construction costs for DNN projects. In support of the dilute and dispose strategy for surplus plutonium disposition, the Surplus Plutonium Disposition (SPD) project will add additional glovebox capacity at SRS to increase plutonium dilution and aid in the removal of plutonium from the State of South Carolina. The fiscal year 2024 request will support completing the final design review and activities to request CD-2/3, Approval of Performance Baseline and Start of Construction, to initiate full construction of the SPD project.

NUCLEAR COUNTERTERRORISM AND INCIDENT RESPONSE

The fiscal year 2024 request for Nuclear Counterterrorism and Incident Response (NCTIR) is \$493.5 million, an increase of \$23.6 million, or 5 percent, above the fiscal year 2023 enacted level. The NCTIR program supports two subprograms: Counterterrorism and Counterproliferation (CTCP) and Emergency Operations (EO). The CTCP fiscal year 2024 budget request is \$474.4 million, an increase of \$34.3 million, or 7.8 percent, above the fiscal year 2023 enacted level. The EO fiscal year 2024 budget request is \$19.1 million, a decrease of \$10.7 million, or 36 percent, below the fiscal year 2023 enacted level.

The CTCP subprogram advances the Nation's technical capabilities to understand, defeat, and attribute nuclear threat devices, including INDs and lost or stolen nuclear weapons; provides technical guidance on physical security requirements for nuclear materials; and conducts Nuclear Threat Reduction exchanges with the United

Kingdom and France to prevent, counter, and respond to nuclear terrorism and nuclear proliferation.

CTCP also manages NEST, NNSA's multi-mission emergency response capability comprised of scientific and technical experts who are trained and equipped to respond rapidly in the event of a nuclear or radiological incident or accident worldwide. NEST includes nuclear forensics capabilities that enable technical personnel to identify the origin of nuclear material interdicted outside of regulatory control or used in a nuclear attack.

Russia's full-scale invasion of Ukraine has resulted in an increased operational posture for CTCP since February 2022. In fiscal year 2023, CTCP received supplemental appropriations of \$110.3 million to support the U.S. Government's response to the conflict in Ukraine. CTCP is using these funds for radiation detection and monitoring of Ukrainian nuclear facilities; personal protective equipment; emergency diesel generators; and procurement of diesel fuel and consumables for Ukraine's nuclear power plants. CTCP will continue to deliver incident response training and build capacity among responders in Ukraine and other partner nations.

The fiscal year 2024 budget request is driven by changes in the operating environment, as CTCP's core capabilities are being leveraged by key domestic and international partners, including DOD, Federal Bureau of Investigation (FBI), U.S. allies and partners bilaterally and multilaterally, and international organizations such as the IAEA. The request will support additional NEST capacity for large and complex nuclear and radiological emergencies, with a particular focus on nuclear threat reduction activities as part of the U.S. Government's response to the Ukraine conflict. Additionally, this increased capacity will allow NEST to expand interagency partner training to improve regional capabilities nation-wide to characterize and defeat weapons of mass destruction (WMD) devices. This effort leverages many of the investments made and experiences gained from the recently completed "Capability Forward" initiative to train and equip the FBI's regional render safe teams in 14 U.S. cities to take decisive action against a wide range of WMD devices. Additional funding will also enable the continuation of planned investments to provide solutions for countering nuclear proliferation through applied analysis, testing, concept development, technology development, predictive modeling, and testing. These investments include targeted funding for High Performance Computing, which will support modernizing and improving the unique assessment capabilities at the NNSA national laboratories.

The CTCP subprogram also supports the interagency National Technical Nuclear Forensics (NTNF) mission, a central pillar of the U.S. strategy to deter hostile states from providing nuclear material to terrorists. Fiscal year 2024 funding enables CTCP to support NTNF efforts to close gaps in the fulfillment of new interagency forensics and attribution requirements. Funding will bridge a longstanding gap between research and development activities geared toward technology transition and NTNF operational capabilities.

The EO subprogram provides both the structure and processes to ensure a comprehensive and integrated approach to all-hazards emergency management across the Department. The EO program aims to improve readiness and effectiveness of the DOE Emergency Management System and the nuclear security enterprise response regardless of the nature or location of the emergency. This unity of effort and culture of continuous improvement helps safeguard the health and safety of workers and the public, protect the environment, and enhance the resilience of the Department and the Nation. EO coordinates plans and procedures for prevention, protection, mitigation, response to, and recovery from, all hazards emergency accidents, incidents, events, and to support operational emergencies. In addition, the fiscal year 2024 budget request supports Continuity of Operations, Continuity of Government, and Enduring Constitutional Government programs to advance the National Continuity Policy and ensure the continued performance and delivery of essential lines of business and services under any circumstances. Fiscal year 2024 funding provides for 24/7/365 Consolidated Emergency Operations Center communications and coordination support to the DOE/NNSA Emergency Management Enterprise, nuclear security enterprise, and Departmental senior leadership. The decrease in the budget request for fiscal year 2024 is due to the completion of certain investments in the consolidated emergency operations center's and alternate operations centers' infrastructure and supporting communications equipment, and classified communications systems improvements in fiscal year 2023.

NAVAL REACTORS APPROPRIATION

With 79 ships, or more than 40 percent of the Navy's major combatants², relying on nuclear propulsion technology, maintaining a qualitative edge in this area remains critical to our national security posture. Providing the Nation's submarines and aircraft carriers with unparalleled mobility, flexibility, responsiveness, and endurance is vital in today's complex geopolitical environment. The ability to maintain robust fleet capabilities on long-term missions is essential for the security of global trade and our allies. The Office of Naval Reactors remains the foundation of this national achievement in global security. Continuous progress in the Naval Nuclear Propulsion Program gives the U.S. Navy a decisive edge in naval warfare and enhances the security and reliability of the sea-based leg of our nuclear triad.

The fiscal year 2024 budget request for Naval Reactors is \$1.96 billion, a decrease of \$117.3 million, or 5.6 percent, below the fiscal year 2023 enacted level. This decrease reflects the revised funding profile for the Spent Fuel Handling Recapitalization Project that was recently re-baselined, and near-complete refueling and overhaul of the S8G Prototype land-based reactor in New York. The budget request supports the continued safe and reliable operation of the nuclear-powered fleet and provides for the continued maintenance, oversight, and operations at the four Naval Nuclear Laboratory sites and the associated contractor workforce. Funding also supports requirements for the office's major initiatives: *Columbia*-class ballistic missile submarine reactor systems development; development of the next generation SSN(X) attack submarine; and continued progress on base technology development, infrastructure recapitalization at program sites, and decontamination and decommissioning efforts.

Consistent, sustained funding is vital for the support of these efforts and will allow Naval Reactors to meet current and future force needs; this foundational support of Naval Reactors is critical to our ability to deliver on AUKUS. The *Columbia*-class lead ship remains under construction and the Spent Fuel Handling Recapitalization Project at the Naval Reactors Facility in Idaho is ongoing. Additionally, work is underway to invigorate long lead-time technology development for the current and future nuclear fleet while supporting specific requirements to meet the Navy's timeline for the next-generation attack submarine ship authorization.

FEDERAL SALARIES AND EXPENSES APPROPRIATION

The fiscal year 2024 budget request for Federal Salaries and Expenses (FSE) is \$539 million, an increase of \$64 million, or 13.5 percent, above the fiscal year 2023 enacted level. Part of the increase is driven by the one-time use of carryover balances in fiscal year 2023. The increase in this account will support an additional 90 Federal Full-time Equivalents (FTE) for a total of 2,006. FSE appropriations will also support pay and benefit escalation, travel costs, support service contractors, training, space and occupancy expenses, the working capital fund, and other related expenses.

NNSA's workforce represents the backbone of the Nation's nuclear security enterprise. The fiscal year 2024 request supports staffing levels sufficient to provide oversight and leadership for our growing mission requirements in the modernization, recapitalization, nonproliferation, and counterterrorism programs. NNSA seeks to recruit and retain top talent in a wide array of fields including science, engineering, crafts and trade, business, foreign affairs and social sciences, and project and program management. This workforce is distributed across the nuclear security enterprise and can be found in eight states and Washington, DC.

NNSA continues to face significant demographic and competition-based challenges to its recruitment and retention strategy. As of fiscal year 2023, 18.7 percent of NNSA FTE Federal staff are eligible to retire, a number that is expected to rise to 34.3 percent by fiscal year 2028. While attrition rates are today lower than the above-average rates in fiscal year 2021, high overall attrition remains a concern. NNSA must also compete for top-tier talent with private sector companies. Many of the skills needed for NNSA to meet expanded and future mission requirements are also in high demand for both established and emerging industries, all of whom are drawing from a limited applicant pool.

NNSA must continue achieving modest increases in the size of the Federal workforce required to manage the Nation's national nuclear security programs. Using innovative recruiting techniques, coupled with available excepted service and direct hiring authorities, NNSA's recruitment team will focus on outreach and recruitment for mission critical occupations. We will continue agency-sponsored career fairs and

²Major combatants, in this instance, include aircraft carriers, submarines, and surface combatants based on the "Active in Commission" column from the Naval Vessel Register

other events targeted toward college students, military personnel and spouses, as well as persons with disabilities. Additionally, NNSA continues to expand use of programs with engaged and dedicated entry-level talent, including the Presidential Management Fellows Program, Pathways Intern Program, Operation Warfighter Program, Minority Servicing Partnership program, and the NNSA Graduate Fellowship Program among others.

NNSA's hiring efforts will support mission and growth requirements with an overall goal of reaching 2,130 FTEs by fiscal year 2027. These goals will also support the Administration's objective of promoting diversity, equity, inclusion, and accessibility across the Federal Government as a means of fostering new technological advancements, cultivating the next generation of researchers to maintain America's role as a leader in scientific excellence, and enhancing national security.

CONCLUSION

NNSA's enduring responsibility is to provide the United States with a nuclear weapons stockpile and naval nuclear propulsion systems capable of providing a credible and effective deterrent while simultaneously executing nonproliferation and counterterrorism programs aimed at reducing global nuclear risk. In an increasingly complex international environment where the existential threats of both nuclear war and climate change loom larger than ever, these efforts are vital to protecting and promoting American and global security.

As the only U.S. Government organization capable of designing, manufacturing, and delivering nuclear weapons, NNSA has a unique responsibility to protect our Nation and our allies. The fiscal year 2024 budget request recognizes the urgency with which NNSA must execute its present mission needs while simultaneously preparing the nuclear security enterprise to handle future missions in a less stable geopolitical climate. It provides funding for the five concurrent life extension and modernization programs supporting all three legs of the nuclear triad, as well as two phase one studies. It also continues significant investments in revitalized or new production facilities for plutonium pits, secondaries, and other critical nuclear and non-nuclear components. The budget request has made priority decisions on construction projects recognizing that worker shortages and supply chain issues that confound progress will not improve if more projects are underway in the enterprise simultaneously. The request supports the manufacturing base of the future by advancing the incorporation of scientific and technological breakthroughs during our revitalization. NNSA will continue to provide a safe, secure, and reliable stockpile without resuming nuclear explosive testing by advancing our scientific tools and understanding. We will be innovative and responsive to recruit and retain the brightest, most diverse scientific and engineering minds of the next generation.

The Defense Nuclear Nonproliferation budget request reflects the ongoing need to minimize and secure nuclear and radiological materials to prevent them from falling into the wrong hands and pairing it with policies and cooperation in an international community that is rapidly embracing nuclear energy and technology. The DNN portfolio recognizes a world where risks are more diffuse and new innovations in arms control verification and international cooperation are both necessary to maintain security and more challenging to realize. The increased budget for the counterterrorism and counterproliferation program is similarly attuned to the changing threat environment and supports the nuclear aspects of Russia's invasion of Ukraine. Finally, the growth in NNSA's bioassurance program recognizes a future where these threats must also be managed while allowing the full benefit of new technology.

The Naval Reactors budget request recognizes and supports the incredible partnership between NNSA and the U.S. Navy in consistently supporting the most survivable leg of the nuclear triad through infrastructure recapitalization, a new spent fuel handling facility, ongoing work to deliver the *Columbia*-class propulsion system on time for deployment, and investment in the nuclear propulsion for SSN(X).

Not since the Manhattan Project has there been a more challenging moment for NNSA. We face an urgent, expanded mission at a time when labor is limited, supply chain disruptions abound, and inflation rates are higher than planned. Successfully meeting our objectives requires consistent investment and clear-eyed prioritization. We appreciate your support for our fiscal year 2024 budget.

Senator KING. Thank you, sir. General.

**STATEMENT OF GENERAL THOMAS A. BUSSIÈRE, USAF,
COMMANDER, AIR FORCE GLOBAL STRIKE COMMAND**

General BUSSIÈRE. Chairman King, Ranking Member Fischer, and distinguished Committee Members, I am honored to be here today to represent the men and women of Air Force Global Strike Command and provide you an update on our mission, our airmen, our modernization programs, and the challenges we face in sustaining our legacy weapons systems.

As you all know, the world is a very different place than it was in 2009 when this command was activated. Air Force Global Strike Command was created to ensure the Air Force dedicated the appropriate leadership and oversight of our Nation's nuclear mission.

As the Commander of Air Force Global Strike Command, I intend to make sure no one forgets why this command exists. For the first time in history, the U.S. faces two major nuclear strategic competitors.

China continues to expand, modernize, and diversify their nuclear forces, and is the foremost country positioned to reshape its region and the international order to comply with its authoritarian purposes.

Meanwhile, President Putin has engaged in reckless rhetoric about the use of nuclear weapons as Russia persists in their unprovoked attacks on Ukraine in an attempt to expand their power and influence. Air Force Global Strike Command remains the bedrock of our Nation's defense and the international insurance against these threats.

I would like to thank the Members of this Committee for your steadfast support as we continue to modernize our weapons systems. I will briefly highlight some of our ongoing initiatives. We continue to maintain and operate our current minimum three ICBMs [intercontinental ballistic missiles], and we are already preparing our wings in their surrounding communities to receive the future ICBM, the Sentinel.

Additionally, our bomber fleet, including the B-1s and our dual capable B-2s and B-52s, are being sustained with innovative solutions as we prepare for the future bomber fleet, including the B-21 Raider and the B-52 Juliet. In addition to ICBM and bombers, we continue our efforts to modernize our nuclear command and control communications, or NC3.

NC3 is integral to the national military command system used to exercise and conduct continuous survivable and secure nuclear command and control. To maintain the security of our Nation and our allies and partners, the U.S. must ensure our weapons are capable and ready.

Our airmen are empowered and equipped. The airmen of Air Force Global Strike Command fulfill our mission with discipline, excellence, and pride. However, a number of our airmen also face personal challenges, including health concerns, housing and childcare availability, and we are working tirelessly to develop prompt and comprehensive solutions to ensure our airmen are getting the care and support they deserve.

Last December, I was honored to be confirmed by you to be the Commander of Air Force Global Strike Command. There is no other place I would rather be. Strategic deterrence and long-range

strike are foundational to our Nation's defense, and Air Force Global Strike Command is the backbone of these mission sets.

With our legacy platforms, our modernized forces, and our devoted airmen, we safeguard our Nation now and, in the decades, to come. Thank you for this opportunity. I look forward to your questions.

[The prepared statement of General Thomas A. Bussiere follows:]

PREPARED STATEMENT BY GENERAL THOMAS A. BUSSIERE

INTRODUCTION

Chairman King, Ranking Member Fischer, and distinguished Members of the Subcommittee, thank you for the opportunity to appear before you and discuss the readiness, sustainment, and modernization of our nuclear and long-range strike weapons and platforms. The mission of Air Force Global Strike Command (AFGSC) is to provide strategic deterrence and long-range strike. This command is the lead for sustaining current forces and fielding future long-range strike weapon systems. The demand signal for these capabilities is unlimited; they are the foundation to an independent Air Force (AF), and the backbone of our National Defense Strategy.

The threat to international stability continues to grow, highlighting the importance of both strategic deterrence and long-range strike. The global risks have escalated to a tipping point. We are in the novel territory of great power competition; thus we must be able to credibly provide a nuclear deterrent against two nuclear adversaries concurrently. The People's Republic of China (PRC) is in the midst of a strategic breakout through a rapid nuclear expansion and continues to develop new military capabilities. Additionally, Russia's full-scale war against Ukraine continues alongside its efforts to develop anti-satellite weapons, hypersonic technology, and cyberspace activities. The aggressive and provocative behaviors occurring within the strategic arena underscore the urgency of our efforts to modernize our weapon systems while we maintain our strategic posture, and this responsibility falls on AFGSC. This is a no fail mission.

AFGSC is ready today to meet the requirements given to us from the President and the Commander of United States Strategic Command (USSTRATCOM), but there is zero operational margin left. Supply chains responsible for legacy system parts are closing, and require innovation to fill those gaps. Additionally, there are mission areas that I feel have received less attention than other high value acquisition programs but are equally critical to our strategic deterrence. I aim to illuminate those mission areas and highlight the risks to our national security if we do not provide them more focus. Unique to this mission area and to AFGSC, we must maintain our legacy weapon systems at full operational capability until the future force is ready to take on the operational requirement. For example, the B-21 "Raider" is the world's first sixth generation aircraft and will offer the United States unparalleled capabilities, but until it is mission capable, we must be postured to deter and, if necessary, fight with our current force of B-1, B-2, and B-52 bomber aircraft. Nearly every portfolio in AFGSC is going through modernization, and the balance of these transitions is critical.

As the Commander of AFGSC, my priority is to ensure we are ready to conduct our mission with great discipline, that we strive for excellence, and our airmen take pride in our historic legacy. Our "Strikers" are proud to be the backstop of integrated deterrence and the sole provider of air-delivered long-range conventional and nuclear strike and land-based nuclear strike capabilities for our allies and partners. Our personnel have remained focused in the face of a rapidly changing geopolitical environment. As the Air Component to USSTRATCOM, we continue to preserve our ability to execute nuclear options upon direction from the President with safe, secure, credible, and reliable weapons, while we concurrently ensure conventional, long-range strike viability. What we do every day of every week is the foundation of our Nation's defense. We are stewards of our Nation's most important mission, which is an absolute privilege. Continued congressional support through stable, reliable funding ensures our Strikers are equipped with the necessary resources to ensure we compete effectively and responsibly as our Nation moves into a new strategic era.

AIRMEN AND FAMILIES

Our airmen and their families represent the greatest strength of AFGSC. Through their service and sacrifice, they operate, maintain, and secure the most powerful

weapons ever designed and execute continuous long-range strike operations across the globe. Such critical missions require the complete focus and attention of our Strikers. To continue the development of our airmen, AFGSC has established academic alliances with education programs, encouraged Command sponsored research, and continued to develop our personnel through internships and participation in exercises. Retaining talent is also crucial to our mission success and providing the right environment for families is a large piece of an airman's decision to remain in the AF. We know there are challenges to families outside the struggles of daily military life. Our wings are working hard within their abilities to provide solutions to healthcare challenges, housing shortages, and long childcare waitlists.

AFGSC established a collaboration with Louisiana Tech University through the Global Strike National Security Fellowship Program, utilizing a small team of interns trained in coding, automation, machine learning, and artificial intelligence to develop tailored analytic tools for bomber operations. Moreover, AFGSC has championed implementing the Envision cloud computing platform to produce operational dashboards and provide data-driven insights for decisionmakers across the nuclear enterprise. Finally, AFGSC has institutionalized a Data Modernization and Analytics Board to create data-centric, insight-driven organizations capable of achieving and maintaining decision advantage. The board, comprised of subject matter experts in technology, analysis, information systems, and data, advises on technical and modernization efforts across the Command.

Our Strikers and their families are the key ingredient to our command's success. Their exceptional resiliency and commitment to excellence have enabled AFGSC to maximize our combat capacity and strategic readiness. To maintain this level of success, we are actively engaged in initiatives to recruit and retain a diverse and talented group of future Striker leaders. However, in recent years, these efforts have become increasingly difficult to sustain as we encounter challenges to provide for the needs of our airmen and families. These challenges are not unique to AFGSC, but many of our rurally located installations and their unique nuclear mission sets have amplified the impact of many of these challenges.

AFGSC has taken an active role in addressing the concerns about a potential correlation between missile field service and elevated health risks. We are responding with both urgency and transparency to compile comprehensive data to understand the risk to our airmen and their families. Our command team is working with the USAF School of Aerospace Medicine to ensure a thorough study is conducted covering a variety of geographic locations, AF Specialties, and work environments. In coordination with Headquarters Air Force (HAF) and the Defense Health Agency (DHA), we will ensure this study addresses the concerns of and appropriately communicates the progress to our airmen, families, retirees, congressional members, and the American people.

Across the command, but especially pronounced within our more rural communities, AFGSC installations are combatting housing concerns for inventory, adequacy, and affordability. This challenge is most intensified at installations with significant military construction (MILCON) efforts that are preparing for an increased amount of personnel such as Ellsworth Air Force Base (AFB), South Dakota. Over the last several years, the Rapid City region and surrounding areas have experienced a surge in housing demand which far outpaces current availability.

AFGSC is also experiencing childcare needs beyond the capacity of our Child Development Centers (CDC). Hiring challenges are the primary driver of the current shortfalls at installation CDCs. Additionally, there are limited options within the local community, which are often cost-prohibitive for military families. However, various wings are implementing initiatives to combat these gaps. The Malmstrom AFB school liaison officer championed a pilot "Transitional-K" program for military children. This early childhood development program within the on-base CDC intends to address childcare issues and enhance academic performance. The pilot program includes 18 military families with support from local high schools and the local university to help children transition between pre-K and a kindergarten educational environment. Additionally, this program helps offset childcare needs and allows military families access to early childhood development resources. Minot AFB has also taken several steps to enhance the quality of life concerning childcare. They have reduced onboarding timelines from 60 to 30 days. Additional advocacy has resulted in the base CDC receiving top priority from AF Installation and Mission Support Center to plan, design, and construct two additional classrooms and renovate an existing classroom into two separate rooms; this initiative will enable the care of 30 more children. Furthermore, Minot AFB has implemented a \$5,000 hiring incentive for an 18-month commitment as part of recruiting and retention initiatives. The installation's Childcare Working Group examines all avenues to expand available, quality childcare.

OPERATIONS

The 20th Air Force (20AF) continues to operate, maintain, and defend the Minuteman III (MMIII) Intercontinental Ballistic Missile (ICBM) weapon system and meet all USSTRATCOM operational requirements. The last 3 years showed the resiliency and ingenuity of our airmen as they faced the challenges of the COVID-19 pandemic while still operating, maintaining, and defending our land-based strategic deterrent at the highest readiness levels seen across the entire Department of Defense. The lessons and adaptations to mission accomplishment will play a vital role in the force development structure employed in the future. Additionally, we continue to provide critical sustainment programs to maintain our MMIII's lethality through the end of life, and our forces remain ready to transition to on-time fielding of Sentinel, our new Ground-Based Strategic Deterrent (GBSD).

Our nuclear security teams remain ready and lethal to meet any challenge. Additionally, 20AF is home to the AF's largest contingent of Security Forces Airmen. As such, 20AF faces many challenges associated with organizing, training, and equipping such a substantial force of dedicated professionals. However, these airmen continue to thrive, working within current constraints and capabilities to support the USSTRATCOM operational plan requirements while gearing toward our future and the fielding of the Sentinel system.

At Malmstrom AFB, the 40th Helicopter Squadron and the 341st Missile Security Operations Squadron have joined forces in the Integrated Alert/Operations Facility—having these on-demand response entities housed under one roof streamlines operational functions and training activities. As Security Forces begin to enter the operations world, with many staffs now under the Ops Directorate, Security Forces' officers are now integrating to new depths at the tactical level. By living, eating, and operating together, these teams are becoming more lethal and more responsive than ever before.

Since 2019, we have been working with the Pentagon as part of the Federal Aviation Administration's Obstruction Evaluation process to evaluate requests from energy developers consistent with title 10, U.S. Code, section 183a. In 2021, after completing a substantial analysis and a formal safety risk assessment, Global Strike determined that wind turbines located within two nautical miles (NM) of an ICBM launch or missile alert facility would unacceptably degrade national security and threaten the safety of our pilots in the event of an emergency response. One of the critical components of nuclear security for the MM III ICBM weapon system is the ability to respond rapidly and with sufficient force over a dispersed ICBM complex the size of the State of South Carolina. The UH-1N and its replacement MH-139 provide the airlift, surveillance, and overwatch capabilities to enable nuclear security, day or night, and in all weather conditions. Wind turbines over 200 feet in height create an unacceptable collision risk within that critical airspace. AFGSC currently assesses that 46 ICBM launch and missile alert facilities are severely encroached on by existing wind turbines. AFGSC continues to work with energy developers through the processes established in title 10, U.S. Code, section 183a to reduce the number of existing turbines and develop alternate locations to avoid any additional turbines within 2NM. In addition, our Sentinel team and the missile wings continue to engage with and educate landowners and other key stakeholders on AFGSC's vital ICBM mission and the risks created by wind turbines within 2NM.

AFGSC has experienced several mission successes within 20AF, including the ICBM Cryptographic Upgrade II, which will reach initial operating capability by mid-2023. Although fielding this capability has faced a few delays, its implementation allows for remote ICBM cryptography changes, has already saved hundreds of labor-hours, and increases nuclear surety and security. Additionally, the Tactical Response Force/Helicopter integration working group was initiated in late 2021 and continues to meet the full spectrum of nuclear security challenges successfully. Last, we continue to engage with partners and develop plans for cooperation on training and knowledge exchange as we begin employing the MH-139A, Grey Wolf helicopter.

Looking forward, we have completed 65 percent construction of the first Weapons Generation Facility at F.E. Warren, Air Force Base (AFB), Wyoming. This facility is an ultra-secure combined nuclear maintenance and storage facility. We will continue using the lessons learned from F.E. Warren to gain efficiencies at future Weapons Generation Facility construction sites. In addition, we deployed the first high-speed data backbone command and control unit at our first ICBM wing. Three hundred personnel trained and equipped 72 vehicle systems, created 12 tech ops centers and erected 40 towers which provide the missile field complex a \$94 million high-speed, self-healing communication system.

AFGSC continues to encourage our Wings and personnel to innovate to execute the mission better. New ICBM security response procedures will allow security experts to lead security response in the missile complex. As part of Sentinel, each missile wing will receive a new on-base Launch Facility Trainer specifically for security forces' use—including active alarm systems and cameras. AFGSC has also coordinated a lease with Camp Guernsey, Wyoming, to provide 24/7 unimpeded access to 6 small arms ranges enabling distance shooting up to 500 meters. The new \$23 million indoor small arms range complex at Minot AFB, North Dakota, is complete and FOC. Malmstrom AFB, Montana, has three operational small arms ranges and uses nearby Fort Harrison, Montana, for long-distance small arms firing. Last, as the new Payload Transporter (PT) completes fielding, we anticipate de-certified PTs will be available for SF training.

The MMIII ICBM remains viable as the ground leg of our nuclear triad. However, the 50-year weapon system and accompanying infrastructure will face significant challenges as it nears end-of-life, with the major factors being parts obsolescence and diminishing manufacturing sources. Over 150 ICBM launch vehicles and operational ground equipment components require risk mitigation to remain operationally viable until their end-of-life. The missile wings have logged over 2.4 million maintenance hours over the last 5 years, which is a 30 percent increase over the previous 5 years. However, our installations still carry a maintenance backlog of 21,000 work orders, and models predict a 25 percent increase over the next Future Year Defense Program (FYDP). Additionally, our weapon system sustainment execution budget has grown over 17 percent within the last 5 years. MMIII sustainment acquisition programs such as Launch Control Center Block Upgrade, Automatic Switching Unit replacement, and Payload Transporter Replacement are critical in maintaining capability. However, the fundamental mitigation action for MMIII to avoid exceeding its operational viability is the fielding of our next generation weapon system program, Sentinel.

Sentinel, the Ground-Based Strategic Deterrent (GBSD), will modernize or replace MMIII flight systems, weapon system command and control, and launch systems, including missile silos, control centers, and other ground infrastructure. The program is in its third year of a 7-year development effort. Sentinel faces the same challenges that many major defense acquisition programs are facing. Macroeconomic factors, manpower challenges, and inflationary effects pose significant challenges; nevertheless, the Sentinel program's top priority is keeping Sentinel on a path to meet the warfighters' need. The Department of the Air Force (DAF) is currently identifying acquisition levers to capitalize on opportunities to keep this projected IOC date. Like other systems within the Command, the Sentinel program will require stable funding and a whole-of-government approach to ensure prompt delivery and avoid critical shortfalls in our Nation's defense.

The MH-139A program accepted the first four MH-139s in August 2022. Development Test has started at Duke Field at Eglin AFB, Florida, and AFGSC expects Initial Operating Capability at Malmstrom AFB in Fiscal Year 2025. Milestone C was approved early March 2023 and starts entry into Low-Rate Initial Production (LRIP). LRIP will consist of three lots of two to 16 aircraft each, with the first lot delivering 13 aircraft. The UH-1N s quickly facing obsolescence challenges one would expect of a weapons system of over 50 years. The MH-139 is the answer to ensure safe, reliable security response to our missile fields spreads.

Eighth Air Force (8AF) operates and maintains the only long-range strategic bombers across all combatant commands and between our allies and partners. AFGSC bombers continue to meet mission requirements despite being below our readiness target goals for spare parts due to parts obsolescence. Aircraft availability has decreased and downtime for maintenance has increased, and this has added challenges and focuses the importance of sustaining the current fleet while staying on time with modernization. Despite the safety stand down, the B-2 is ready for any national taskings. It is the only penetrating bomber and must maintain full operational capacity, until replaced by the B-21 Raider. The crew force continues to find ways to maintain readiness while maintainers utilize this time to repair aircraft discrepancies. The safety investigation continues to progress as engineers, aircrew, and maintenance subject matter experts look for a long-term engineering solution to prevent future gear safety mishaps.

The B-52 continues to be the workhorse of long-range strike, but also has its sustainment challenges. Parts obsolescence increases aircraft down time and leads to higher cannibalization rates of parts from other aircraft. This means to meet mission requirements, aircrews are flying less training sorties. A lack of training sorties leads to a lack of current aircrew to fly mission lines and an inability to absorb the number of crews required. To combat availability issues, AFGSC is pursuing a medium fidelity weapon system trainer to maintain aircrew readiness and increase

training quality. AFGSC has an obligation to deliver solutions to our airmen if we continue to make them operate this way. Proficiency and currency are part of the nuclear triad.

We will implement as directed the 4-Bin Force Generation Model and the Agile Combat Employment (ACE) concept to achieve Commander, USSTRATCOM and Chief of Staff of the Air Force (CSAF) objectives while deterring our enemies and assuring our allies. The 4-Bin Model intends to meet specific CSAF objectives, conform to the 2022 National Defense Strategy, and move the AF to a more predictable and sustainable model for our airmen. ACE exercises practice distributed operations from dispersed locations to increase survivability while generating combat power. We initially sent four B-52s to Fairchild AFB, Washington, to execute the ACE mission. Each bomber transported a mobile maintenance team and a Bomber Onboard Cargo System (BOCS) to practice the capability of landing, rearming, and repairing the aircraft anywhere that has enough runway. AFGSC has successfully deployed two B-52 ACE operations to Alaska and Spain while taking maintenance personnel and equipment using the Bomber Onboard Cargo System to remain agile and lethal with a minimum logistical footprint and tanker requirement. Additionally, B-1s completed a limited ACE deployment to Alaska with a lean and agile maintenance footprint conducting combat training missions out of Eielson AFB, Alaska. Other notable events include the first B-52, C-17, and KC-46 large force exercise, demonstrating ACE to U.S. Indo-Pacific Command (USINDOPACOM) with a KC-46 and B-52 in formation, integrating AMC/CC and AFGSC/CC objectives.

As the Air Component to USSTRATCOM, AFGSC is leading the way in accomplishing multiple site surveys of airfields and air bases worldwide to determine their suitability to support bomber operations in peacetime and during contingencies. In Fiscal Year 2022, AFGSC surveyed 14 bases, eight countries, and three geographic combatant commands with scheduled bomber task force missions to execute this year.

AFGSC is committed to the requirements and funding stability on the baseline acquisition program for the B-21 Raider. Since the program's inception, the top-level key system attributes and performance parameters have remained unchanged. Similarly, since the Engineering and Manufacturing Development (EMD) contract was awarded in 2016, the B-21 program has remained within its Acquisition Program Baseline (APB) for both cost and schedule targets. The Fiscal Year 2024 President's Budget includes funding to continue development and procurement funding to continue the program's transition to low-rate initial production. Therefore, the following significant milestones for the program are the first flight and the start of low-rate initial production.

Aligned with the National Defense Strategy, the B-21 provides survivable, long-range, penetrating strike capabilities to deter aggression and strategic attack against the United States, its allies, and partners. Six aircraft are in production. Test aircraft are being built on the same production line, using the same tools, processes, and technicians that will manufacture the production aircraft. The program has completed loads calibration for the first test article that will support first flight, has initiated full-scale static testing for the second B-21 test article, and completed an integrated kill chain demonstration using a Flying Test Bed. The recent public unveiling of the B-21 on Dec 2, 2022, demonstrates our commitment to integrated deterrence to the Nation, our allies, and our partners. The first flight remains a key milestone, which will be an "event-driven" milestone that will, in turn, drive the flight test campaign for the B-21.

Military construction at Ellsworth AFB is part of the critical path to support the B-21 nuclear and conventional mission. In calendar year 2021, the Acting Secretary of the Air Force confirmed that Ellsworth AFB would be the first B-21 Main Operating Base. Ellsworth has yet to host a stealth, nuclear capable aircraft thus, requiring the necessary facilities, infrastructure, and workforce to support the nuclear mission and meet USSTRATCOM requirements. Funding for two military construction projects, Phase Hangar and Fuel Systems Maintenance Dock at Ellsworth AFB, have been requested in the Fiscal Year 2024 President's Budget to support aircraft arrival in the mid-2020's.

Additionally, the Fiscal Year 2024 President's Budget includes Planning and Design (P&D) funding for military construction (MILCON) projects at Dyess AFB, TX, and Whiteman AFB, MO. Our MILCON projects remain a crucial component to the execution of our bed-down activities across all our AFGSC bases.

The design of the B-21 is an Open Systems Architecture that will allow for rapid capability integration with minimal disruption to production and aircraft availability, ensuring the weapon system will keep pace with the highly contested threat environment. The recent successful integration of a third-party sensor demonstration validates these words are more than talking points and that the B-21 will pro-

vide an enduring capability against present and emerging threats for our Nation and our allies for decades. The Fiscal Year 2024 President's Budget includes funding to begin modernization activities such as nuclear certification, Long Range Standoff mission (LRSO) integration, and other, more exquisite activities. Continued investments in new capabilities like the B-21 ensure our Nation possesses cutting-edge technology needed to maintain strategic deterrence and execute effective operations across the globe. Furthermore, the Secretary of the Air Force's operational imperatives, including the B-21 Long Range Strike Family of-Systems, will further enable the B-21 to enhance survivability, resiliency, and lethality while promoting interoperability with the Joint Force.

The Commercial Engine Replacement Program (CERP) is critical to B-52 viability through 2050. The AF Life Cycle Management Center's Propulsion Directorate found the current B-52 TF-33 engines will be unsustainable beyond 2030. As a result, USAF selected Rolls Royce as the new engine supplier. The off-the-shelf variant of the F130 turbofan will replace the obsolete TF-33. The program will be a net cost-saver in place of continued TF-33 service life extensions, and AFGSC anticipates an increase of 20 percent to the B-52's unrefueled range. The program is transitioning from a Middle Tier of Acquisition (MTA) to a Major Capability Acquisition (MCA), with IOC occurring in Fiscal Year 2031.

The Radar Modernization Program (RMP) will integrate an off-the-shelf radar system that will ensure the B-52's ability to employ nuclear and conventional weapons in present and future fights. The current B-52 radar is unsustainable and suffering from parts obsolescence. The program will reduce maintenance repair times, decrease operating costs, and provide for future growth capability. An EMD contract award occurred in 3QFY21. We project IOC for Fiscal Year 2027 and FOC in Fiscal Year 2031.

The nuclear armed Long Range Standoff missile (LRSO) is an Acquisition Category 1D Major Defense Acquisition Program (MDAP) to design, develop, produce and deploy a weapon system replacement for the current nuclear armed Air Launched Cruise Missile (ALCM). The LRSO program completed its February 2023 Critical Design Review (CDR) on time and remains on track for the scheduled IOC/Full Operational Capability (FOC).

AFGSC continues to transition from a legacy to a modern Nuclear Command, Control, and Communication (NC3) enterprise. The AF has begun recapitalizing the aging E-4B with the Survivable Airborne Operations Center (SAOC) program. The E-4B is a vital piece of the National Military Command System, providing Nuclear Command and Control (NC2) for the executive branch. AFGSC authored an AF-validated SAOC Capabilities Development Document that gained Joint Requirement Oversight Council validation in March 2022. The Department has concluded its market research, finalized requirements, worked with key stakeholders, including industry, to develop SAOC solicitation, and is targeting a competitive contract award in CY2023. The AF continues to refine the SAOC acquisition strategy, leveraging modernization opportunities, open system architecture, and digital engineering to reduce overall program costs. As a result, the SAOC will achieve FOC in the early to mid-2030's.

NC3 is a program that fails to gain the notoriety of larger acquisition programs. However, this is an important weapons system for AFGSC and our national defense. Collectively, we need better accountability and transparency of these systems and a clearer answer to who oversees each system and the funding streams associated with the programs. NC3 is a no-fail mission, and we aim to highlight its importance as we continue striving to bring visibility to NC3. AFGSC will work closely with USSTRATCOM, AF, Space Force, and industry partners to generate the NC3 Next modernization plan.

We have several recent and upcoming ICBM command and control modernization efforts for our Strategic Automated Command and Control System, satellite communications, and very low-frequency radios. These will ensure command and control capability for deployment of the new Sentinel ICBM and the legacy MMIII ICBM fleet until it is retired.

AFGSC Intelligence, Surveillance, and Reconnaissance Directorate partnered with the NC3 Enterprise Center (NEC) and other intelligence organizations to produce the first-ever NC3 focused intelligence, surveillance, and reconnaissance Program of Analysis (POA). This effort synchronizes NC3 intelligence requirements across the enterprise. In addition, the POA provides a means to advocate within the wider Intelligence Community to advocate for NC3 equities. It also provides a way to assess the effectiveness of NC3-related collection and analysis.

AFGSC has successfully fielded 12 fixed Global Aircrew Strategic Networking Terminal Systems at 18 main operating bases within the continental United States at the close of CY22 and eight transportable terminals to support the Mobile Nuclear

Command and Control Mission to execute USSTRATCOM's Nuclear Alert Mission. In Fiscal Year 2023, AFGSC projects to release 42 additional terminals to 25 locations worldwide. AFGSC maintenance and logistics aligns with the USSTRATCOM NEC and the NC3 Program Office. Through this connection, we provide oversight on NC3 weapon system status reporting to align operational units with the Joint Global Strike Operations Center (J-GSOC) and the NEC reporting requirements and timelines and routinely work with the Air Force Nuclear Weapons Center's (AFNWC) Integrated Product Center to resolve field-level sustainment concerns.

CONCLUSION

AFGSC thanks Congress for your continual support to our mission. The risks to our national security are becoming more apparent every day. The PRC aims to surpass the United States in terms of global influence and military might, while Russia continues to challenge international norms increasing risk to strategic stability. AFGSC understands the importance of sustaining our current fleet and will continue to modernize at the speed of relevance. We are ready today to meet the requirements given to us from the President and the Commander of USSTRATCOM, but there is no operational margin left and we have a plan to get where we need to go. Sustainment is the first piece of this plan. AFGSC is not afforded the same luxury as other commands when onboarding new systems. We must maintain full operational capability to meet our national security requirements, while fielding new weapon systems. These legacy systems still require stable funding until they can be completely divested. Modernization is the second piece. We cannot slow down and AFGSC is building the architecture to meet current and future requirements. Nearly every portfolio is being modernized from new sixth generation aircraft, to better vehicles for our security forces in the missile fields. Last, our airmen and families are the foundational component that make sustainment, modernization, and deterrence possible. AFGSC and the Nation have an obligation to help meet the challenges facing our airmen. We owe our airmen answers to their health concerns, access to the required medical attention, adequate childcare, and opportunities for education and growth for both the member and their family. If we take care of them, they will take care of the mission. Strategic deterrence and long-range strike are foundational to our Nation's defense, and AFGSC is the backbone of those mission sets. Our success in this enterprise to field and sustain these capabilities for our Nation requires coordination from Congress and the continued support you provide.

Senator KING. Thank you, General. Admiral Wolfe.

STATEMENT OF VICE ADMIRAL JOHNNY R. WOLFE, JR., USN, DIRECTOR, NAVY STRATEGIC SYSTEMS PROGRAMS

Vice Admiral WOLFE. Chairman King, Ranking Member Fischer, and distinguished Members of the Subcommittee, thank you for the opportunity to testify on the Department of the Navy's budget priorities for nuclear forces.

I would like to thank the Subcommittee for its continued support of the Navy's nuclear deterrence mission. The mission of my command, Strategic Assistance Programs, is to provide credible and affordable strategic solutions to our warfighter.

To quote from the administration's 2022 Nuclear Posture Review, I quote, "in a dynamic security environment, a safe, effective nuclear deterrent is foundational to broader U.S. defense strategy and the extended deterrence commitments we have made to allies and partners." For nearly 7 decades, the Navy has provided unwavering support to the sea-based leg of the nuclear triad.

This coming year we will build on this remarkable history. Later this year, the Navy will conduct the final demonstration and shake-down operation for an *Ohio*-class ballistic missile submarine. Alongside our partners in the United Kingdom, we will celebrate the 60th anniversary of the Polaris Sales Agreement.

In coordination with our colleagues at NNSA, we will continue to ensure the W93/Mk7 program remains on schedule. As this work

shows, we must continue to sustain today's deterrent while modernizing for the future.

The Navy continues to manage the nuclear strategic weapons system across three main mission priorities. First, sustaining the weapon system D5LE through *Ohio* end of life. Second developing the strategic weapon system in the future, D5 Life Extension II for the *Columbia*-class, and third, safeguarding our special relationship with the United Kingdom, embodied in the Polaris Sales Agreement. First and foremost, we must maintain the current D5LE missile inventory and provide the necessary operational support to sustain *Ohio*-class submarines through their end of life in the early 2040's.

All of our life extension programs remain on track, and our current program will support the deployment of all existing warheads. We must also recapitalize our supporting Navy nuclear deterrence mission infrastructure to support and sustain nuclear weapons and SSBN operations that enable sea based strategic deterrence.

Second, along with PEO SSBN, we must continue to transition between *Ohio*-class and *Columbia*-class submarines and make sure they stay on schedule. For PEO SSBN, this means delivering the largest, most capable, and most advanced submarine ever produced by our Nation, representing a generational recapitalization of the SSBN force.

For my command, this requires a seamless transition of the current Trident II D5LE weapon system and missile inventory onto the new *Columbia*-class ballistic missile submarine. We have already started the work on the next variant of Trident D5LE II and its corresponding weapon system. D5LE II will be necessary to out load the *Columbia*-class SSBN, starting with the 9th hull, ensuring that Trident remains credible until at least 2084.

Finally, one of the greatest advantages the United States has is its alliances and partnerships. For decades, United States policy has recognized the contribution of an independent British nuclear deterrent and how it adds to NATO and global security, and SSP [Strategic Systems Program] will continue to support this most important relationship.

Execution of these three mission priorities is only possible through investment in our people, our infrastructure, and our industrial base. Nuclear modernization will take time, so sustained resourcing and enterprise effort is absolutely essential. We can no longer put off recapitalizing our nuclear triad.

Our adversaries are not idle. Russia's and China's nuclear arsenal is our Nation's biggest existential threat. It is only through your continued support that the Department's top modernization priorities can be achieved and the Navy can deliver a reliable, sea based strategic deterrent capability.

As the 14th Director, it is my highest honor to represent the men and women of SSP. My personal number one priority is to ensure that they are poised to execute the mission with the same level of success, passion, and rigor that has characterized our workforce since our program was founded in 1955.

Thank you for the opportunity to testify today on behalf of the dedicated Americans that make deterrence of major power conflict their life's work. I look forward to your questions.

[The prepared statement of Vice Admiral Johnny Wolfe follows:]

PREPARED STATEMENT BY VICE ADMIRAL JOHNNY WOLFE

INTRODUCTION

Chairman King, Ranking Member Fischer, and distinguished Members of the subcommittee, thank you for this opportunity to discuss the sustainment and recapitalization of the sea-based leg of the nuclear triad. It is an honor to represent the Navy's Strategic Systems Programs (SSP) and the contributions the Navy provides to our national and global security through Sea Based Strategic Deterrence (SBSD).

I should start by noting that the priorities and lines of effort that I am here to describe today are all in service of the 2022 National Defense Strategy (NDS), which—as the Secretary often says—is our north star.

The Mission Priorities of SSP, in support of the NDS, are to:

1. Sustain the Trident II D5 (D5) and Trident II Life Extension (D5LE) Strategic Weapons System (SWS) and ensure Nuclear Weapons Surety on the *Ohio*-class SSBN and in supporting shore facilities through 2042 while providing Naval Nuclear Weapons Program Technical Authority for Nuclear Weapon (NW) systems and Regulatory Oversight of the Navy Nuclear Deterrence Mission (NNDM). SSP will re-host and sustain the D5LE SWS onto the initial *Columbia* and United Kingdom (UK) *Dreadnought* SSBNs.
2. Develop the *Columbia* and UK *Dreadnought* SWS and advanced weapon capabilities in the Trident II D5LE2 missile and W93/Mk7 warhead and reentry body assembly. Simultaneously, SSP will develop and deliver the U.S. Navy's non-nuclear, Conventional Prompt Strike hypersonic missile capability to fill a critical gap in our full spectrum of deterrence. The two nations are working separate but parallel warhead programs with collaboration between the two.
3. Safeguard the special relationship between the U.S. and UK through the Polaris Sales Agreement (PSA), as amended, and Mutual Defense Agreement (MDA), as amended, benefiting both nations and supporting the UK's Continuous At Sea Deterrence (CASD).

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; ready to respond to the emerging needs of our warfighter, and to protect and safeguard our Nation's assets with which we are entrusted. We certainly could not do this without the support from this Committee.

STATE OF THE PROGRAM

The Nation's nuclear triad consists of intercontinental ballistic missiles, heavy bombers, and ballistic missile submarines (SSBNs) equipped with submarine-launched ballistic missiles (SLBM). These platforms and their associated weapons systems are essential to the very foundation of our Nation's security and survival. The Administration's recently released National Defense Strategy priorities deterring strategic attacks against the United States, our allies, and our partners, and the Nuclear Posture Review (NPR) affirms the following roles for nuclear weapons: deter strategic attacks, assure allies and partners, and achieve U.S. objectives if deterrence fails. While the U.S. nuclear arsenal remains safe, secure and effective, most U.S. nuclear deterrent systems—including the SSBN fleet—are operating beyond their original design life. Replacement programs are ongoing, but there is little or no margin between the end of useful life of existing programs and the fielding of their replacements. As noted by the 2022 NPR, we need to fully fund the *Columbia*-class SSBN program to deliver a minimum of 12 boats on time, as the *Ohio*-class SSBNs begin to retire. We also need to continue to prioritize near term investments in the submarine industrial base, *Ohio*-class sustainment and the second life extension of the Trident II D5 SWS.

The U.S. Navy provides the most survivable leg of the nuclear triad with the interdependent *Ohio*-class SSBNs and the Trident II D5 SWS. The SSBN fleet is responsible for more than 70 percent of the Nation's deployed nuclear warheads accountable as defined by the New START Treaty. As the Navy carefully manages the

approach to end of life of *Ohio*-class SSBNs, addressing the viability of the SWS throughout the life of the *Columbia*-class SSBNs remains a top priority. *Columbia*-class SSBNs will ensure the effectiveness and availability of the Nation's Sea Based Strategic Deterrent through the 2080's. The currently deployed Trident II D5LE missiles will support initial load-outs on *Columbia*, but modernization of the D5LE SWS, via D5LE2, is required to support later *Columbia*-class missile inventory and seamlessly sustain USSTRATCOM requirements. D5LE2 will ensure the SWS will be flexible and adaptable in order to maintain demonstrated performance and survivability despite the dynamic threat environment.

As the fourteenth Director, it is my highest honor to serve as the program manager, technical authority, safety and security lead, regulatory lead, and U.S. Project Officer under the Polaris Sales Agreement (PSA), as amended, for the Naval 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, 1,400 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

The *Ohio*-class SSBN began a new phase of Sea Based Strategic Deterrence (SBSD) when it started relieving the 41 for Freedom SSBNs in the 1980's, initially employing the Trident I C4 Submarine Launched Ballistic Missile and leveraging the nuclear warheads and missile production infrastructure of the original Fleet Ballistic Missile Program. As the U.S. sought to increase the range, accuracy, reliability, and lethality of its Submarine Launched Ballistic Missile program, in 1988, USS *Tennessee* (SSBN734) dawned a new age of SBSB as she ushered in the advanced Trident II D5 Strategic Weapons System in the newly built Kings Bay Naval Submarine Base, specifically designed to support this new weapon system. Over the following decade, as new *Ohio*-class SSBNs were brought online (SSBN 735 through SSBN 743) with the D5 missile system, the early *Ohio*-class SSBNs were also converted from a C4 system to align with the rest of the D5 fleet. Originally composed of 18 *Ohio*-class SSBNs, the SSBN fleet settled on a 14-ship class carrying the Trident II D5 missile system executing SBSB, while the first four *Ohio*-class SSBNs were converted to conventional guided missile and special operations forces submarines (SSGN 726 through SSGN 729). The 14 ship *Ohio*-class SSBN fleet remains the backbone of U.S. strategic deterrence, carrying approximately 70 percent of the United States' treaty-accountable deployed nuclear warheads in the form of the W76 and W88 families of warheads. Originally designed for a 30-year service life, the *Ohio*-class submarines were called upon to extend this service to 42 years, supporting a delay in investment in the next generation of SSBNs. To account for this extension in service life, SSP embarked on a life extension program for the D5 missiles to update critical but aging missile electronics systems. SSP introduced the Trident II D5 Life Extension (D5LE) program to the fleet in 2017 and will continue through approximately 2025 to convert D5 missiles to D5LE when they are pulled off the SSBNs during normal missile maintenance times.

The final *Ohio*-class SSBN, USS *Louisiana* (SSBN 743), which recently completed her mid-life Engineered Refueling Overhaul (ERO) will support the sea-based strategic deterrent until her scheduled retirement in 2042. SSP must ensure the "no fail" SBSB mission is supported on the *Ohio*-class through 2042, providing a reliable Trident II D5/D5LE weapons systems with W76/W88 warheads until this final ship of the class is decommissioned. In parallel, SSP's program efforts and collaboration with the UK through the Polaris Sales Agreement and Mutual Defense Agreement will support the UK's Continuous At Sea Deterrence through *Vanguard*-class life and the transition to a *Dreadnought*-class SSBN fleet.

To meet these critical program responsibilities, SSP will execute Naval Nuclear Weapons Program Technical Authority for Nuclear Weapon (NW) systems and Regulatory Oversight of the NNDM. Through programmatic excellence in shipboard sustainment and modernization programs across the SWS subsystems and in NW surety, and through diligent oversight of the logistical supply chains, SSP not only will maintain a credible and reliable weapons system, but will also continue unlocking new capabilities the warfighter can leverage to enhance strategic deterrence and act decisively should deterrence fail.

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 more than three decades and is planned to be deployed more than 55 years. This demand to maintain demonstrated high performance while extending the service life past initial design requirements required a missile life extension effort, D5LE. The current Trident D5 Life Extension (D5LE) remains an effective and credible Strategic Weapon System on both the *Ohio*-class and *Columbia*-class SSBNs into the 2040's, supporting the *Ohio*-class submarine through end of service life and serving as the initial Strategic Weapon System for the *Columbia*-class SSBNs.

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. A minimum of 12 *Columbia*-class SSBNs will replace today's 14 *Ohio* SSBNs and beginning in FY30, D5LE missiles will support initial load-outs on *Columbia* (Hulls 1–8). Production of additional D5LE missiles is not practical due to obsolete parts and the lack of a robust industrial base. In order to meet inventory requirements and maintain a credible strategic deterrent in the face of evolving threats, a second life extension of the Trident II Strategic Weapons System (D5LE2) is required to be designed, engineered, produced and deployed by *Columbia* Hull #9's strategic outload. It will be incorporated on all follow on Hulls as well as Hulls 1–8 during their Extended Refit Period from fiscal year 2039 to 2049 to continue to meet USSTRATCOM requirements. D5LE2's architecture will ensure the weapon system maintains demonstrated performance and remains survivable while facing a dynamic threat environment driven by two near peer competitors until *Columbia* end of life.

D5LE2 is a hybrid of pull-through cost-effective technology (e.g., solid rocket motors, ignitors) and redesigned and updated components (e.g., avionics, guidance, system architecture). 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 Sea Based Strategic Deterrent.

As directed in the 2018 Nuclear Posture review, SSP executed system architecture studies in fiscal year 2020 to 2022 to evaluate solutions to problems associated with emerging threats, supportability, and adaptability required to address challenges in a dynamic threat environment. Additionally, activities focused on missile and guidance technology to determine the effective composition of redesign, remanufacture, and pull-through of highly reliable components. Fiscal year 2024 activities continue the refinement of systems studies and critical Missile and Guidance Technology work while building up the focused work on subsystem redesign and industrial base development activities for the D5LE2 program.

Unlike SLBM programs of the past, D5LE2 does not have the benefit of a healthy defense industrial base that comes from maintaining production and continuous development. The 2022 NPR reiterated the need for D5LE2 and stated that the United States will prioritize near-term investments to "ensure that D5LE2 is effective in the expected threat environment and delivers on time." In short, full support of D5LE2 today is vital to achieving 2039 Initial Fleet Introduction and to embarking on a path that maintains an SLBM deterrent capability through the service life of the *Columbia*-class SSBN.

The Navy must also recapitalize our Strategic Weapons Facilities and test locations to support the development and production of D5LE2 and to continue to support and sustain SSBN operations and weapons activities that enable our continuous at-sea presence.

WARHEAD AND REENTRY BODY ACTIVITIES

The Navy is also working in partnership with the Department of Energy's National Nuclear Security Administration (NNSA) to refurbish our existing reentry systems and develop new reentry systems in response to USSTRATCOM requirements. As the threat environment the nuclear enterprise faces continues to evolve, it is critical that the Navy designs, develops, and deploys programs that meet the needs of the Warfighter. The TRIDENT II D5 missile is capable of carrying two types of warhead families today, the W76 and the W88. The W93/Mk7 warhead and reentry body system will be designed for use on both the D5LE and D5LE2 missiles and, the PSA and MDA, as amended, will support the United Kingdom's sovereign Replacement Warhead program. In 2019, NNSA completed the W76-1 Life Extension Program (W76-1/Mk4A), marking the U.S. stockpile's first full-scale warhead refurbishment program. The Navy continues to work on modernizing integrated aeroshells that house these warheads through the Mk4B program with the inclusion

of a Shape Stable Nose Tip, which reduces reentry variability and improves performance margins.

The W88/Mk5 warhead continues to undergo its refurbishment program (ALT370) on a revised timeline based on capacitor component issues that did not meet reliability requirements, a technical issue which has since been resolved. The Navy and NNSA coordinated on tightly coupled schedules for the fleet, the nuclear weapons complex, and production of affected non-nuclear components to execute an 19-month delay to the original schedule that was endorsed by the Nuclear Weapons Council (NWC). This program reached the First Production Unit milestone on schedule in 2021 and achieved Initial Operational Capability in January 2022. I am confident that our teams will continue to work together to manage and deliver this program, as we have historically addressed refurbishment challenges with a mission-focused attitude and rigor. The Navy will continue to 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, the setback this program faced is indicative of the pervasive and overwhelming risk carried within the nuclear enterprise as refurbishment programs face capacity, historic funding and schedule challenges.

W93/Mk7 will provide flexibility and adaptability to meet future warfighter needs. With the near simultaneous age out of the deployed stockpile in the 2040's, the W93/Mk7 will help address production concerns in the weapons complex and ensure an uninterrupted at-sea deterrent for the sea-based leg of the nuclear triad. In 2021, the Navy entered Phase 1 of the joint DOD-DOE Nuclear Weapons Lifecycle Process with NNSA for the W93. 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-based leg of the nuclear triad while simultaneously reinvigorating the atrophied industrial base and modernizing a Cold War era stockpile. In FY22, the W93 program received NWC authorization to proceed into Phase 2, Feasibility Study and Design Options, which will further refine and mature the design of the W93/Mk7 program in a manner that provides an affordable, credible, safe, and secure weapon to the Warfighter. Even with the addition of the W93/Mk7 to the stockpile, we will not increase the deployed stockpile. The Navy will work in close coordination with the Department of Defense, NNSA, the NWC, and the Congress as this effort matures, but we cannot continue to life extend our leftover Cold War era weapons and systems and successfully carry out our National Defense Strategy.

INDUSTRIAL BASE AND INFRASTRUCTURE

The Nation requires a fully modernized nuclear force and supporting infrastructure to execute our National Defense Strategy. 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, strategic inertial instrumentation, 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. Essential to the nuclear deterrent is a national aeroshell production capability. The Navy has not delivered an integrated aeroshell since the 1980's and needs to reinvigorate a production capability that only resides in a small cadre of highly skilled experts in an exceptionally niche industry. Aeroshell investment supports the Navy but will also be cost-effectively leveraged by our colleagues in the Air Force—and also our strategic partners in the United Kingdom as they pursue their independent warhead 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. If the Nation does not continue to address these concerns, no amount of money will be able to adequately mitigate the risks associated with key stockpile and infrastructure losses.

Regarding the program's infrastructure, existing facilities are reaching their 30-year recapitalization windows as we enter into a once-in-a-generation transition of both the weapons system and platform. The Navy relies on a limited footprint to process missiles and outfit the SSBNs. Maintaining and sustaining facilities is critical to meeting USSTRATCOM and Fleet mission requirements. We will make smart investments to address capability gaps, through-put constraints, and build in surge capacity to address requirements presented by new and emerging threats. The Administration has shown its commitment to investment in our strategic infrastruc-

ture with the funding of multiple MILCON projects in fiscal year 2024 that are required for the on-time delivery of the D5LE2 SWS. We are re-establishing pad launch capabilities on Florida's Space Coast over four decades after the final Trident II D5 X-Flight in January 1989, as well as modernizing and sustaining our Strategic Weapons Facilities that will produce and deliver D5LE2 missiles to the Fleet. Our Nation and the Navy will continue to prioritize and resource the sustainment and modernization of its nuclear infrastructure enterprise to provide an effective and flexible deterrent now and into 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 utmost importance, we must have an effective, resilient, and responsive plutonium pit production capability. This capability can address age-related risks, support planned refurbishments, as well as prepare for future uncertainty. Additionally, NNSA's tritium, lithium, uranium, and high explosives and energetics, among other strategic materials, are vital to ensuring the Navy can continue to meet its strategic deterrent requirements. Efforts to sustain and modernize deterrent forces must continue. Our strategic forces underpin every military operation around the world, and we cannot afford to delay given the increasing threats facing our Nation.

WORKFORCE

History reminds us that the swift, successful creation and execution of the Fleet Ballistic Missile program in the 1950's was truly a result of national commitment, congressional support, and a 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.

SSP has made significant strides in recent years to honor our past, innovate our present, and ensure our future workforce is connected to the fundamental global security mission. In order to create the ideal workforce and workplace, SSP developed the SSP Human Capital Operating Plan (HCOP) in FY19. The HCOP is a 5-year plan aligning human capital initiatives to SSP's strategic goals. SSP is now in the fifth year of the HCOP execution and is realizing valuable change from these efforts. The five goals and associated successes are outlined below.

Goal 1—Recruitment and Retention: create and implement effective strategies to recruit and retain highly qualified candidates and employees, internal and external, sufficient to ensure that SSP fulfills its mission requirements. Accomplishments toward this end include: developing a comprehensive Talent Pipeline strategy to integrate Science, Technology, Engineering and Mathematics community engagement, recruitment outreach, student internships, and entry-level developmental programs; implementing the Compass Program to better acclimate new employees to SSP's mission and culture; standardizing SSP-enterprise Exit and Stay Interview processes; and integrating data analytics across Human Resource (HR) functions;

Goal 2—Talent Development and Sustainment: support, develop, and strengthen the workforce to continually evolve and successfully execute the mission. Accomplishments toward this end include: developing Science & Technology Subject Matter Expert (S&T SME) career tracks; conducting a staffing study to assess current and future competencies and capacities; implementing robust mentorship programs; establishing the Career Development Counseling Program; and deploying the SSP Academy and the Waypoints learning management system;

Goal 3—Leadership Development: strengthen enterprise leadership at all levels through robust leadership development programs and clear assignment and execution of authority, accountability, and responsibility. Accomplishments toward this end include: Implementing robust coaching programs for leaders and developmental employees; delivering a Human Resources Management for Supervisors training; and continuously promoting internal and external leadership development programs.

Goal 4—Culture: clearly define and communicate SSP culture and values. Reinforce and assess the organizational culture as necessary for continuous improvement

at every level. Accomplishments toward this end include: expanding and improving employee recognition programs; delivering on-going health and wellness activities; establishing a 'We Hear You' campaign to communicate SSP's responses to feedback; defining SSP Culture and Values (Director's Intent); developing SSP Culture Videos; and creating a Supervisory Corner, a centralized web-based hub to equip supervisors with the resources, information, and tools necessary to be an effective supervisor;

Goal 5—Diversity and Inclusion: create and implement effective strategies to cultivate a diverse and inclusive work environment that promotes employee engagement and the exchange of different ideas, philosophies, and perspectives. Accomplishments toward this end include: conducting barrier analysis; establishing Diversity and Inclusion Council; increasing use of Individuals with Disabilities Recruitment Program; and connecting a Leadership Learning Series with Special Emphasis Programs.

Over the next several months, SSP will be preparing to release HCOP FY24-FY28 with refined goals, measures of effectiveness, and other programmatic enhancements.

POLARIS SALES AGREEMENT: SUPPORT TO THE UK

Fundamental to U.S. strategic and extended deterrence policies is the special relationship between the U.S. and the UK through the 1963 Polaris Sales Agreement (PSA), as amended, and the 1958 Mutual Defense Agreement (MDA), as amended. Under the PSA, the U.S. sells the Trident II SWS to the UK along with associated defense services. Under the MDA, the U.S. cooperates with the UK on the exchange of information and the transfer of nuclear material and equipment for mutual defense purposes. The two agreements are complementary, and together enable the U.S. Navy to sell SWS delivery system and reentry body equipment to the UK, as well as to exchange classified information, including Restricted Data (RD) and Formerly Restricted Data (FRD), with the UK. This framework has ensured the United States' ability to support the UK with capabilities to ensure a robust nuclear deterrent. The Common Missile Compartment (CMC) represents the most recent example of the PSA partnership, in which the two nations are designing, developing, and producing common shipboard infrastructure which improves the ease of comingling the D5 missile inventory and sets the stage to improve maintenance system consistency across the two fleets. SSP will support PEO SSBN throughout the 2020's as they oversee U.S. industry delivery of CMC components to both navies for installation into their new SSBNs. As with *Columbia*, the *Dreadnought*-class SSBNs will initially carry the D5LE missile. The development of the Mk7 reentry system to support the U.S. W93 warhead program is also critical to the development of a next generation nuclear warhead and reentry system for the UK. The two nations are working separate but parallel warhead programs with collaboration between the two.

Next month will mark sixty years since our two governments signed the PSA. With sixty years behind us, SSP will continue to nurture and safeguard this special relationship with the UK to sustain the SBSB and support UK Continuous At Sea Deterrence (CASD) of today while modernizing and building flexibility, adaptability, and resiliency into SBSB 2084 and the UK's future CASD.

CONCLUSION

Our Nation's sea-based strategic deterrent has been a critical component of our national security since the 1950's and must continue to assure our allies and partners and to deter potential adversaries well into the future. 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. 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 nuclear triad and the vital role it plays in our national and global security.

Senator KING. I think your last statement is very important in terms of the basic strategy of this country, which is deterrence. The best way to prevent a war is to be sure that adversaries know that they will pay an unacceptable price for an attack on this country, and that is what has, in fact, worked to deter—nuclear deterrence for over 70 years.

I think that is an important overall, overarching concept of this hearing, and in fact, our entire military strategy. Admiral Wolfe, we heard General Caldwell talk about a new or a modified reactor.

Are you talking about modernization of the D5 missiles for the new—for the *Columbia*-class? Is that a later development or is that part of the current schedule?

Vice Admiral WOLFE. What we have requested, sir, as part of SSP's strategy going forward in schedule to make sure that we have what we call D5 Life Extension II. It is a new missile that will replace aging assets that we have got in the current system.

Senator KING. Will that be ready when the first *Columbia*—?

Vice Admiral WOLFE. It will not be ready. The plan is for *Columbia*, in order to reduce risk to the overall deterrent, the decision was made because of where we are at with the Trident weapons system.

We are ostensibly picking that system up and we are going to install that onto the first eight platforms of the *Columbia*-class. We have got the missile inventory. We have got the life on the system to be able to do that.

In 2039 when we get to the 9th hull, we will have concerns about aging electronics. We will have concerns about quantities of missiles that we have because we flight test every year to prove their reliability—

Senator KING. I am assuming that the *Columbia* is going to be designed on a modular basis so that as technology develops you will be able to improve and add new technology without rebuilding the whole platform.

Vice Admiral WOLFE. Yes, sir. That is exactly right. So, we already do that today on the shipboard systems. All of our shipboard systems, we are able to modernize them and keep up with technology of what industry is doing and others are doing.

Senator KING. Let me followup with another question on the *Columbia*. We have heard testimony in this Subcommittee and in the larger Committee and all over Capitol Hill on workforce problems.

We are talking about major workforce demands to do *Virginia*, *Columbia*, and now AUKUS. Is it realistic that the yards are going to be able to meet the schedules that we have laid out for those programs, given the challenges of workforce that we have—that we are experiencing everywhere?

Vice Admiral WOLFE. Sir, I think to your point, there is no doubt we are going to continue to have challenges.

Those challenges are going to go well in the future. I would tell you, I think that the strategy that the Navy has taken with the things that we are doing for industrial base investment, if you look at the request in President's Budget 2024, it is greater than \$1 billion to invest in six key areas of how we are going to get the industrial base revitalized, how we are going to more rapidly train a workforce, a skilled workforce that the Navy is going to need and the shipyards are going to need.

In our program, we are also very concerned about that workforce as well as we start to ramp up a number of missile development programs, not just for what the Navy's doing, but in parallel for what the Air Force is doing.

There are challenges everywhere. But we are working that very diligently with the industrial base to make sure we keep up with that demand.

Senator KING. I think diligence is the right word. General, you are going to be in charge of managing the Sentinel project, one of the largest, as I mentioned, one of the largest projects ever undertaken by the U.S. Government.

Are you satisfied with the progress—and this is an unclassified setting. Are you satisfied with the progress that is being made under that contract?

General BUSSIÈRE. Chairman King, so far, yes. It is probably one of the most scrutinized and oversighted program in the Department of Defense. Has the direct attention of Honorable Plehn, Honorable Hunter, myself, obviously, the Secretary and the Chief.

We do episodic and routine progress statuses with both internal to the Defense Department as well as with the industry partners. It will be one of the major work projects our Nation has undertaken probably in the last 50 plus years.

So, it is not only just the aspects of building the new weapons system itself, but the process of integrating that new weapon system across the fabric of our Nation, while we maintain full operational capability with our legacy Minuteman III.

Senator KING. I know you are aware that one of the great challenges is NC3 also. The whole enterprise won't work if we don't have invulnerable communication.

General BUSSIÈRE. I couldn't agree more, Chairman King. The underpinning of our deterrence is the ability to command and control our forces.

Senator KING. Thank you. Admiral Wolfe, one final point. I am running out of time. But we have had testimony in the past on the strategic importance of a sea launch cruise missile that is nuclear tipped.

The Congress passed appropriations to support research, and yet there is nothing for it in this budget that has just been submitted. Can you give me your best military judgment about whether the SLCM-N is a significant part of our strategic deterrent?

Vice Admiral WOLFE. Sir, as I alluded to, the 2022 Nuclear Posture Review, as they looked at the body of the requirements. It was decided that the sea launch cruise missile was not going to be part of the Nuclear Posture Review, not be part of a supported system.

The 76-2, which we currently have, was stocked to fill that gap. We are aware, though, and we will comply with the plus ups that Congress has given us, \$5 million in fiscal year 2022. We are executing that for research and development.

The \$25 million in fiscal year 2023, we have developed a plan to continue to look at technologies, to look at what infrastructure would be, to look at how we would integrate into platforms as time goes forward.

Senator KING. I think we have to take cognizance of the way the world has changed since that Nuclear Posture Review was prepared, particularly given Russia's continuous discussion of the use of tactical nuclear weapons.

We don't want to be in a situation where our only response is a massive one, which isn't credible given a lower level of utilization.

I hope that you will continue to review that issue, and I know we are going to have further discussions in this Subcommittee.

Senator FISCHER.

Senator FISCHER. Thank you, Mr. Chairman. Admiral, I appreciated our conversation yesterday about the significance of developing new weapons based on proven designs, like the W-93. Can you share with the rest of the Committee your assessment of why this is important and necessary?

Vice Admiral WOLFE. Yes, ma'am. Certainly, as we look at what the combatant commanders' requirements are, and to Senator King's point, as we look at the changing environment that we now face. We are faced with the challenge of making sure that we have weapons—first of all, they have to be credible and they have to be from our strategic competitors' eyes reliable that they are going to work.

Which is why we talk about in partnership with NNSA, making sure not only what they do with the explosive package, but what we do with the system at large to make sure that if ever called upon, it is going to work every single time. That is really the essence of deterrence.

It is absolutely critical, as our systems start to age, that we stay ahead of that and we never question the reliability or the function of any of those weapons, which is why modernization right now is so important for the entire Department.

Senator FISCHER. Thank you. General, the Chairman touched on NC3. It has become really common terminology within the nuclear enterprise. With Sentinel's integration into our nuclear architecture, can you describe any advances taking place on items that you believe need congressional support?

General BUSSIÈRE. Specific to NC3, Senator Fischer? The Sentinel weapon system will be fielded with probably the most advanced communication systems that our Nation has developed. It will take into account our new carrier pathways, for example, fiber.

It will take advantage of our cybersecurity protocols. It will be designed so that, like Admiral Wolfe illuminated, it will be designed so that as technology is developed over the years, it is not difficult to integrate that into the open architecture of our NC2 systems.

Senator FISCHER. Do you have any specifics on the technologies that you have been briefed on that might be emerging that you are looking ahead that Congress needs to know about?

General BUSSIÈRE. I don't think we would require any assistance of Congress now, but there may be some technologies in the future that would require that.

Senator FISCHER. Okay. Can you provide us with an update on the SAOC program?

General BUSSIÈRE. So, the Survival Airborne Operations Center, as everyone knows, is the replacement to our current E-4B fleet, which is our airborne command and control platform. It is a 747-200 platform now.

There are requests out to industry to come back with their proposals and offerings for the SAOC program, and we are optimistic we will see those in the next few weeks, if not months.

Senator FISCHER. Okay, and then for Admiral and General, how are you both working with NNSA to ensure that the warheads needed for Sentinel and for Trident missiles are delivered on schedule?

Then I would like Dr. Adams to respond to that, to look at how—what the possibilities are that we could accelerate the delivery of those.

General BUSSIERE. Senator Fischer, specific to our programs, whether it is the fielding of Sentinel or the fielding of the LRSO [long range stand off] weapon system, we work closely with NNSA. We work closely with the Nuke Weapons Council, and the Department of Energy, Department of Defense Forum that really has those oversight responsibilities.

We are integral into those discussions. We are confident that the Sentinel will be fielded, as you know, with the W87-0. So, we will be able to field that weapon system and then transition in the future to the W87-1.

We are also confident in NNSA's estimates to get us the required W80-4 for our current schedule for when we field the RSO.

Senator FISCHER. Thank you. Admiral.

Vice Admiral WOLFE. Yes, ma'am. Much like General Bussiere said, we work very closely within NNSA. We work at the Nuclear Weapons Council. I would say for our systems, as Dr. Adams alluded to, we have just come through the life extension for W76/Mk4.

We are in the throes of having the deliveries for the W88 alteration that NNSA just completed, and those deliveries are occurring. As we look to the future for the W93/Mk7, Dr. Adams and I work very, very closely together.

We are in phase two right now to understand what the options are and what options we want to carry forward, so that as I get into the Navy work and the integration that has to occur, and NNSA gets into the work they have to do, we are absolutely in sync and aligned on schedules, and that we are pushing each other to make sure that we stay true to those schedules.

Senator FISCHER. Dr. Adams, your comments?

Mr. ADAMS. Yes, those were the—[technical problems]—I am sorry. Do I need to repeat that? Just it was a comment that says that the two programs in production now, we have delivered on schedule to both the Navy and the Air Force.

The next one up is the W80-4. We are holding very closely to our scheduled first production unit of 2027. There is some schedule risk. We are monitoring that very closely and putting all hands-on-deck to make sure we don't realize schedule risks. Several components are difficult to manufacture and we are working on that. We do remain closely aligned with the LRSO program.

The LRSO delivery platform depends on us for hardware, for their part of flight testing, and we depend on their flights for our part of the flight testing. There are a lot of environments that the LRSO is subject to because of a lot of delivery platforms, a lot of aircraft, and we have to design our warheads to make sure they can withstand those environments.

The W87-1 is farther out. At this point, we talk in terms of a schedule range. It is quite consistent with the Sentinel schedule

ranges that I have seen. We will be able to support the deployed stockpile of that.

I am highly confident of that, and we are working hard to make sure that we support the need for the hedge portion of that as well. Details of that are classified. With the W93 farther out yet, as Admiral Wolfe said, we are in phase two, but already—that is a tightly integrated program.

The Mk-7 is under development at the same time that the W93 warhead that will go in it is under development. Our teams work incredibly closely together, and we have also begun working very closely with the UK on their parallel program.

Senator FISCHER. Okay. Thank you very much. Thank you, Mr. Chair.

Senator KING. Senator Rosen.

Senator ROSEN. Well, thank you, Chairman King, Ranking Member Fischer, for holding this hearing. I would like to thank you all for your service and for being here today. Before I begin, I really want to start by offering my condolences to the families of the U1a miners killed in a car accident last week at the Nevada National Security Site, and to our entire NNSA community.

They are a very tight knit group and I know how much this is hurting all of them. I want to just give them my condolences. I am going to move on and continue to talk about Nevada National Security Site, build on some of the importance of NNSA.

We have the NNSA and NNSA, all the NNs, but the audit of the U1a complex and the enhancement projects. Dr. Adams, as you and I have discussed, the Nevada National Security Site oversees the Stockpile Stewardship Program, principally the U1a facility.

It is an underground laboratory where scientists conduct subcritical experiments to verify the safety and reliability of our nuclear stockpile without explosive testing. U1a is undergoing a major construction project that will soon host the most capable weapons radiographic system in the world.

However, a November 2022 audit by the Department of Energy's Inspector General found that the U1a Complex Enhancements Project has faced unanticipated cost increases and schedule overruns, which are going to threaten our stockpile stewardship goals.

Dr. Adams, what actions has the NNSA taken to improve its management of science and technology development projects that are necessary to support the stockpiles through our stockpile stewardship, and what management oversight changes are you putting in place to avoid further cost and schedule changes in the future?

Mr. ADAMS. Thank you for that question, Senator Rosen. We agree with the recommendations made in that IG report, the draft recommendations. We have taken corrective actions.

We had taken corrective actions prior to that audit and we have been enhancing our management of these critical activities. Like other construction projects around the country and certainly within the NNSA portfolio, the construction underground at U1a, those projects have suffered from the same kind of supply chain problems, inflation, labor shortages, and labor productivity being lower than expected.

Our response to that is manifold. We have instituted, for example, a lessons learned task force on UPF, which was one of the first

construction projects we saw kind of go off of the anticipated cost and schedule a little less than a year ago, that came to light. We are instituting recommendations based on those studies.

A lot of those things, Administrator Hruby mentioned in the first panel session. With regards to sort of the big picture of how we are handling those things, given the causes for some of these construction schedule problems and the costs that go along with schedule extensions, our fiscal year 2024 budget request reflects the prioritization that we have made to focus our limited labor, supply, and dollars on a smaller number of high priority projects to try to execute in parallel.

Those high priority projects include projects underground U1a, the accelerator that you mentioned for the radiography capability, the ASD Scorpius project. We have added money to that in our request for fiscal year 2024. Similarly, what is known as the ZEUS testbed is going to require some mining that we didn't expect before and we have asked for the funding to support that.

Senator ROSEN. Thank you. I have a short amount of time, so General Bussiere, I am going to just ask you a little bit about AFWERX. You have a location right here in Las Vegas—right there in Las Vegas, designed to develop effective solutions to the challenges facing the Air Force by establishing partnerships with the private sector.

In a few short years, it has evolved into the innovation engine of the Air Force. Is now part of the Air Force research laboratories, and the Air Force Global Strike Command's innovation hub STRIKEWERX is based on the AFWERX's model?

I just have a few seconds left, but I know that with cyber innovation center, STRIKEWERX, we have saved the Air Force over \$248 million. It is nearly a fivefold return on the funding that Congress originally appropriated to fund this agreement.

I didn't see any discussion of this in your fiscal year 2024 budget request, so what are your plans for expanding the command's innovative efforts to take advantage of things like STRIKEWERX?

General BUSSIÈRE. Senator Rosen, thanks for highlighting the CIC and the innovation efforts of Global Strike Command. I will briefly kind of give you an overview. We have several different programs that highlight and give our airmen the opportunity to use their most powerful tool, and that is their ideas.

We have AFWERX at the Air Force level, as you are well familiar with. We have STRIKEWERX, which was really a smaller scale model of that entry port. We also have innovation cells at all our installations. In addition to our airmen innovation areas and cells, we also have started a partnership with the help of Congress.

It is a commercial capabilities innovation team, which basically does the same things with small business and commercial entities in and around our business. It is sometimes difficult to convince the system that an idea is worthy of a program. But make no mistake, we invest and bring in our airmen to get ideas.

We use the funding within our current top line and we use our program. Whatever innovation that are saving money is, that is where we would use the program dollars for. But I will take for the record to go back and see what was submitted in 2024. I don't have that in front of me and I will get back to you, if that is acceptable.

[The information referred to follows:]

General BUSSIÈRE. Air Force Global Strike Command places great importance on fostering innovation, including initiatives like STRIKEWERX. However, the MAJCOM is currently leading major nuclear modernization efforts across multiple platforms to include Sentinel, B-21, SAOC, LRSO, MH-139, B-52 modernization and several NC3 systems. Given the scope and magnitude of the modernization efforts, as well as the need to sustain legacy nuclear weapon systems through modernization, efforts such as STRIKEWERX were deemed to be a lower priority.

However, recognizing the potential for advancements across all AFGSC organizational units, we have taken a step by establishing the Commercial Capabilities Integration and Transition (CCIT) Division. Originally conceived as a "Prototype" organization within AFGSC, the CCIT aligned its objectives with the Chief of Staff of the Air Force's vision of effectively integrating and transitioning commercial capabilities and technologies into the United States Air Force (USAF). Under my direction, Major General Armagost provides the day-to-day leadership and oversight of the CCIT. Together, we have the goal of providing AFGSC (at all levels) access to the best commercial capabilities and technologies available throughout the Nation. Additionally, I envision AFGSC taking a leading role within the USAF by proactively identifying, expediting, and integrating the most cutting-edge commercial solutions to tackle both USAF-wide and AFGSC-specific challenges. Already, the CCIT has enhanced competition by cultivating collaborative relationships with the private technology sector, which will ensure continuous access to state-of-the-art commercial technologies for the USAF.

Senator ROSEN. Thank you. I appreciate it. Thank you, Mr. Chairman.

Senator KING. Thank you, Senator. Senator Rounds.

Senator ROUNDS. Thank you, Mr. Chairman, and thank you to all of you for your service to our country. Admiral Wolfe, I would like to begin with you. The—you mentioned the really special anniversary coming up here, the 60th anniversary of our agreement to Polaris sales of missiles to the United Kingdom.

As part of the Five Eyes group, they clearly are some of our closest allies. But this particular agreement has continued on through the years, and it really has been a way for us to extend our capabilities. Can you talk a little bit about just how critical it is that we continue that relationship with the United Kingdom?

Vice Admiral WOLFE. Yes, Senator, thanks for that, because I think you are absolutely spot on, our relationship with the United Kingdom under the Polaris Sales Agreement. I am the United States project officer as part of that Polaris Sales Agreement, and what we provide to the United Kingdom is the entire weapon system.

It is not just the missiles. As you look at where we are at right now with the United Kingdom, they are modernizing their entire SSBN force as well to include their replacement of their *Vanguard*-class submarine, which would be the Dreadnought. We work very closely with them, PEO SSBN.

We have a common missile compartments. Ostensibly, it looks exactly the same as what the U.S. *Columbia* will have, and in so doing, what that allows us to do is have—treat them like an extra four SSBNs in my program.

I know the other panel talked about trust. I would tell you that the trust that the UK has with us, and the system that we provide, and the certifications that we give to them really does provide an extension for the United States, it really provides for NATO, and it really leads to global stability.

So, it is incredibly important that we continue to support them in everything that they do as they modernize their entire SSBN

force. They have recently celebrated more than 50 years of continuous at sea deterrence, which means one SSBN at sea 24 hours a day, 7 days a week for the last 50 plus years.

We have a big part in making sure that they continue that record, and we are absolutely all in to do that.

Senator ROUNDS. That is one less that we have to have in the water at the same time.

Vice Admiral WOLFE. Yes, sir. I mean, it is all part of that extended deterrence. Yes, sir.

Senator ROUNDS. Thank you. General Bussiere, the B-21 program is right now one of the shining stars out there with regard to being on time, on budget, and one which the folks in Rapid City, South Dakota, are really looking forward to having it deployed there at Ellsworth Air Force Base.

I am just curious with regard to the implementation of its nuclear capability as well that requires a weapons generation facility which will be created there at Ellsworth. Can you share a little bit about the timelines and so forth, and where you are seeing the B-2, in this unclassified section, but at least share a little bit about the development and the future timelines that you can share with the public.

General BUSSIERE. Senator Rounds, as you know, the first base for the B-21 raider will be Ellsworth Air Force Base. Construction has already started on several different facilities to support that sixth-generation low observable platform, including adding a weapons generation facility to be able to facilitate its dual docked mission.

I think the committee is also familiar that the Secretary of Defense, I think 3 years ago, directed that the certification of the B-21 Raider for conventional and nuclear certification be closed. So, when we deliver that weapon system to the wings, it will be capable of both missions.

Very happy with the way that program is going. Very happy with both industry, as well as the Rapid Capabilities Office, and obviously the Nation and the world got a sneak peek at that in December when that weapon system was revealed.

Senator ROUNDS. Great, thank you, and I need to go back just for a minute, Admiral Wolfe, with regard to the situation we have got with trying to deploy the new submarines, as well as keep the existing submarines operational. I go back to the USS *Boise* as an example.

This is a *Los Angeles*-class nuclear submarine, attack submarine, has now been in dry dock or prepared to be in dry dock for its half-life basically, or close to 7 years now, if my memory serves me right.

But it suggests the bigger problem that we have got in that we are trying to not only maintain and configure the *Ohio*-class, but also another *Columbia*-class. How are we going to right now create the new submarines, maintain the existing submarines, handle the half-lives for the attack submarines.

It seems to me that we just simply don't have enough shipyard space and is there a priority for the *Columbia*-class and the *Ohio*-class that is perhaps one of the reasons why the *Los Angeles*-class submarines are sitting at dry dock.

Vice Admiral WOLFE. So, yes, sir, I would tell you that from a Navy priority, *Columbia*-class as a new platform is the priority. I would tell you that PEO SSBN and PEO SSN, both of them frequently meet together to understand what needs to be done to make sure *Columbia* stays a priority, to your point, so that we have a replacement SSBN.

I would also tell you that the good news is, we are about done with all of our—as I alluded to, we are going to do our last demonstration and shakedown operation on our *Ohio*-class, the USS *Louisiana*, and that will be the last of the *Ohio*-class that goes through their mid-life refueling overhaul.

So those will be past us now. We will still have to do normal maintenance and all the things that we do, but those big availabilities are now going to be completed, and we will continue to work through that capacity challenge as well.

Senator ROUNDS. Thank you. Thank you, Mr. Chairman.

Senator KING. One thing we learned from Admiral Caldwell was that the *Columbia*-class will never have to be refueled. Gentlemen, thank you very much for your testimony, for your service.

Thank you for joining us today and for giving us the forthright answers to our questions. This hearing is adjourned.

[Whereupon, at 6:27 p.m., the Committee adjourned.]

[Questions for the record with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR ANGUS KING

HANFORD TANK WASTE TREATMENT

1. Senator KING. Mr. White, the Government Accountability Office (GAO), federally funded research and development center (FFRDC) Report and National Academy of Sciences, Engineering, and Medicine (NAS) have indicated that the Department of Energy (DOE) should proceed with urgency the grouting and out of State disposal of mixed low-level waste (MLLW) from Hanford tanks to save money and to accelerate the cleanup schedule at Hanford in parallel with the direct-feed low-activity waste (DFLAW) program. Can you please explain why DOE has not requested any funds to pursue these recommendations for fiscal year 2024?

Mr. WHITE. The Department agrees that this is a priority and DOE is working expeditiously to complete these activities. DOE did not request funds in fiscal year 2024 to pursue these recommendations because funding is already available for the proposed 2,000-gallon Test Bed Initiative Demonstration.

2. Senator KING. Mr. White, please provide this committee with a cost estimate and schedule to begin grouting and out of State disposal of waste already treated by Tank-Side Cesium Removal (TSCR) and awaiting vitrification.

Mr. WHITE. Further implementation of grout beyond the 2,000-gallon Test Bed Initiative Demonstration would require additional permits, a public involvement process and a National Environmental Policy Act (NEPA) review. One of the purposes of the Test Bed Initiative Demonstration is to gain information about the costs, schedule and regulatory processes associated with potentially expanding use of a grouting technology. DOE looks forward to sharing additional information with Congress as it becomes available.

3. Senator KING. Mr. White, please explain why DOE cannot do both out of State disposal and the DFLAW program today while the vitrification plant is awaiting startup and commissioning.

Mr. WHITE. In parallel with the DFLAW program, DOE is working with the State of Washington to consider additional options for augmenting and accelerating the tank waste mission. That includes taking thoughtful steps to advance the Test Bed Initiative Demonstration. The Test Bed Initiative Demonstration is designed to consider the most effective combination of pretreatment, transportation, treatment, and grouting processes and to gain experience through progressive demonstrations. Once regulatory approvals are received, DOE will complete the Test Bed Initiative Dem-

onstration, evaluate the results, and follow regulatory and legal processes, in concert with regulators and in communication with Congress, for consideration of further implementation of this approach.

4. Senator KING. Mr. White, it has been almost 5 years since 3 gallons of MLLW from Hanford tanks was treated, grouted, and disposed out of Washington State. Given the estimated cost savings and schedule acceleration that, according to the FFRDC Report, multiple NAS reports and GAO analyses, would be realized by grouting and out of State disposal of MLLW, why hasn't DOE moved with extreme urgency on this demonstration project?

Mr. WHITE. DOE appreciates the work performed by the NAS/FFRDC at the direction of Congress, the work of the GAO and others in analyzing the potential benefits of options, including grout. While DOE focuses on treatment via the DFLAW program, the Department continues working on a path forward for addressing all Hanford tank waste in a safe, effective manner and at a practical cost. Grout is one alternative for the low activity liquid waste that scientific experts continue to analyze, as well as several other options. DOE is committed to following regulatory and legal processes, in concert with regulators including the State of Washington and in communication with Congress, stakeholders, and Tribal Nations as options like the TBI Demonstration advance.

5. Senator KING. Mr. White, are DOE and the Washington State Department of Ecology aligned on the land disposal treatment standard to be applied to waste that DOE determines through its processes and methods is not high-level radioactive waste (HLW)? If not why not?

Mr. WHITE. While the Test Bed Initiative Demonstration involves out-of-State disposal, DOE and the State of Washington continue working in a deliberate and constructive manner to reach agreement on many issues related to the Hanford tank waste mission. DOE looks forward to working with Congress on these issues as these discussions continue.

6. Senator KING. Mr. White, what does DOE suggest be done to address any such impasses between the two organizations?

Mr. WHITE. DOE, the State of Washington, and the U.S. Environmental Protection Agency (EPA) recently reached conceptual agreement in Holistic Negotiations on revising plans for managing millions of gallons of waste stored in tanks at the Hanford Site. This agreement demonstrates a commitment to resolving issues in good faith and upholds the Tri-Party Agencies' shared commitment to a safe, effective, and achievable path forward. Continuing constructive discussions among DOE, EPA, and the State of Washington is the best way to address impasses and reach agreement on solutions to advance the Hanford tank waste mission.

7. Senator KING. Mr. White, the GAO has recommended that legislation is required to address and clarify which agency has jurisdiction over the final treatment standard to be applied to waste DOE determines is not HLW. DOE concurred in GAO's recommendations to pursue legislation. Does the Department still stand by that recommendation? If so when can we expect proposed legislation for Congress to consider?

Mr. WHITE. DOE does not believe additional clarification from Congress is needed to classify Hanford reprocessing waste as non-high-level waste (HLW). GAO recommended that Congress should consider authorizing DOE to classify the volumes of waste corresponding to the TBI Demonstration for out-of-State waste disposal as something other than HLW and specifying that this waste is exempt from the Resource Conservation and Recovery Act (RCRA) vitrification standard for mixed HLW. As stated above and in our response to GAO, DOE believes that the authority to classify reprocessing waste as other than HLW already resides with DOE.

QUESTIONS SUBMITTED BY SENATOR ELIZABETH WARREN

PIT PRODUCTION PROGRAM

8. Senator WARREN. Administrator Hruby, the W87-1 Modification Program is creating a warhead replacement for the U.S. Air Force Ground Based Strategic Deterrent. The First Production Unit is planned for 2030, but its new design requires a newly manufactured pit. For those overseeing this program, it is difficult for them to understand how their program will be impacted by pit production capability

schedule changes without a proper Integrated Master Schedule (IMS). What has been the impact on the lack of a proper IMS and cost estimate had on planning for the W87-1 Modification Program?

Ms. HRUBY. By way of background, the current Minuteman III Intercontinental Ballistic Missile (ICBM) is armed with both W78 and W87-0 warheads. The baseline Sentinel program plan, and the transition of the ICBM force from Minuteman III to Sentinel has always included deployment with W87-0 warheads first, followed by the W87-1 warheads. The newly manufactured pits will be used in the W87-1. The schedule for the W87-1 warheads has been closely synchronized between the NNSA and the DOD Sentinel acquisition program. NNSA does not believe the level of maturity and fidelity of the NNSA Integrated Master Schedule (NIMS) for plutonium pit production has had a negative impact on the schedule or planning for deployment of the W87-1 warhead.

The first version of the NIMS was implemented in October 2021 and improved upon the original milestone schedule by incorporating detailed schedule logic for first production unit at the Los Alamos National Laboratory, while retaining all other milestones for scope supporting the full 80 pits-per-year mission. NNSA continues to refine the NIMS and update cost estimates in order to inform pit production schedules. The next report on NIMS, requested through the House Armed Services Committee report accompanying the National Defense Authorization Act for fiscal year 2023, will be delivered to Congress in the coming months, but the NIMS has been implemented and NNSA is constantly improving the schedule and project management tool with higher fidelity data as the underlying projects and programs mature.

9. Senator WARREN. Administrator Hruby, will the W87-1 Modification Program be delayed due to the inability of National Nuclear Security Administration (NNSA) to meet its capability of producing 80 pits per year by 2030?

Ms. HRUBY. No. NNSA and the U.S. Air Force continue to work closely with other Nuclear Weapons Council stakeholders to develop and refine plans that accommodate schedule uncertainties in both the NNSA and DOD programs. The baseline design for the W87-1 includes a newly manufactured pit, and the program is on track to provide these pits on a schedule that supports current plans. NNSA is also carrying a backup option of a reuse pit, to ensure that warheads can be delivered to the Air Force on the needed schedule in the event of unanticipated disruptions to pit production schedules.

10. Senator WARREN. Administrator Hruby, what plan is in place to be able to complete the W87-1 Modification Program if the plutonium pit is not able to be developed in time for the W87-1 production schedule?

Ms. HRUBY. As noted in the answer to question 9, NNSA and the U.S. Air Force continue to work closely with other Nuclear Weapons Council stakeholders to develop and refine plans that accommodate schedule uncertainties. The baseline design for the W87-1 includes a newly manufactured pit, and the program is on track to provide these pits on a schedule that supports current plans. NNSA is also carrying a backup option of a reuse pit, to ensure that warheads can be delivered to the Air Force on the needed schedule in the event of unanticipated disruptions to pit production schedules.

11. Senator WARREN. Administrator Hruby, the current NNSA IMS includes activities only at two sites, Los Alamos and Livermore, to manufacture one first production unit (FPU) by 2024. Will the updated IMS include all of the information on activities at the other five sites that have a role in the pit production process, including the Nevada National Security Site, the Kansas City National Security Campus, the Waste Isolation Pilot Plant, the Pantex Plant, and the Savannah River Site?

Ms. HRUBY. The current version of NNSA's Integrated Master Schedule (NIMS) for plutonium pit production includes multi-site information at a level of detail that makes it an effective management tool for the program. Integrated detailed site schedule logic from Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory, and the Kansas City National Security Campus is contained in the NIMS for program scope focused on pit manufacturing and production efforts to attain FPU at LANL. Schedule logic with less detail is included for programs and projects at the Savannah River Plutonium Processing Facility and those associated with later phases of equipment installation at Los Alamos. NIMS will continue to integrate higher fidelity schedule logic for those programs and projects as their designs and schedules mature and this logic becomes available. In this way NIMS ca-

pabilities will keep pace as more programs and projects develop more detailed schedules, and it will remain an effective management tool for the program.

12. Senator WARREN. Administrator Hruby, which projects is the NNSA currently undertaking that require these new pits and what is the timeline for those projects to be completed?

Ms. HRUBY. The preferred option for both the W87-1 Modification Program and the W93 warhead, as well as any warhead program that follows, is a newly manufactured pit. NNSA is carrying options for reuse pits for the W87-1 and the W93, to support warhead delivery on the required schedule in the event that newly manufactured pits cannot be produced in time. Any subsequent warhead program is expected to use newly manufactured pits. The W87-1 is expected to reach system-level first production unit in the 2030-2032 timeframe, with newly manufactured pits from Los Alamos, and will align with U.S. Air Force timelines for the Sentinel ICBM program. DOE/NNSA continues to coordinate closely with the Department of Defense (DoD) and the Nuclear Weapons Council (NWC) to ensure this schedule alignment. The W93 program is still early in its development and has an anticipated FPU in the mid-2030's. We continue to coordinate with the DOD, NWC, and the United Kingdom to ensure schedule alignment between the W93 program and the UK's separate but parallel Replacement Warhead program.

13. Senator WARREN. Administrator Hruby, what steps is NNSA taking to prevent against the backlog of projects that may arise when the delay of the pit production program impacts these programs and there is limited NNSA infrastructure to take operate all these projects?

Ms. HRUBY. NNSA works closely and continuously with the Department of Defense to account for pit production timeline uncertainties, and NNSA is carrying pit reuse options for the W87-1 and W93 as insurance against disruptive delays. We continue to assess and make changes to schedules as needed as we jointly ensure that our nuclear deterrent remains safe, secure, and effective. Once both pit production facilities are operational there will be inherent resilience in the NNSA enterprise.

14. Senator WARREN. Administrator Hruby, why can't NNSA use the approach that Government Accountability Office (GAO) describes that should allow you to have an estimate much sooner?

Ms. HRUBY. NNSA is tackling this challenge and will develop an initial pit production total acquisition cost estimate by April 2024. NNSA's Plutonium Program is planned and managed using NNSA practices and procedures that are consistent with GAO and government project and program management requirements. NNSA will develop its initial total acquisition cost estimate in April 2024, although this estimate will have significant uncertainties. An improved baseline total acquisition cost estimate, with smaller uncertainties, will follow the establishment of baseline cost and schedule estimates for the Savannah River Plutonium Processing Facility Project and the Los Alamos Plutonium Pit Production Project, which we expect to happen by mid-2026. These cost and schedule estimates cannot be established until designs are nearer to completion.

15. Senator WARREN. Administrator Hruby, in 2021 the NNSA provided to Congress a Research Program Plan for Plutonium and Pit Aging. Can you please provide an unclassified version of that plan?

Ms. HRUBY. NNSA's Research Program Plan for Plutonium and Pit Aging report to Congress is classified and NNSA is ready and willing to provide a classified briefing to appropriately cleared personnel. We do not have an unclassified version of the plan.

16. Senator WARREN. Deputy Administrator Adams, when do you expect to see additional data that can be publicly shared from the 2021 Research Program Plan for Plutonium and Pit Aging? When would you recommend the JASON group perform an assessment of that data?

Ms. HRUBY. The experimental data on such weapons-relevant physics regimes is classified. However, per Section 3124(d) of the National Defense Authorization Act for fiscal year 2023, NNSA will enter into an arrangement with the JASON scientific advisory group to conduct an updated assessment of plutonium pit aging not later than 2030. Such a date allows NNSA to continue to research plutonium aging and make progress against the milestones described in our Research Program Plan, thereby providing the JASONS sufficient data for an updated assessment.

17. Senator WARREN. Administrator Hruby, in 2006, the JASONs concluded that pits last at least a century. Congress required a second updated report. However, in a 2019 “letter report” the JASONs said that NNSA did not give them time for a full study but laid out criteria for what a future study should do. When will NNSA have an independent updated pit life study completed when potentially tens of billions of dollars are riding on the outcome?

Ms. HRUBY. The 2006 JASON report on pit aging was more nuanced than is commonly reported. It did not make a blanket statement that all pits in today’s warheads will meet military requirements until they are 100 years old. Pit performance degrades over time. It is difficult to quantify how much the pit material properties will change over time, and even more difficult to quantify how much those changes will affect weapon performance under all relevant conditions. Estimating how long a given pit type will meet requirements, in a given weapon system and environment, is an extrapolatory exercise involving considerable uncertainty. The answer is different for different warhead designs and different environments.

The choice of a “letter report” instead of a full study in 2019 was based on many factors, including availability of JASON person-hours and prioritization of other studies sponsored by various government agencies. The 2019 report acknowledged the difficulty of reducing uncertainties in pit performance as a function of age and recommended continued research. As directed by the Fiscal Year 2023 National Defense Authorization Act, NNSA has developed a briefing that describes its plan to study plutonium aging. Research efforts are making significant progress, but uncertainties will diminish incrementally over time due to the complexity of pit aging phenomena and the extreme dynamic conditions of nuclear explosions. NNSA will enter into an arrangement with the JASON scientific advisory group to conduct an updated assessment of plutonium pit aging not later than 2030. Such a date allows NNSA to continue to research plutonium aging and make progress against the milestones described in our Research Program Plan, thereby providing the JASONs sufficient data for an updated assessment.

18. Senator WARREN. Administrator Hruby, expanded plutonium pit production is NNSA’s most expensive program ever. NNSA’s last public cost estimate was in 2018 with a price tag of 43 billion dollars. Costs have gone up at both the Los Alamos National Laboratory and the Savannah River Site, likely putting it above \$60 billion. NNSA swore that its Uranium Processing Facility would never exceed its declared budget cap of \$6.5 billion, but its fiscal year 2024 budget request just doubled from last year to \$760 million, with its total price estimate now at \$8.5 billion. When will NNSA meet the Government Accountability Office’s strong recommendations for a total cost estimate and Integrated Master Schedule for pit production that Congress and the public can rely upon?

Ms. HRUBY. NNSA is tackling this challenge and will develop an initial pit production total acquisition cost estimate by April 2024. This estimate will have large uncertainties because the Savannah River Plutonium Processing Facility design will still be far from complete, but we will strive to ensure that assumptions are clearly stated and uncertainties bound the cost and schedule. An improved “baseline” pit production total acquisition cost estimate will follow the establishment of baseline cost and schedule estimates for the Savannah River Plutonium Processing Facility and the Los Alamos Plutonium Pit Production Project, which we expect to happen by mid-2026. Please see the answer to Question 11 for a discussion of the Integrated Master Schedule.

19. Senator WARREN. Administrator Hruby, media has reported that a classified change is being made to the design of future W87-1 pits. What is the rationale for changing pit designs that have been full scale tested?

Ms. HRUBY. In Fall 2022, NNSA, Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory, and Kansas City National Security Campus agreed to implement a design change that makes the W87-1 pit more manufacturable, which means more War Reserve pits will be produced at LANL on the time scales needed for the stockpile.

This W87-1 pit design change has a major effect on manufacturability but a minor effect on performance. Both pre-and post-change designs conform closely to previously tested pit designs, resulting in minimal risks to qualification and certification.

20. Senator WARREN. Administrator Hruby, what guarantees that future pits will be reliable when they can’t be full scale tested?

Ms. HRUBY. Since the 1992 nuclear explosive test moratorium decision, we have relied on our underground nuclear test history, ever-improving experimental and

computational tools, and continually increasing scientific understanding to maintain confidence in the safety, security, and reliability of our nuclear warheads. Future pit designs will take advantage of this and will incorporate ample performance margin to account for uncertainties. New subcritical experimental capabilities at the Nevada National Security Site will be used to strengthen our understanding in key areas associated with weapon performance and will enable the nuclear security enterprise to respond to an evolving security environment without a return to underground nuclear explosive testing.

21. Senator WARREN. Administrator Hruby, do nuclear weapons design codes have high fidelity?

Ms. HRUBY. Yes, today's codes on today's computers can execute high-fidelity simulations of the performance of today's warheads under nominal conditions.

22. Senator WARREN. Administrator Hruby, what is the empirical basis for having confidence in current nuclear weapons design codes?

Ms. HRUBY. The Advanced Simulation and Computing (ASC) Program's modeling and simulation capabilities that have been developed over the past 28 years underpin NNSA's Stockpile Stewardship Program. The ASC weapons codes represent the primary design tools for the nuclear security enterprise because they simulate performance and safety of weapon systems over a wide range of conditions and environmental effects. The empirical basis for confidence in current codes is comparison with measured data collected from historical underground nuclear explosive tests and from separate effects tests, e.g., subcritical experiments or experiments on NIF, Z, or Omega, as well as experiments from around the world and across history that measure basic material properties and characterize basic physical phenomena.

23. Senator WARREN. Administrator Hruby, will new-design nuclear weapons prompt the U.S. to resume testing?

Ms. HRUBY. Warheads produced by U.S. modernization programs will be certified without nuclear explosive testing. Since the 1992 moratorium decision, we have relied on our nuclear explosive test history, ever-improving experimental and computational tools, and continually increasing scientific understanding to maintain confidence in the safety, security, and effectiveness of our nuclear warheads. This will continue.

The W87-1 Modification Program will replace the aging W78 warhead using a modified existing legacy W87-0 design and will deploy new technologies that improve safety and security, address material obsolescence, and improve warhead manufacturability. Similarly, the W93 will not require additional nuclear explosive testing to be certified since it is anchored on previously tested nuclear components. The W93 will also incorporate modern technologies to improve safety, security, and flexibility to address future threats. It will be designed for ease of manufacturing, maintenance, and certification. Key nuclear components will be based on currently deployed, and previously tested nuclear designs, and extensive stockpile component and materials experience. Today's codes, which have been extensively tested against data from historical nuclear explosions and from a vast array of other experiments (as noted in the answer to Question 22), provide weapons experts with quantitative results and insights that are essential for their certification and assessments efforts.

24. Senator WARREN. Administrator Hruby, the Project Data Sheets (PDS) in the fiscal year 2024 Department of Energy congressional Justification for NNSA for the Los Alamos Plutonium Pit Production Project (LAP4) and Savannah River Plutonium Processing Facility (SRPPF) State that total costs and total project duration could be significantly greater than presented in the tables which follow. Please provide alternative cost schedules which reflect these greater totals and durations for each of the two projects, in order to bracket the annual costs and durations you expect for each project and subproject within some stated confidence level.

Ms. HRUBY. Currently, CD-2, Approve Performance Baseline, is planned for the 4Q of fiscal year 2025 for LAP4 and 3Q of 2026 for SRPPF. We are re-evaluating our schedules as designs are advanced for LAP4 and SRPPF. As we reported to committee staff in our 2d Quarterly Construction Briefing during the week of August 14, we anticipate a 2-4 year schedule delay for LAP4 and are currently re-evaluating the schedule delay for SRPPF. NNSA has committed to providing updated cost and schedule estimates for SRPPF by April 2024, which will be the culmination of a multi-month effort that will begin when SRPPF's design is 50 percent complete. Additionally, NNSA remains committed to providing quarterly construction updates that include the latest estimates for costs and schedules, as well as updates in annual congressional Justifications.

25. Senator WARREN. Administrator Hruby, what is the expected schedule for the production of War Reserve (WR) pits at a) Los Alamos National Laboratory (LANL) and b) Savannah River Site (SRS) from fiscal year 2024 through fiscal year 2039, with confidence levels for each year?

Ms. HRUBY. LANL Pit Production—The first War Reserve pit is expected to be delivered by LANL in late 2024. The number of pits manufactured per year will increase as more equipment is installed at Los Alamos and the manufacturing capacity increases. The fraction of manufactured pits that are judged to meet War Reserve standards will also grow as pit production processes gain maturity. The rate of equipment installation is a major factor in the WR pit production timeline at Los Alamos, and it is uncertain for a variety of technical and operational reasons not associated with deficiencies in planning. The time required to decontaminate and remove old gloveboxes and equipment is not precisely predictable, as each presents unique challenges. Installation of new equipment, some highly specialized, is subject to supply chain delays. The frequency and duration of facility upsets is not precisely predictable. With these and other sources of uncertainty, it is premature to definitively tighten the range for reaching rate production, though we expect that Los Alamos will likely achieve 15–30 WR pits per year between 2027 and 2029 if requested funding and current progress continues.

SRS Pit Production—Before WR pits can be produced at SRS, we need to complete construction of SRPPF, establish plutonium inventories and radiological operations, and develop and certify processes and products. The schedule estimate approved at Critical Decision (CD)–1, Approve Alternative Selection and Cost Range, had a CD–4, Approve Start of Operations or Project Completion, schedule range of 1st Quarter fiscal year 2032 to 4th Quarter fiscal year 2035. The project’s schedule will not be baselined until the design is complete at CD–2/3, Approve Performance Baseline and Approve Start of Construction, currently forecasted for approval by 3d Quarter fiscal year 2026. This is later than the fiscal year 2024 construction project data sheets indicated, reflecting information received from Savannah River Nuclear Solutions, LLC, after those data sheets were submitted.

The uncertainty in the SRS pit production schedule will remain high until the SRPPF design matures and the project is baselined at CD–2. Once CD–4 is reached, the infrastructure and process equipment necessary to establish a pit production capability will be turned over to the Savannah River (SR) Plutonium Modernization Program for operations. The Program will then introduce plutonium and begin radiological “hot” operations, followed by the development, qualification, and certification activities necessary to produce the first production unit (FPU), followed by continued process and capacity improvements until rate production is reached. Historically it has taken more than 5 years for nuclear facilities to proceed from material introduction to rate production. The Savannah River Site Plutonium Modernization Program continues to explore and implement acceleration strategies to reduce this rate production timeline at SRS, with a key part of the strategy being the establishment and use of the High Fidelity Training and Operations Center (HFTOC). The HFTOC will contain identical process gloveboxes and equipment lines for key processes that will be used in the SRPPF Main Processing Building. HFTOC is planned to be completed ahead of the Main Process Building by as much as 6 years. Using a surrogate material, cold development activities and training in the HFTOC will reduce the number of activities that would normally happen during hot operations in the Main Processing Building, thereby reducing the time from CD–4 to rate production.

NNSA, working with both SRS and LANL, will continue to refine the schedule for pit production at SRS.

26. Senator WARREN. Administrator Hruby, please provide the expected Plutonium Modernization Program spending level in each of the main three geographic categories (LANL, SRS, Enterprise Support) for the years fiscal year 2029 to fiscal year 2039, or the last year in which you expect full production at SRPPF to occur.

Ms. HRUBY. The table below provides estimated per year average spending rate of the Plutonium Modernization Program, excluding construction projects. The Plutonium Modernization Program includes support for plutonium science, subcritical experiments, and other activities involving plutonium, so it encompasses much more than support for pit production. Many of these activities are conducted at Los Alamos, which is the NNSA Center of Excellence for Plutonium. The estimates in the table assume 2.2 percent escalation per year after fiscal year 2039 to account for inflation on continuing steady State activities. Spending rates through 2059 assume that current plans for the stockpile will remain largely unchanged. While SRPPF is expected to continue operating well beyond 2059, we have little basis for speculating on pit production demands that far into the future.

Control Level	ESTIMATED AVERAGE SPENDING RATE FISCAL YEAR 2029–2039 (\$B)	ESTIMATED AVERAGE SPENDING RATE FISCAL YEAR 2040–2049 (\$B)	ESTIMATED AVERAGE SPENDING RATE FISCAL YEAR 2050–2059 (\$B)
Los Alamos Plutonium Operations	1.4	2.0	2.5
Savannah River Plutonium Operations	0.8	1.7	2.1
Enterprise Plutonium Support	0.2	0.2	0.3

Because time periods covered in this table are outside the planning cycle and many details about the future are unknown, we stress that these are rough estimates with significant uncertainty.

27. Senator WARREN. Administrator Hruby, please provide a complete schedule of line item construction projects, with associated estimated costs, that you anticipate needing to support pit production in the years up to and including fiscal year 2039.

Ms. HRUBY. Line item projects that exist or are planned today are listed below, with the requested estimates. As the designs mature for the existing projects, other line-item projects might be identified that could begin before 2039. CD–4, Complete Construction, dates may change as projects achieve major acquisition milestones and are baselined and/or re-baselined (dollars in thousands). The schedules and costs shown below are based on assumptions about funding profiles and will change if actual funding profiles differ from those assumed.

- Savannah River Plutonium Processing Facility (SRPPF)
 - CD–1 estimated CD–4 Date: fiscal year 2032-fiscal year 2035
 - CD–1 TPC: \$11,100,000
 - Note: Cost estimate reflects the high end of the cost range estimated at CD–1 in 2021. We now know that this estimate will increase, partly because construction costs nationwide have grown significantly and partly because the project design has matured, providing more detailed information. The potential impact on the project cost may be an increase of 60 percent to 125 percent. We remain committed to providing updated cost and schedule ranges in April 2024.
- Chemistry & Metallurgy Research Replacement (CMRR)
 - Estimated CD–4 Date: 2029
 - CD–1 TPC: \$2,886,230
 - Note: NNSA is finalizing decisions on the scope of the remaining CMRR sub-projects. The reaffirmed scope will prioritize equipment installations over infrastructure improvements to support the original mission need to maximize utilization of existing facilities in the absence of the CMRR Nuclear Facility. NNSA is evaluating options for future projects to complete any required scope that is not ultimately included in CMRR.
- Los Alamos Plutonium Pit Production Project (LAP–4)
 - Estimated CD–4 Date: 2032
 - Estimated TPC: \$4,729,875
 - Note: The TPC reflects the fiscal year 2024 President’s Budget Request (PBR), which includes an increase to the 30 Reliable subproject estimate that is greater than the high end of the CD–1 cost range due to the transfer of scope from the 30 Base subproject at approval of CD–2/3, Approve Project Baseline and Approve Start of Construction. This estimate may change as project design reaches completion and as the impact of economic factors on nuclear construction projects is more fully understood. The potential impact on the project cost may be an increase of 30 percent to 40 percent and could extend the schedule by 2 to 4 years.
- LANL Pajarito Corridor Office Complex (PCOC) Building 1: Operations and Waste Management Office
 - Estimated CD–4 Date: 2025
 - Estimated TPC: \$50,048
- LANL Plutonium Production Building (PCOC Building 2) (FY 2024 New Start)
 - Estimated CD–4 Date: 2026
 - Estimated TPC: \$49,500

- LANL Plutonium Mission Safety & Quality Building (PCOC Building 3)
 - Estimated CD-4 Date: 2027
 - Estimated TPC: \$49,437
- LANL Plutonium Program Accounting Building (PCOC Building 4)
 - Estimated CD-4 Date: 2028
 - Estimated TPC: \$50,213
- LANL Plutonium Engineering Support Building (PCOC Building 5)
 - Estimated CD-4 Date: 2031
 - Estimated TPC: \$49,700
- LANL TA-46 Protective Force Facility (FY 2024 New Start)
 - Estimated CD-4 Date: 2026
 - Estimated TPC: \$50,000
- LANL Protective Forces Support Facility
 - Estimated CD-4 Date: 2029
 - Estimated TPC: \$50,213
- TA-55 Reinvestment Project Phase 3
 - Estimated CD-4 Date: 2027
 - Estimated TPC: \$236,030
- Radioactive Liquid Waste Treatment Facility Transuranic Liquid Waste
 - Estimated CD-4 Date: 2027
 - Estimated TPC: \$206,394
- SRS Office Space Project—This is in the early planning stages but will support pit production. NNSA will provide cost and schedule estimates when they become available.
 - CD-4 Date: unknown
 - TPC: unknown

28. Senator WARREN. Administrator Hruby, will it be necessary to replace or augment the Plutonium Facility (PF-4) at Los Alamos? If so, when will this be necessary, how do you propose to do it, and what do you anticipate the generalized cost and investment schedule to be?

Ms. HRUBY. PF-4 is undergoing a host of modifications/upgrades through multiple activities to extend the life of the facility: Los Alamos Plutonium Pit Production Project (LAP4) line item; Plutonium Facility Equipment Installation Phase 2 (PEI2) subproject; TA-55 Reinvestment Project (TRP) Phase III; Pu Modernization Program Major Items of Equipment (MIE) portfolio; Capabilities Based Investments (CBI) portfolio; and a series of Recapitalization projects to address infrastructure and safety priorities. A first look at replacement of PF-4 will likely take place in the 2050 – 2060 timeframe.

29. Senator WARREN. Administrator Hruby, will it be necessary to replace or augment other nuclear facilities at LANL to support pit production and if so, when will this be necessary, how do you propose to do it, and what do you anticipate the generalized cost and investment schedule to be?

Ms. HRUBY. Yes, it will be necessary to replace and augment nuclear facilities at LANL other than PF-4 to support pit production over the next 10 years. Our plans and budget requests include these investments, which have already begun and will continue through approximately the 2032 timeframe. These investments are funded through a combination of funding sources including the Plutonium Modernization (PuM) Program and Line-Item Projects that have been included the PBR. LANL also uses indirect funds for facility improvements across the laboratory, including facilities that support pit production. The only identified new nuclear facility currently being replaced is the TRU Liquid Waste Treatment Facility which is estimated to complete in 2027 at \$206M. Additionally, Infrastructure and Operations is making upgrades to the Waste Characterization, Reduction, and Repackaging Facility (WCRRF) which is necessary for size reducing and repackaging out dated and aging PF-4 gloveboxes that are being replaced by the Chemistry and Metallurgy Research Replacement (CMRR) project and the Los Alamos Plutonium Pit Production Project (LAP4).

30. Senator WARREN. Administrator Hruby, does the SRPPF encompass all the construction required to support pit production at SRS and if not what further facilities and infrastructure will be needed and what will these improvements cost?

Ms. HRUBY. The project includes the facilities and associated infrastructure needed to establish a pit production capability at SRS as defined in the Program Requirements Document (PRD). NNSA is evaluating additional infrastructure that

could be needed to provide supporting capabilities for efficient operations at SRPPF, as an alternative to outsourcing that support, to mitigate risks and improve operational efficiencies and reduce development and production timelines. NNSA is also evaluating additional infrastructure, such as office space, to support the broader mission set at SRS because of the significant and long-term nature of the pit production, tritium, and nonproliferation missions we conduct at the site.

NNSA is evaluating the F-Area utilities at SRS such as fire water, domestic water, or sewer that are currently under DOE-EM management and are provided as a service to SRPPF. Initial reviews indicate that the service water system may need refurbishment, domestic water may need resizing, the 13.8 kV electrical distribution system may need a new feeder extension, and the sanitary wastewater system may require a higher capacity lift station to support SRPPF utility demands. Estimates for these infrastructure enhancements are being developed as further assessment of existing capabilities and capacities are completed.

31. Senator WARREN. Administrator Hruby, please provide a complete list of construction projects and capital equipment projects necessary to support plutonium pit production at each of the two main sites which are neither line-items nor included in program costs.

Ms. HRUBY. The majority of construction projects and capital equipment projects necessary to support plutonium pit production at Los Alamos and Savannah River are line-item projects or program costs. There are a few projects LANL plans to execute using indirect funds whose resulting infrastructure will support multiple laboratory efforts, one of which is plutonium pit production. At this time three multi-use office buildings are in progress and another three are in the planning and evaluation phase; three cafeterias are in the planning and evaluation phase; and one parking garage is in the planning and evaluation phase. As DOE/NNSA works toward the SRS management transition and SRS shifts from a closure site to an enduring site, NNSA is evaluating the need for additional infrastructure to support the broader national security mission set at SRS.

32. Senator WARREN. Administrator Hruby, please provide an expected schedule of full time equivalents (FTEs) required at each of the two main sites to support pit production preparations and operations, by year through fiscal year 2039.

Ms. HRUBY. We cannot answer this question with high confidence at this point because time periods covered here are outside the planning cycle and many details about the future are unknown. Therefore, we stress that these are rough estimates with significant uncertainty. In addition, the number of FTEs that can be supported at each site depends directly on funding profiles, which are not known this far into the future. Our estimates assume that funding profiles will support timely completion and thereby minimize total project costs. The estimates will change if actual funding profiles are different. Finally, we have not yet analyzed whether the two sites have done the FTE accounting the same way, for example, whether these are direct FTEs only or also include indirect funded FTEs.

To support both SRPPF construction and operations, it is expected that FTEs at SRS will grow from about 1,370 FTEs in fiscal year 2023 to a peak of approximately 6,000 around fiscal year 2031. After peaking at approximately 6,000 it is expected that the required FTEs will decrease to approximately 2,000 and stay steady through fiscal year 2039.

At LANL, FTEs associated with both construction and operations plutonium work will grow from approximately 2,600 in fiscal year 2023 to about 3,600 in fiscal year 2026, and level out at approximately 3,000 FTEs from FYs 2029–2039. The LANL FTEs support multiple plutonium missions including pit production, as noted in the answer to Question 26.

33. Senator WARREN. Administrator Hruby, using the above data, please provide a schedule of the projected annual and cumulative spending by site for Plutonium Modernization, in the best and worst cases.

Ms. HRUBY. The table below shows the projected annual and cumulative spending by site for the Plutonium program of record, including both construction and operation costs, to deliver an 80 WR pits per year capability at LANL and SRS. The estimates beyond the fiscal year 2024–28 Future Years Nuclear Security Program (FYNSP) include current project cost plans and inflation adjusted growth for the remaining activities. As stated in the answers to question 26 (which only includes operations costs, excluding construction project costs) and question 32 (which includes FTEs for both construction and operations), these estimates have high uncertainty, as they extend well beyond our planning cycle and contain significant assumptions about things that cannot be known today. The estimates in the table, and construc-

tion costs beyond 2030 in particular, are based on estimates that were available when the fiscal year 2024 congressional Justifications were created. More recent information suggests that costs will increase, with SRS constructions costs likely to increase significantly, as noted in the answer to question 27. We are working to quantify the range of potential increases.

Site	FY 2023 Enacted	FY 2024 PBR	FY 2025 PBR	FY 2026 PBR	FY 2027 PBR	FY 2028 PBR	FY 2029 Estimate	FY 2030 Estimate	FY 2031 Estimate	FY 2032 Estimate	FY 2033 Estimate	FY 2034 Estimate	FY 2035 Estimate	FY 2036 Estimate	FY 2037 Estimate	FY 2038 Estimate	FY 2039 Estimate
LANL Pit Production	767.4	833.1	865.9	898.4	927.5	1,004.1	1,110.7	1,166.2	1,224.5	1,285.8	1,350.1	1,417.6	1,488.4	1,562.9	1,641.0	1,723.1	1,809.2
LANL Construction	781.1	927.1	791.6	735.2	715.5	730.0	315.4	137.3	36.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LANL Total	1,548.5	1,760.2	1,657.5	1,631.6	1,643.0	1,734.1	1,426.1	1,303.5	1,261.2	1,285.8	1,350.1	1,417.6	1,488.4	1,562.9	1,641.0	1,723.1	1,809.2
SRS Pit Production	58.3	62.8	74.3	112.4	144.7	164.3	212.3	222.9	334.4	468.1	655.4	753.7	866.7	996.7	1,146.3	1,318.2	1,515.9
SRS Construction	987.9	898.2	1,100.0	1,200.0	1,200.0	1,230.0	1,085.0	968.5	844.0	420.8	110.0	82.3	68.9	0.0	0.0	0.0	0.0
SRS Total	1,046.2	961.0	1,174.3	1,312.4	1,344.7	1,394.3	1,297.3	1,191.4	878.4	488.9	765.4	836.0	935.4	996.7	1,146.3	1,318.2	1,515.9
TOTAL	2,594.7	2,681.2	2,831.8	2,944.0	2,987.6	3,128.4	2,723.4	2,494.9	2,139.6	2,174.6	2,115.4	2,253.6	2,424.1	2,559.6	2,787.3	3,041.2	3,325.1

Notes:

- 1) Shown in \$M
- 2) Fiscal year 2024–2028 numbers based on PBR data; fiscal year 2029+ operations based on escalation estimates and major expectations (i.e. SRS Pit Production Operations staffing). These estimates could change based on maturing project information as each activity completes design and the complete scope of work is baselined at Critical Decision–2
- 3) Includes SRPPF, LAP4, CMRR, TRP-III, TLW costs based on Financial Schedule (#3) in fiscal year 2024 CPDS

34. Senator WARREN. Administrator Hruby, please provide a schedule of the cost savings, risks, benefits, and stockpile implications of terminating preparations for all but de minimus pit production at LANL, while retaining technology demonstration and training functions. Please include the total number of glovebox replacements in PF–4 planned, how many of these might be avoided under demonstration and training scenario, and what effect this would have on project(s) schedule, as well as on the number of personnel required and the program costs. Presumably LAP4 would be terminated. What other economies in capital asset management would be possible?

Ms. HRUBY. Stockpile requirements could not be met if preparations were terminated for all but de minimus pit production at LANL. Pit reuse for future stockpile programs is planned and justified only for limited applications. NNSA must meet current and future Department of Defense (DoD) requirements and deliver safe, secure, reliable warheads under a variety of possible scenarios. It is clear that new pit production capacity, including the planned capacity at LANL, is necessary to meet requirements as laid out in current stockpile plans, and that delays beyond those currently anticipated would be difficult to accommodate in stockpile planning.

Efforts in the LAP4 project include the replacement of 54 gloveboxes, including 18 that are highly complex. An additional 11 gloveboxes are also being procured and installed under the Plutonium Modernization Program. Additional gloveboxes of lower complexity will support the LAP4 Training and Development Center. The required number of lower-complexity gloveboxes for these training purposes is still being refined, but NNSA expects that approximately 72 will be needed. For reasons given in the previous paragraph, NNSA has not developed plans for the de minimus scenario outlined in the question, and we are therefore not prepared to answer questions about schedule, people, or costs associated with such a scenario.

35. Senator WARREN. Administrator Hruby, if pit production at LANL were kept to a single production shift, how many war reserve (WR) pits could be produced in each year and how would personnel and capital requirements change?

Ms. HRUBY. The estimated capacity for single shift at LANL is 30 WR pits per year once rate production is achieved. Current personnel and capital plans support this capacity and do not need to change to accommodate it. Second and third shifts are planned for maintenance, equipment removal, and equipment installation.

QUESTIONS SUBMITTED BY SENATOR TOM COTTON

SEA-LAUNCHED CRUISE MISSILE-NUCLEAR (SLCM-N)

36. Senator COTTON. Admiral Wolfe and Mr. Adams, last year, Congress appropriated \$25 million to the Navy for the SLCM-N and \$20 million to the National Nuclear Security Administration (NNSA) for the SLCM-N warhead. It also required the Navy and the NNSA to submit a spending plan for SLCM-N research and devel-

opment. Can you provide an update on how these funds are being spent and what progress has been made on the SLCM-N?

Vice Admiral WOLFE. The Navy's Nuclear-Capable Sea-Launched Cruise Missile (SLCM-N) spending plan was developed in accordance with Section 1642 of the National Defense Authorization Act (Public Law 117-263) for fiscal year 2023, and was completed and delivered to Congress on 14 April 2023. Although the Department of Defense does not currently have a SLCM-N program of record, Navy continues RDT&E activities in support of a potential SLCM program as required by congressional requirements.

There are a number of operational and technical challenges associated with a potential SLCM-N program including adapting the SLCM-N candidate missile for vertical launch from a Navy launch platform—either surfaced or submerged. The SLCM-N candidate missile will also need to be evaluated and qualified for an at-sea deployment from a manned Navy platform which is a unique environment. Developing a nuclear certified shipboard interface from the launch platform to the missile as well as equipping the launch platform with the necessary nuclear surety, safety, and security measures are also examples of challenges to overcome since the most likely launch platforms were not designed to deploy with nuclear weapons. The designated launch platforms will also need to be updated to incorporate the necessary nuclear command and control capabilities.

From a programmatic standpoint, the largest immediate challenge is the need to update and validate the assumptions and variables in the 2019–2020 Analysis of Alternatives (AoA). Specifics surrounding delivery vehicles, nuclear explosive package integration, platforms, and lethality must be identified in order to inform a final course of action (COA) and determine what candidate SLCM-N missile to develop and deploy.

Mr. ADAMS. The 2022 Nuclear Posture Review concluded, after weighing many factors, that the SLCM-N program is no longer necessary and should be canceled. Although the Department of Defense does not currently have a SLCM-N program of record, funding appropriated for SLCM-N will be used toward research and development activities of system agnostic technologies (e.g., safety, security, and performance) pertinent to cruise missile platforms that would inform and mature NNSA architectures and components.

W93/MARK 7 TIMELINE

37. Senator COTTON. Admiral Wolfe and Mr. Adams, as you know, the NNSA has reported it is unable to meet the requirement to produce 80 plutonium pits per year by 2030. How would this delay impact the production timeline of the W93/Mark 7 warhead?

Vice Admiral WOLFE. Navy SSP defers to NNSA on their plans for producing pits and/or utilizing pit reuse for the W93 warhead and how a delay in production of pits would impact any planning factors NNSA has for pit reuse.

Mr. ADAMS. DOE/NNSA, in coordination with the Department of Defense (DoD), has identified options to mitigate against risks to required warhead deliverables until pit production capacities are established. Given what is known today about the effects of plutonium aging, the reuse of high margin pits is a viable option to meet W93 production requirements. If new pit production does not support the required production timeline for the W93, then reused pits can be used to support that timeline. NNSA continues to coordinate closely with the DOD and the Nuclear Weapons Council to ensure schedule alignment.

38. Senator COTTON. Admiral Wolfe, what are some of the risks of a delay in W93 production to the sea-based nuclear deterrent?

Vice Admiral WOLFE. Navy SSP defers to USSTRATCOM on any operational risks within the sea-leg that may be realized should W93/Mk7 be delayed. From a programmatic perspective, delays in the W93/Mk7 program may result in increased costs, put at risk the ability of the program to respond to warfighter needs at the speed of relevance, and challenge the ability of the Sea-Based Strategic Deterrence workforce to transition to programs following W93/Mk7—such as the Future Strategic Sea-based Warhead (FSSW). Delays in the W93/Mk7 program may also negatively impact progress in the United Kingdom's Replacement Warhead program.

W87-1 TIMELINE

39. Senator COTTON. General Bussiere and Mr. Adams, as you know, the NNSA has reported it is unable to meet the requirement to produce 80 plutonium pits per year by 2030. How would this delay impact the production timeline of the W87-1 warhead?

General BUSSIERE. The current pit production plan supports the ability for the W87-1 Modification Program to achieve first production unit on schedule. The W87-1 Modification Program remains on-track to meet warhead rate production and on-time deliveries to the Department of Defense. If pit production delays worsen and put at risk the W87-1 warhead production rate, DOE/NNSA will employ contingency options, including potential reuse of existing pits.

Mr. ADAMS. The baseline design for the W87-1 includes a newly manufactured pit, and the program is on track to provide these pits on a schedule that supports current plans. NNSA is also carrying a backup option of pit reuse, to ensure that warheads can be delivered to the Air Force on the needed schedule in the event of unanticipated disruptions to pit production schedules.

40. Senator COTTON. General Bussiere, what are some of the risks of a delay in W87-1 production to the land-based nuclear deterrent?

General BUSSIERE.

- 1) Delays to W87-1 have the potential to delay Minuteman III to Sentinel transition.
 - a. The W78 weapon employed in the Mk12A is only compatible with Minuteman III.
 - b. Delays in W87-1 fielding on Sentinel may require the Minuteman III to remain fielded longer to meet operational requirements for strategic target coverage.
 - c. Minuteman III remaining fielded longer than anticipated will result in a proportional delay to Sentinel's Full Operational Capability (FOC).
- 2) Depending on the length of delay, it may become necessary to consider W78 (Mk12A) for integration into Sentinel.
 - a. Initial projections suggest integration would be major modification effort requiring substantial financial and time cost, but this option has not been fully evaluated by the Air Force. Rigorous analysis will need to be done to capture exact costs.

MINUTEMAN III TESTS

41. Senator COTTON. General Bussiere, can you explain the role that routine tests of the Minuteman III Intercontinental Ballistic Missile (ICBM) play in guiding the development of the Sentinel Ground Based Strategic Deterrent?

General BUSSIERE.

- 1) Minuteman III (MM III) flight testing continues to assess the reliability and confidence of the Mk21/W87 reentry vehicle (RV), the baseline weapon for the Sentinel.
- 2) MMIII flight tests have been used to further the development of the Arming and Fuzing Assembly for the Mk21A weapon system that is expected to be employed on Sentinel.
- 3) MMIII flight tests enable collection of launch facility and silo environment data to better understand the launch environment for Sentinel.
- 4) MMIII flight tests aid in the further development of remote scoring systems that can be used in broad ocean areas. These scoring systems are being upgraded and expanded to meet the expected requirements of Sentinel.
- 5) MMIII test provide weapon system accuracy data that establishes a baseline for the progression of our Sentinel modeling efforts.

42. Senator COTTON. General Bussiere, what impact did the cancelation of the Minuteman III ICBM test on April 1, 2022 have on the timeline of Sentinel Ground Based Strategic Deterrent development?

General BUSSIERE. There was no impact on the overall Sentinel timeline. The cancellation of the 1 April 2022 Minuteman III (MMIII) flight test did delay the collection of silo fly out environment data needed for the Sentinel program by 4 months, but this data was able to be collected in the subsequent MMIII flight test which occurred in August 2022.

**DEPARTMENT OF DEFENSE AUTHORIZATION
REQUEST FOR APPROPRIATIONS FOR
FISCAL YEAR 2024 AND THE FUTURE YEARS
DEFENSE PROGRAM**

TUESDAY, MAY 2, 2023

UNITED STATES SENATE,
SUBCOMMITTEE ON STRATEGIC FORCES,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

THE DEPARTMENT OF DEFENSE SPACE ACTIVITIES

The Subcommittee met, pursuant to notice, at 4:45 p.m., in room 222, Russell Senate Office Building, Senator Angus S. King, Jr. (Chairman of the Subcommittee) presiding.

Subcommittee Members present: Senators King, Gillibrand, Rosen, Kelly, Fischer, Rounds, Cramer, and Tuberville.

OPENING STATEMENT OF SENATOR ANGUS S. KING, JR.

Senator KING.

[Technical problems]—for the Strategic Forces Subcommittee of the United States Committee on Armed Services. The hearing today is on U.S. Space Force and programs in review of the defense authorization request for fiscal year 2024 and future years. I want to thank our witnesses today for agreeing to appear before us, and I thank you for your service and your testimony.

The purpose of today's hearing is to examine the fiscal year 2024 budget of the Space Force, a separate title 10 service, which was authorized in the Fiscal Year 2020 National Defense Authorization Act (NDAA). Mr. Plumb, you all have finished up the Space Policy Review. In February, we had a classified full committee brief on it with Secretary Hicks.

While the outcome satisfied many members' concerns, I still want to make sure our Space Force Guardians have ample opportunity to train and equip for conflict under this policy. Mr. Calvelli, you are responsible for the acquisition of space assets.

I would like to know how we can ensure our guardians are equipped to have space assets to train with for a conflict in space. For fiscal year 2024, the Space Force budget is \$30 billion, a \$3.7 billion increase over last year's enacted budget, or a 14.7 percent increase over fiscal year 2022.

General Thompson, it will be important to explain to the Committee in open session, if possible, what this increase will be going for. Further, I want to know what is being transferred into the

Space Force, especially with the transfer of uniformed Army and Navy personnel.

Last year, the Administration has submitted a proposal for a new personnel system that would treat Space Force Guardians as either full or part time components based on reserve status. I want to know more about this, given this and given the competing proposals for Space National Guard.

Again, I want to thank our witnesses for joining us, and after the brief opening statements, we will have 5-minute rounds of questions for the witnesses. Senator Fischer.

STATEMENT OF SENATOR DEB FISCHER

Senator FISCHER. Thank you, Mr. Chairman. Dr. Plum, Mr. Calvelli, and General Thompson, thank you all for being here today and for sharing your perspective with this Subcommittee. And thank you each for your many years of service.

As Members of the Subcommittee know, space has and continues to play a critical role in upholding our Nation's security and maintaining our prosperity. The United States leadership in space has been buoyed by a robust commercial space industry and cooperation with our allies and partners.

But our adversaries, like Russia and China, are also exploiting the benefits of space and are developing capabilities that put U.S. space assets, and the benefits our armed forces receive from those assets, at risk.

I look forward to hearing how each of you intends to play a unique role in safeguarding U.S. space assets, countering the capabilities of our adversaries, and integrating the advanced capabilities of the U.S. commercial space industry.

I would also like to better understand how the Space Force is being incorporated into the combatant commands to ensure they have access to the full range of space expertise. Thank you, Mr. Chairman.

Senator KING. Secretary Plumb.

STATEMENT OF DR. JOHN F. PLUMB, ASSISTANT SECRETARY OF DEFENSE FOR SPACE POLICY

Dr. PLUMB. Thank you, Senator King, thank you, Senator Fischer, Members of the Committee. I appreciate the chance to testify today on the Department's national security space programs, and I am honored to appear alongside Secretary Calvelli and General Thompson. Space plays a critical role in our Nation's security, in our prosperity, and in our way of life. For the DOD [Department of Defense], space is essential to how we compete and fight in every domain. We simply cannot fight without space.

Our competitors understand this. They are fielding and developing increasingly complex systems to deny space missions to our U.S. Joint Force. In just the last few years, the quantity and quality of those threats has significantly increased.

China has already fielded ground based counterspace weapons, including direct ascent, ASAT [anti-satellite weapon] missiles, and it continues to seek new methods to hold our satellites at risk. China is also building a space architecture to enable long range precision strikes by its military.

China ultimately seeks to challenge our ability to conduct joint operations in the Indo-Pacific. Russia is developing, testing, and fielding its own counter space systems, including both ground and space based kinetic, anti-satellite weapons. Their goal is to degrade or deny United States space systems.

As Senator King pointed out, President Biden's \$33.3 billion space budget for this fiscal year 24 invests in the capabilities necessary to meet these challenges and is roughly 15 percent over the fiscal year 2023 investments.

The President's Budget request includes almost \$5 billion for missile warning and missile track, and this includes \$2.3 billion for new proliferated resilient architectures, \$2.6 billion for next generation overhead persistent infrared, OPIR, \$1.3 billion for position navigation and timing, including the development of the next generation operational control system for GPS [Global Positioning System], \$3 billion for 15 launch vehicles and first associated range upgrades, \$4.7 billion for protected and jam resistant SATCOM [Satellite Communications], and it includes additional investments in ground user equipment, science and technology research, and, of course, classified programs.

My office remains laser focused on the three priorities that I briefed to this Committee before, which is space control, space cooperation, and space classification. On space control, the Department will protect and defend our national security interests from the growing scope and scale of space and counterspace threats, and we will protect and defend our servicemen and women in harm's way from space enabled threats.

For space cooperation, we are investing in relationships with allies, partners, and commercial space. These partnerships are an enduring strength and an asymmetric advantage that our competitors cannot hope to match.

For space classification, the Department is working at the highest levels to remove barriers to sharing information with our allies and to strengthen our ability to communicate really with ourselves across the U.S. Government.

Our competitors have watched us. They have learned from us. They have stolen from us. And they have developed capabilities to hold us at risk. But they are not ready for us. They aren't ready for us today, and with congressional support for the national security space investments in the President's Budget, they will not be ready for us tomorrow.

Thank you to the Committee for this hearing, for your dedication to the Department and U.S. National Security, and I look forward to answering your questions.

[The prepared statement of Dr. John F. Plumb follows:]

PREPARED STATEMENT BY DR. JOHN F. PLUMB

INTRODUCTION

Chairman King, Ranking Member Fischer, and distinguished Members of the Committee: Thank you for inviting me to testify before you on the Department's national security space programs. I am honored to appear alongside Air Force Assistant Secretary Calvelli and General Thompson.

Space plays a critical role in American security, prosperity, and way of life. Space-based services support the world's financial system, scientific discoveries, and environmental monitoring. Every American uses space every single day. For the Depart-

ment of Defense, all U.S. military service force structures are built assuming continued access to space. Space access enables us to provide our military with indications and warning of threats or attacks, command and control of our forces across the globe, and monitoring of adversary activities. U.S. space capabilities, such as positioning, navigation, and timing (PNT), satellite communications (SATCOM), missile warning and missile tracking, and other missions, are critical to overall military effectiveness across all domains and, therefore, to successful homeland defense, deterrence, and countering aggression. The intelligence, surveillance, and reconnaissance (ISR) support provided by space capabilities is vital to identifying and exposing aggressive activity, deterring escalation, and catalyzing international responses to crises.

The Department's fiscal year 2024 space budget request of \$33.3 billion is driven by the priorities outlined in the National Defense Strategy (NDS). This historic investment in space reflects a net increase of \$22.9 billion over the Future Years Defense Program (FYDP) for the U.S. Space Force and an increase of approximately 15 percent year to year from fiscal year 2023 to meet emerging threats. The investments in the fiscal year 2024 space budget request will enable the Department of Defense to: (1) maintain the benefits provided to all from space by preserving stability in, access to, and freedom to operate in, from, and through the space domain; and (2) deter hostile uses of space that threaten the national security interests of the United States and its allies and partners, while ensuring we are prepared to prevail in conflict, if deterrence fails.

SECURITY ENVIRONMENT

Today, the United States finds itself in a highly dynamic security environment characterized by intensifying strategic competition, assertive behavior by multiple competitors, rapidly evolving domains of conflict, shifting balances of power, and, as a result, a growing risk of military confrontation. Our competitors have placed space warfare and space-enabled long-range strike capabilities at the center of their strategies to coerce and, if necessary, fight the United States and its allies and partners. They seek to create a future operating environment in which they can leverage space and strike capabilities to hold at risk our forces, ports, and airfields, and to deny U.S. freedom of maneuver. The People's Republic of China (PRC) expects space-enabled long-range precision strikes will play an important role in future conflicts, and counterspace operations will be integral to potential PRC military campaigns. Space capabilities also underwrite ongoing efforts by U.S. competitors to gain advantage in "gray zone" competition, undercut U.S. leadership, and reshape global norms to their advantage.

People's Republic of China

The Department's fiscal year 2024 budget is driven by the seriousness of our strategic competition with the PRC, which remains the most comprehensive challenge to U.S. national security. The PRC is the greatest geopolitical challenge facing the United States because it is the only competitor with the intent and, increasingly, the capability to remake the rules-based international order. The PRC's activities on the ground and, increasingly, in space are designed to advance its global standing, strengthen the PRC's endeavor to erode U.S. influence across military, technological, economic, and diplomatic spheres, and challenge the interests and values of the United States and our allies and partners. The People's Liberation Army (PLA) views space superiority—the ability to control the space-enabled information sphere and deny adversaries their own space-based information gathering and communication capabilities—as a critical component of conducting modern "informatized warfare." As a result, the PRC reorganized its military in 2015 to approach space more effectively as a warfighting domain and to support the PLA's holistic approach to joint warfare.

The PLA continues to build a space architecture to enhance its ability to fight and win a modern military conflict. In 2022, the PRC conducted 62 successful space launches, placing 200 payloads into orbit, more than half of which were PRC ISR satellites. Today, the PLA benefits from more than 340 ISR satellites with optical, multispectral, radar, and radiofrequency sensors, and now owns and operates roughly half of the world's ISR systems. The PRC ISR architecture enhances the PRC's worldwide situational awareness and could support the PLA's monitoring, tracking, and targeting of U.S. and allied forces worldwide, especially in the Indo-Pacific region.

The PRC expects ISR capabilities will play an important role in future conflicts by enabling the PLA to acquire timely, high-fidelity information in order to conduct long-range precision strikes and conduct battlefield damage assessments. The PLA continues to integrate ISR, PNT, and SATCOM capabilities into its weapons and

command and control (C2) systems to provide over-the-horizon targeting information for its strike platforms in an effort to challenge U.S. freedom of maneuver on land, sea, and in the air. Recent PLA improvements to its ISR fleet enhance the PLA's ability to operate farther from the Chinese coast and to monitor forces across the globe, including United States aircraft carriers, expeditionary strike groups, and deployed air wings. This makes U.S. and allied forces more susceptible to long-range strike and ultimately challenges our ability to conduct joint operations, particularly in the Indo-Pacific region.

The PRC also has a robust network of space surveillance sensors on Earth capable of searching, tracking, and characterizing satellites in all Earth orbits. This network includes a variety of telescopes, radars, and other sensors that allow the PRC to support missions such as intelligence collection, ballistic missile early warning, and counterspace targeting.

The PRC views counterspace systems as a means to deny other militaries' space-based information systems and to deter and counter outside intervention during a regional conflict. The PRC has already fielded ground-based counterspace weapons, including electronic warfare systems, directed energy weapons, and direct-ascent (DA) anti-satellite (ASAT) missiles designed to disrupt, damage, and destroy U.S. satellites. The PRC has launched multiple DA-ASAT missiles, including a 2007 destructive DA-ASAT missile test in low Earth orbit (LEO), and plans to pursue DA-ASAT weapons intended to destroy satellites up to geo-synchronous Earth orbit.

The PRC is probably testing dual-use technologies in space that could be applied to counterspace missions, such as robotic arm technology that could be used for grappling other satellites, as evidenced last year when the Shijian-21 moved a derelict satellite to a graveyard orbit. The PRC continues to seek new methods, which probably include space-based kinetic energy weapons, to hold our satellites at risk, and is developing other sophisticated capabilities to deliver effects through space, such as the PRC's fractional orbital launch of an intercontinental ballistic missile (ICBM) with a hypersonic glide vehicle from China in 2021.

Russia

Russia reorganized its military in 2015 to create a separate space force because Russia sees achieving supremacy in space as a decisive factor in winning conflicts. Russia believes the importance of space will continue to expand because of the growing role of precision weapons and satellite-supported information networks in conflict, but it seeks to avoid becoming excessively dependent on space to conduct its national missions.

Russia has more than 30 ISR satellites, including some of the world's most capable satellites for optical imagery, radar imagery, signals intelligence, and missile warning. Russia can also employ its civil and commercial remote sensing satellites to supplement military-dedicated capabilities and has sought to acquire satellite imagery from foreign companies. For example, in January 2023, the Department of Treasury sanctioned a PRC company, Spacety China, for providing a Russian-based technology firm with synthetic aperture radar satellite imagery orders over Ukraine in order to enable Wagner Group combat operations.

Russia is developing, testing, and fielding a suite of non-destructive and destructive counterspace systems to degrade or deny U.S. space-based services as a means of offsetting a perceived U.S. military advantage and deterring the United States from entering a regional conflict. Russia has fielded several ground-based lasers that can blind satellite sensors and has a wide range of ground-based electronic warfare systems that can counter the Global Positioning System (GPS), tactical and satellite communications, radars, and Western space-enabled C2 and weapons guidance systems. Russia also considers space-enabled information collection and transmission to be strategically decisive and has taken steps to modernize its military information attack capabilities. For example, in support of Russia's illegal full-scale invasion of Ukraine in 2022, Russia conducted cyber attacks against commercial satellite networks in February 2022 to disrupt Ukrainian C2 and has sought to jam commercial SATCOM used by Ukraine.

In November 2021, Russia demonstrated the capability to destroy satellites in LEO with its test of a destructive DA-ASAT missile, which created over 1,500 pieces of trackable space debris and tens of thousands of pieces of potentially lethal but non-trackable debris, which threatens spacecraft of all nations in LEO. Russia is also reportedly developing an air-launched ASAT weapon that can target satellites in LEO. Finally, Russia tested a space-based ASAT capable of kinetically killing satellites in LEO in 2020 and is developing sophisticated dual-use orbital capabilities that could be used to conduct an attack on other countries' satellites.

While the PRC and Russia develop and field these counterspace weapons, both nations simultaneously promote false claims that they will not place weapons in space

and have coordinated to propose a flawed legally binding treaty on the non-weaponization of space at the United Nations that would be unverifiable and unenforceable.

Other Challenges: Iran & the Democratic People's Republic of Korea (DPRK)

Iran recognizes the strategic value of space and counterspace capabilities and will attempt to deny the United States its use of space during a conflict. Iran has developed capabilities to jam SATCOM and GPS signals, and Iran's advancements in space launch vehicle technology could be applied to developing a DA-ASAT missile or could shorten the timeline to an ICBM. The DPRK has also demonstrated non-kinetic counterspace capabilities, including GPS and SATCOM jamming. Under the guise of peaceful use of space, the DPRK has applied data from its space program to aid in the development of long-range and multistage ballistic missiles.

THE PRESIDENT'S BUDGET REQUEST FOR FISCAL YEAR 2024

Strengthening Deterrence & Building Enduring Advantages in Space

In October 2022, the Department of Defense released the unclassified version of the National Defense Strategy (NDS), which emphasized that the United States is entering a period of heightened risk and articulated an urgent imperative to strengthen deterrence. In support of this aim, the NDS outlined a strategy of integrated deterrence, which provides a framework for working seamlessly across domains, theaters, and the spectrum of conflict, as well as across all instruments of U.S. power and with allies and partners. The Department's efforts in the space domain undergird all four priorities in the NDS: (1) defending the homeland; (2) deterring strategic attacks; (3) deterring aggression while preparing to prevail in conflict; and (4) building a resilient Joint Force and defense ecosystem that can sustain U.S. strategic advantages.

The Department's fiscal year 2024 budget request is grounded in the understanding that deterrence in space contributes to deterrence on the ground. Space is a key node for integrated deterrence because deterrence strategies rely on credible combat forces, which are underwritten by space. Strengthening deterrence through enhanced mission assurance and building enduring advantages today that sharpen the edge of national security space in the coming years are, therefore, central to our budget request this year.

Because the space domain empowers the entire Joint Force, the Department is focused on assuring critical space-based missions by accelerating our transition to more resilient architectures and by defending critical systems against counterspace threats. The foundation of mission assurance is resilience—being able to provide critical space-based services across the Joint Force in competition, crisis, and conflict. By focusing on the ability of space-based services to withstand, fight through, and recover quickly from disruption, DOD can continue to support the Joint Force and deny adversaries the benefit of attack and an information advantage that is critical to success in modern warfare.

Even as the Department builds resilience in space as a means to deter aggression, we must also be prepared to protect and defend our national security interests in space. Consistent with our long-standing policy, the Department will protect and defend U.S. space capabilities, along with those of our allies, partners, and the commercial sector when directed to do so. To effectively deter, and, if necessary, counter and respond to hostile acts in space, the Department is focused on protecting the whole of our space architecture, including ground nodes and networks, in addition to assets on orbit. Defending our national security interests from the growing scope and scale of space and counterspace threats also requires that we strengthen our ability to detect and credibly attribute hostile acts in, from, and to space. Providing space operators with relevant, timely space domain awareness data can help to prevent operational surprise and support efforts to protect and defend space assets.

Finally, the United States must be prepared to protect the Joint Force from attacks enabled by adversaries' increasingly sophisticated and proliferated space-based ISR networks and C2 systems. The Department of Defense is developing a range of solutions across all domains in order to protect and defend U.S. and, as directed, allied, partner, and commercial capabilities, as well as to prevent adversaries from leveraging space-enabled targeting to attack the Joint Force. This Committee's support for the investments outlined in the President's Fiscal Year 2024 Budget is essential to strengthening deterrence and building the enduring advantages in space necessary to defend our systems against counterspace threats and protect the U.S. Joint Force from adversary hostile use of space.

The DOD's fiscal year 2024 national security space budget request provides for vital space capabilities, resilient architectures, and enhanced space command and

control to keep space safe for military, civilian, and commercial operations, while modernizing U.S. capabilities to secure the use of space in the face of increasing threats to U.S. national security space systems. The budget request would continue to strengthen mission assurance by accelerating the transition to resilient-by-design architectures that are diverse, proliferated, disaggregated, distributed, and protected; enhance our ability to fight through disruption by improving defensive capabilities; advance assured access to space across all orbits; invest heavily in research, development, testing, and experimentation to ensure we continue to meet emerging threats; and modernize our space architecture to further integrate space-based services across the Joint Force. Some of the highlights of the fiscal year 2024 budget request include investments in:

- Missile Warning: \$5.0 billion to develop proliferated, resilient missile warning / missile tracking architectures, and next-generation overhead persistent infrared (OPIR) space and associated ground architectures;
- GPS Enterprise: \$1.3 billion for PNT through GPS III follow-on satellite support and development of the next-generation operational control system (OCX) for GPS III and legacy satellites;
- Launch Enterprise: \$3.0 billion to fund 15 launch vehicles and launch range upgrades; and
- Satellite Communications: \$4.7 billion for the Evolved Strategic Satellite Communications (ESS), protected, robust, secure, survivable, and jam-resistant tactical, wideband, and narrowband capabilities, and Space Development Agency's (SDA) proliferated space data transport layer.

Other Space Force investments include ground user equipment, science & technology research, personnel funding, operations and maintenance, and classified investments.

Campaigning in the Space Domain

As the United States invests in critical capabilities, the Department of Defense is actively campaigning in and through the space domain to strengthen integrated deterrence and build advantages with allies and partners as well as the commercial sector, while demonstrating responsible leadership.

Our allies and partners provide an enduring strength and asymmetric advantage that our competitors cannot match. Our allies and partners are essential to our integrated deterrence strategy. We therefore must be able to integrate, plan, and operate with our most capable allies and partners in the space domain. Combined operations require us to be able to effectively share information. The Department is reviewing the classification and disclosure policies of space-related information to overcome barriers to integration with our allies and partners.

One example of how we are strengthening military-to-military ties to our allies is through the Combined Space Operations (CSpO) Initiative, which includes defense leaders from Australia, Canada, France, Germany, New Zealand, the United Kingdom, and the United States. In this forum, we are identifying ways to improve cooperation, coordination, and interoperability to sustain freedom of action in space, optimize resources, enhance mission assurance, and prevent conflict. During last December's CSpO Principals Board meeting, leaders emphasized the need to continue to increase information sharing to enable space operations and collaboratively address challenges to the safety and security of the domain.

The NDS also highlights the importance of partnering with the commercial sector as part of our integrated deterrence efforts. Commercial services and providers offer innovative solutions across many mission areas at potentially lower cost and with more rapid development cycles. Therefore, the Department is assessing how our missions can increasingly leverage commercial space services as one element of our broader approach to building resilience.

Last, day-to-day, the Department is upholding and strengthening the rules-based international order and leading in the development of new responsible behaviors that contribute to the safety, stability, security, and long-term sustainability of space activities. Because the Department is one of the world's most experienced space operators, we play a significant role in the United States' observation and demonstration of responsible space behaviors. The Department's policies and practices, such as the Secretary of Defense's Tenets of Responsible Behavior in Space memorandum, issued in 2021, serve as a key element for U.S. proposals for international measures that contribute to the safety, stability, security, and long-term sustainability of space activities. Our operational expertise also leads us to participate in United Nations' space-related committees as part of State Department-led delegations.

Most recently, the Department assisted in developing the commitment announced by the Vice President in April 2022 not to conduct destructive DA-ASAT missile

testing and to work to establish this as a new international norm of responsible behavior in space. This U.S. announcement led to a December 2022 vote at the United Nations General Assembly that gave overwhelming approval of a U.S.-sponsored resolution calling upon all States to commit not to conduct destructive DA-ASAT missile tests. One hundred and fifty-five countries voted in favor, with nine opposing, including the PRC and Russia. The Department continues to engage with allies and partners to urge the widespread adoption of this commitment. This approach to developing nonbinding norms of responsible behavior that garner broad support can support the long-term sustainability of the outer space environment directly. The Department will continue to demonstrate leadership in both the responsible use of space and stewardship of the space environment.

CONCLUSION

U.S. space systems are central to our ability to deter our competitors and to prevail in conflict, should deterrence fail. Our competitors have watched us, they have learned from us, they have stolen from us, and they are coming for us. But they are not ready for us today. The investments in the fiscal year 2024 budget request are essential to equip the Department of Defense with the capabilities necessary to ensure they are not ready for us tomorrow. Thank you to the Committee for its tireless dedication to our national security and our servicemembers, and I look forward to answering your questions.

STATEMENT OF THE HONORABLE FRANK CALVELLI, ASSISTANT SECRETARY OF THE AIR FORCE FOR SPACE ACQUISITION AND INTEGRATION

Mr. CALVELLI. Chairman King, Ranking Member Fischer, and distinguished Members of the Committee, thank you for inviting me to testify before you today. We continue to face an unprecedented strategic competitor in China and our space environment continues to become more congested and contested.

To address these challenges, we are transforming our space architecture from the large, highly capable but vulnerable satellites today, to smaller, proliferated, resilient systems across multiple mission areas.

For example, we are pivoting from the legacy missile warning architecture to a proliferated, resilient architecture that adds a new capability to actually track missile threats. We are adding new critical space domain awareness capabilities.

We are fundamentally transforming our military satellite communications and data transport architecture through disaggregation of missions, proliferation, and partnerships with allies and commercial. We are even collaborating with the intelligence community to develop a proliferated, space based, round moving target indication system.

As we transition to this architecture, we continue to deliver new, credible capabilities to our warfighters. Over the last year and a half, the Space Systems Command delivered to new geosynchronous space situational awareness satellites, a new space based infrared missile warning satellite, and a new GPS 3 satellite.

The Space Rapid Capabilities Office delivered their first set of missions to orbit this past January. In March, the Space Development Agency delivered their first ten satellites to orbit in less than 3 years from contract award to launch.

As the Assistant Secretary of the Air Force for Space Acquisition Integration, I am focused on adding speed to our acquisitions and delivering programs on schedule and on cost. I also recognize I inherited several troubled programs that are behind schedule and

overrun on costs, and I am paying close attention to these programs.

Overall, I am proactively managing the space acquisition enterprise through weekly status reports, biweekly tag ops with my portfolio leads, and detailed quarterly program reviews. These reviews enable me to ensure all our programs remain focused on delivering capabilities to our warfighters on cost and on schedule.

In October 2022, I issued strategic acquisition guidance to the workforce outlining nine space acquisition tenants. These tenants form the basis of a new direction for space acquisition, and emphasize speed and program management discipline, while addressing the fundamental issues that slow up space acquisition.

I am committed to using all the tools and authorities Congress has provided to help speed space acquisition. That includes the use of section 804 middle tier of acquisition pathway, use of other transactional authorities (OTA), and use of the Space Acquisition Council to ensure collaboration and integration while avoiding duplication of effort across the entire national security space enterprise.

Thank you to the Committee, and I look forward to your questions.

Senator KING. General Thompson.

**STATEMENT OF GENERAL DAVID D. THOMPSON, USSF, VICE
CHIEF OF SPACE OPERATIONS**

General THOMPSON. Chairman King, Ranking Member Fischer, and distinguished Members of the Subcommittee, it is an honor to appear before you today on behalf of the Secretary of the Air Force, Chief of Space Operations, and 14,000 guardians around the world executing our missions.

The capabilities and benefits provided from space are essential to our way of life and crucial to effective military operations in every other domain. Success in great power competition depends on access and freedom to operate in space while denying the same to potential adversaries.

Space access is increasingly threatened by a number of hostile actors who are developing and deploying counterspace weapons to threaten U.S. systems in every orbital regime, on the ground and in cyberspace. We continue to respond to these challenges through three lines of effort, fielding combat ready forces, amplifying the guardian spirit, and partnering to win.

A combat ready force requires personnel, training, and equipment, simple by description, but complex in execution. We need innovative operational concepts, survivable platforms, highly trained personnel, validated tactics, actionable intelligence, decisive command and control, fortified networks, suitable facilities, and perpetual sustainment and modernization.

These elements must be in place to deter adversaries and, if needed, prevail in conflict. The key to success in all of these areas is our people. Military and civilian guardians are dedicated and determined. They are imbued with a deep sense of pride and purpose. But they must also be bold and innovative problem solvers who can overcome any obstacle and thrive in the current dynamic environment.

The Space Force must attract talented Americans who embody these principles. We must then amplify them and keep those guardians on the field of play. To do so, our members must have challenging and rewarding work, the means to provide for their families, quality affordable care and living conditions, and acknowledgment from their leaders and all Americans that we value and respect who they are and what they do. This is the essence of the guardian spirit.

Finally, we do not propose to accomplish this alone. The third tenet to our success is partnering to win. The Space Force is pursuing and strengthening relationships across the Department of Defense, within the rest of the U.S. Government, with traditional defense industry and the rapidly growing commercial sector, with longstanding allies, and with new partners who share the vision of a stable, peaceful space domain.

We seek partners who will be advocates for the space capabilities that they need and will hold us accountable to deliver them for them. The President's Fiscal Year 2024 Budget Request reaffirms the Space Force's commitment to a bold, threat informed shift.

It extends the pivot to resilient constellations, intelligence driven space domain awareness, aggressive cybersecurity, measured investment in space superiority, and combat credible forces anchored in a full spectrum test and training enterprise.

Your timely enactment of the fiscal year 2024 Defense Authorization Bill will enable the Space Force to remain the world's leader in space and to preserve freedom of action for the Nation. Thank you for your continued partnership and support. I look forward to your questions.

[The joint prepared statement of The Honorable Mr. Frank Calvelli and General David D. Thompson follows:]

JOINT PREPARED STATEMENT BY THE HONORABLE MR. FRANK CALVELLI AND
GENERAL DAVID D. THOMPSON

INTRODUCTION

Chairman King, Ranking Member Fischer, and distinguished Members of the Committee, thank you for inviting us to testify before you today, representing Secretary Kendall, General Saltzman, and our Nation's Space Force.

We continue to face an unprecedented strategic competitor in China, and our space environment continues to become more contested, congested, and competitive. We have seen an exponential growth of in-space activity, including counter-space threats. The Department of the Air Force and the United States Space Force are fundamentally transforming our space architecture to be more resilient, proliferated, and integrated to meet warfighter requirements to counter the growing threat from strategic competitors. In 3 years' time, we have made significant progress to transform our force to counter the threat, but there is still much more we must accomplish.

To that effect, on November 22, 2022, the CSO outlined three lines of effort to ensure that the Space Force maintains urgency and momentum in the progress we have made over the past 3 years:

- *Field Combat-Ready Forces* so that the Space Force has the personnel, training, and equipment required to prevail in a fight.
- *Amplify the Guardian Spirit* so that the Space Force attracts, develops, inspires, empowers, and retains individuals who thrive in our organization and under our values.
- *Partner to Win* so that the Space Force can collaborate with mission partners to accomplish our critical set of roles and functions.

These lines of effort ensure that the force is advancing its readiness for the high-end fight. We must deliver and field the forces and capabilities necessary to adequately deter and if deterrence fails, prevail against any potential adversaries.

TRANSFORMING THE SPACE ARCHITECTURE TO FIELD COMBAT-READY FORCES

As previously mentioned, the Department of the Air Force and the United States Space Force are fundamentally transforming our space architecture to be more resilient, proliferated, and integrated to meet warfighter requirements to counter the growing threat from strategic competitors.

We are actively moving away from building a small number of highly capable but vulnerable large satellites, to a proliferated resilient Missile Warning / Missile Tracking (MW/MT) architecture. Our resilient MW/MT focuses on tracking advanced threats by integrating critical missile tracking capabilities that previously did not exist. The Space Development Agency (SDA) and Space Systems Command (SSC) are developing the low earth orbit (LEO) and medium earth orbit (MEO) architecture through an incremental process that allows us to incorporate new technologies and get them on orbit fast. The Space Development Agency just launched the first two LEO tracking satellites this month and will launch six more by the end of this fiscal year. Thirty-nine more tracking satellites will be delivered in their next Tranche, which is set to launch in 2025. SSC's resilient MW/MT MEO portion will follow with nine satellites in two orbital planes with launches in fiscal year 2026 and fiscal year 2027.

As we develop this new capability, we are continuing the development of the Next Generation Geosynchronous and Next Generation Polar missile warning programs as a bridge to enable the eventual transition to the resilient MW/MT architecture.

Simultaneously we are transitioning our space domain awareness architecture to focus on deterring and defending against attempts to negate our critical space capabilities. We continue our Geosynchronous Space Situational Awareness Program (GSSAP), which remains our hallmark program for space domain awareness. We are adding three new radar sites (United States, Australia, and United Kingdom) with the Deep Space Advanced Radar Capability to enhance our deep-space object tracking. Additionally, we are upgrading our space tracking telescopes in the Continental United States and Hawaii as part of our Ground-Based Operational Surveillance System program. These upgrades include new cameras, better sensitivity, and better search capability. We are also collaborating with the Intelligence Community (IC) on a new GEO-based satellite system called Silent Barker that will launch this year, which provides on-orbit optical space domain awareness for orbit determination, discovery, custody, and change detection of deep space objects.

We are fundamentally transforming our military satellite communications architecture through disaggregation, proliferation, capacity expansion, and partnerships with Allies and commercial entities.

We are designing new architectures that disaggregate the strategic and tactical missions currently found on the Advanced Extremely High Frequency satellites. These future architectures increase resilience by reducing vulnerabilities associated with very large multi-mission satellites and increase architectural diversity via payload hosting opportunities.

The proliferated transport layer will provide resilient low-latency military data connectivity to a range of warfighter platforms. The first eight of these satellites were launched in April. Another 12 will launch this June, followed by 138 more in 2024.

We continue to expand and enhance our wideband satellite communications capabilities by making ground system improvements that will increase resiliency of the Wideband Global SATCOM (WGS) satellites 11 and 12. Additionally, we are on track to operationalize the new Protected Tactical Waveform by the end of 2024 to be used over WGS, which adds critical anti-jam capabilities for our warfighters. We are also beginning the service life extension development for two additional Mobile User Objective System satellites to extend narrowband services as interim gap-fillers as we define the future architecture.

In partnership with Norway, our Enhanced Polar System Recapitalization payload will provide protected SATCOM coverage in the North Polar Region and will launch next year. We are also beginning a commercial SATCOM partnership with Luxembourg and have cooperative agreements on the use of U.S. military satellite communications with 10 countries.

These holistic efforts enhance our ability to fight in contested and degraded operational environments through increased capacity, extended coverage, and anti-jam capabilities. Our pivot to a resilient, integrated, and proliferated military satellite communications architecture provides diverse capabilities that enable warfighters to

have data transport in any environment and whenever needed in daily operations, crisis, or conflict.

We continue to build upon the success of our Global Positioning System (GPS) program. We have four GPS III satellites completed and in storage and are on contract to produce another 10 satellites. GPS III and IIF satellites will increase military signal power as well as produce a more resilient fourth civil signal. In fiscal year 2024, we will launch and begin testing of the Navigation Technology Satellite 3, an end-to-end space-based prototype across space, ground, and user equipment segments to improve resiliency in contested environments against jamming and spoofing. We are also making progress with the development and testing of the cyber-hardened next-generation GPS ground control segment and paying careful attention to this troubled program which is years late and significantly overrun on costs.

We are transitioning our solution for moving target indication from the air domain to the space domain. The Long-Range Kill Chains is a new fiscal year 2024 program element that supports a proliferated space-based ground moving target indication (GMTI) capability. The Space Force is collaborating with the Intelligence Community to design, develop, deploy, and operate space-based GMTI. It will provide actionable information on adversary surface targets that the Space Force will deliver to the warfighter through the Advanced Battle Management System as an integral part of Joint All-Domain Command and Control. The space-based systems will surpass the range limitations of current air platforms and provide capabilities in contested and non-contested environments to ensure the strategic advantage provided by GMTI is available to warfighters even when facing near-peer competitors.

At the same time, we are making tough budget choices. We are reducing the Next Generation Overhead Persistent Infrared (NG OPIR) Geosynchronous Earth Orbit (GEO) (NGG) space vehicle purchases from three to two, ensuring we have the resources to pivot to resilient MW/MT. The NGG and NG OPIR Polar programs successfully completed several major milestones, and the Space Based Infrared System (SBIRS) constellation continues to have positive performance, thus ensuring our critical missile warning capability. We are also delaying the purchase of additional GPS IIF satellites in fiscal year 2024. The GPS constellation is healthy, with four satellites ready for launch in fiscal year 2024, fiscal year 2025, and fiscal year 2026. This enables the Space Force to fund immediate resiliency priorities in other mission areas with no impact to the GPS military code or civil service.

CRITICAL CAPABILITIES DELIVERED IN THE LAST YEAR (JANUARY 2022 TO PRESENT)

Over the past 15 months, the Department has provided significant new capabilities on orbit. In January 2022, we launched two SSC-developed GSSAP satellites bringing the constellation to a total of 6 satellites. Having two more GSSAP satellites enables the Space Force to provide immediate and precise orbital predictions of all geosynchronous objects, as well as detailed space domain awareness in the GEO belt, which is critical to our space superiority.

In July 2022, SSC launched two experimental satellites, one of which was the Wide Field of View demonstration. This new technology will increase the amount of Earth coverage to over 3,000 kilometers at any one time, an unprecedented area not previously incorporated into any missile warning platform. The data from this demonstration will be used to develop future missile warning sensors in LEO and MEO.

SSC completed the SBIRS constellation with the launch of the GEO-6 satellite in August 2022 and operational acceptance in March 2023. The robust SBIRS constellation will continue providing persistent ballistic missile warning and launch detection crucial to national defense and deterrence, thus enabling the pivot to a resilient MW/MT architecture.

In November 2022, SSC launched the second Long Duration Propulsive Evolved Expendable Launch Vehicle (EELV) Secondary Payload Adapter (ESPA) (LDPE) mission. LDPE provides a low-cost, multi-mission propulsive platform that enables multiple prototype demonstrations. Both the LDPE and the ring-shaped payload adapter provide small satellite providers with launch opportunities more readily than ever before. This vehicle was delivered in only 4 years from contract award, approaching SAF/SQ's recent guidance to drive contract scope to 3 years or less from start to launch.

In January 2023, the sixth of ten SSC-developed GPS III satellites launched. Enabled by on-orbit verification efficiencies to expedite warfighter capability delivery, Space Operations Command operationally accepted GPS III-06 just 12 days after launch.

Also, in January 2023, the Space Rapid Capabilities Office (SpRCO) launched and initialized three operational prototypes, including two for enhanced situational

awareness and one cryptographic interface payload providing secure space-to-ground communications capability. These systems are the first SpRCO on-orbit assets, with all three successfully testing within 2 months from launch, a major accomplishment for critical rapid acquisitions.”

One of the most notable achievements in space acquisition occurred when SDA successfully launched the first 10 satellites of the Proliferated Warfighter Space Architecture. On April 2, 2023, SDA delivered 8 transport layer and 2 tracking layer Tranche 0 satellites just 31 months after contract award. The second launch, to complete the 28-satellite Tranche 0, will occur Summer of 2023, providing the warfighter immersion tranche by supporting military exercises, missile tracking tests, and demonstrating technology and process feasibility. This accelerated timeline represents a necessary benchmark for space acquisitions.

Overall, in the past 15 months we conducted a total of 9 National Security Space Launch missions to provide critical capabilities to the Nation.

LAUNCH

Our launch programs, National Security Space Launch (NSSL) and Rocket Systems Launch Program (RSLP), evolved tremendously over the past 5 years with unprecedented growth in the commercial launch market and focus on the pacing challenge. We are adapting our procurement strategies and concept of operations to best leverage emerging commercial launch capabilities to meet warfighter needs across the DOD, IC, and other mission partners. We totaled seven successful NSSL launches in fiscal year 2022 and are on track to exceed that count this fiscal year.

NSSL has a long and respected legacy of success, delivering reliable medium and heavy space lift for our Nation’s most complex payloads and demanding orbits without fail. In NSSL Phase 2, we met the congressional mandate to end United States reliance on Russian-made engines by investing in new rocket technologies and expanding competition. We drove down government launch costs and provided assured access to space through two launch service providers (SpaceX and United Launch Alliance) capable of meeting all reference orbits.

We are in an exciting period of transition as fiscal year 2024 marks the fifth and final order year of the NSSL Phase 2 contract in which we are ordering 20 launch services for the Space Force and National Reconnaissance Office (60 percent increase from fiscal year 2023) along with the launch support required to place critical capabilities on orbit. Simultaneously, we are preparing for the next NSSL procurement phase starting in fiscal year 2025. Building upon Phase 2, Phase 3 pursues a dual-lane, hybrid approach to maximize competition and use of the Nation’s robust commercial launch industry as we transition to more proliferated space architectures. NSSL Phase 3 will provide Assured Access to Space and protects capacity for the DOD’s less risk-tolerant missions with two fully certified launch service providers in one lane while allowing emerging providers to compete, when ready, for the DOD’s more risk-tolerant missions in another lane. This diversification produces a resilient launch architecture that allows the Space Force to rapidly harness new technological discoveries to improve launch reliability and success.

Complementary to NSSL, the RSLP focuses primarily on launching our smaller payloads, e.g., suborbital targets, experimental, demonstration, and allows us to meet the full spectrum of launch. We have access to 11 different launch service providers through RSLP and we are working to on-ramp more providers in the next year. Our ability to use space effectively relies on maintaining assured access, being the first to field necessary capabilities, and the ability to rapidly reconstitute them, if necessary. In sum, our portfolio of launch programs continues to push the envelope to accelerate launch timelines to deliver integrated, resilient capabilities more rapidly whenever and wherever needed.

FY 2024 marks the first time the Space Force has specifically budgeted for Tactically Responsive Space (TacRS), acknowledging TacRS as an emerging imperative. Importantly, TacRS is more than just launch capability; it also includes the end-to-end mission for satellite, ground capability, integration activities, and operations. Together, these activities constitute a complete mission set required to deliver a space capability to the warfighter in a rapid manner, on-demand to either reconstitute or augment capabilities in a more contested environment.

We successfully completed the first TacRS demonstration, Tactically Responsive Launch-2, in June 2021 after building a demonstration satellite in 12 months and launching it 21 days after call-up. For the next demo, VICTUS NOX, we plan to build the satellite in 10 months and only have a 3.5-day call-up (60-hour activation and launch within 24 hours of an operational need); VICTUS NOX is scheduled to launch this summer. In fiscal year 2024, we are investing \$60 million to demonstrate a 24-hour notification to launch timeline and to develop the operations,

training, testing, acquisitions, concept of operations, and Tactics, Techniques, and Procedures required to establish an enduring TacRS capability.

MANAGING THE SPACE ACQUISITION ENTERPRISE

The Assistant Secretary of the Air Force for Space Acquisition and Integration (SAF/SQ), a new role created by the National Defense Authorization Act for Fiscal Year 2020, is singularly focused on transforming the space acquisition enterprise to add speed to our acquisitions and meet the growing threat posed by strategic competition. There are three organizations with unique capabilities and authorities that procure space capabilities for the Space Force: Space Systems Command (SSC), Space Development Agency (SDA), and Space Rapid Capabilities Office (SpRCO). Each has unique strengths and, in some cases, unique statutory authorities. SAF/SQ manages their programs as an integrated portfolio leveraging their strengths and authorities.

As the Space Service Acquisition Executive, SAF/SQ conducts reviews with each of the portfolio leads (Program Executive Officers) every 2 weeks to discuss the status of programs within their purview. SAF/SQ also holds Quarterly Program Reviews for a deeper program analysis. During these quarterly reviews, the government program managers present the technical, schedule, cost, and staffing status, open risks and issues, upcoming activities, and an overall assessment of program health. Based on the data from the quarterlies so far—the latest in February 2023—we identified a few troubled programs to track more closely. For those programs, the program office provides a biweekly update on progress against a detailed schedule to get to a healthy status. Holistically, these reviews enable the space acquisition workforce to remain focused on delivering rapid, resilient, and integrated capabilities to our warfighters, on cost and on schedule.

In October 2022, SAF/SQ issued strategic acquisition guidance to the workforce, outlining Nine Space Acquisition Tenets. The tenets form the basis of a new direction to transform our space acquisition approach and refocus our space acquisition professionals on addressing the threat in the next decade by emphasizing speed and program management discipline. The tenets are:

- 1) Build Smaller Satellites, Smaller Ground Systems, and Minimize Non-Recurring Engineering
- 2) Get the Acquisition Strategy Correct
- 3) Enable Teamwork Between Contracting Officer and Program Manager
- 4) Award Executable Contracts
- 5) Maintain Program Stability
- 6) Avoid SAPs and Over Classifying
- 7) Deliver Ground Before Launch
- 8) Hold Industry Accountable for Results
- 9) Execute—Deliver Capabilities that Work, and Deliver them on Schedule and on Cost To emphasize how these tenets enable speed, SAF/SQ derived a simple formula for going fast in space acquisition which includes:
 - 1) Build smaller systems
 - +2) Use existing technology designs to minimize non-recurring engineering
 - +3) Drive contract scope to 3 years or less from start to launch
 - +4) Use fixed-price contracts

= Mission Capabilities Faster to Our Warfighters

This simple formula is the cornerstone of our approach to build resilient architectures faster with innately integrated capabilities. Together, the tenets and formula provide the vision for how our space acquisition workforce is approaching a transformation to the process of delivering space capabilities to meet and outpace the growing threat posed by strategic competitors.

Further, thanks to Congress, SAF/SQ chairs the Space Acquisition Council (SAC) for the Department of Defense, and the CSO is a key statutory member. The SAC has been a valuable tool to ensure collaboration and integration while avoiding duplication of effort across the entire national security space enterprise across all Departments. Additionally, SAF/SQ chairs the Acquisition Strategy Panel for all Space Force programs seeking acquisition strategy changes. This forum allows us to evaluate newly proposed space systems, contracts, and incentive strategies to ensure we optimize our approach to acquisitions and that our portfolio of programs remains concentrated on delivering resilient capabilities faster and more integrated with the warfighter.

SAF/SQ is committed to using all the tools and authorities Congress has provided, which are aiding us in speeding up space acquisition and delivering capabilities to the warfighter rapidly and effectively. We will continue to leverage Middle Tier of

Acquisition to quickly identify, prototype, and field innovative solutions to our challenging problems. At the same time, we are using Other Transaction Authorities to increase program flexibility, as well as the pool of possible vendors. Overall, these tools and authorities enable us to use industry practices to move faster, utilize non-traditional companies, expand flexibility, and improve affordability. The priorities and tenets enable our acquisition force to develop and acquire capabilities our guardians and warfighters need to maintain readiness and deter the threat posed by strategic competitors.

SPACE FORCE READINESS

More Resilient and Effective Space Capabilities

As the CSO recently testified, the Space Force is accelerating its pivot toward resilient satellite constellations, ground stations, networks, and data links; informed by transformational force design analysis. Space Force readiness, and the Department's broader integrated deterrence emphasis, ultimately demands resilient space systems and capabilities that effectively deter both on-orbit and terrestrial threats. As such, most of the Space Force's on-orbit assets must be proliferated, disaggregated, and distributed.

Through effective and efficient resilience, the Space Force will not only ensure enduring access to space capabilities, but it will also disincentivize and deter targeted aggression. The President's Fiscal Year 2024 Budget Request demonstrates the Department's significant, analytically informed investments in resilient systems. Planned upgrades include military MW/MT, Space Data Transport, Command, Control, Communications, and Battle Management (C3BM) systems, and space-based targeting proliferated architecture that will be more resilient during a strategic attack.

As always, the Space Force will continue to work closely with DOD and IC stakeholders, as well as our allied and commercial partners, to develop and deliver a digital engineering ecosystem that enables the Space Force to rapidly mature innovative concepts into integrated solutions and deliver warfighting capabilities faster.

Force Design

A key element of readiness are the capabilities inherent in the systems the Space Force uses to execute its missions. The Space Force, primarily through the Space Warfighting Analysis Center, executes a force design process intended to assess future capabilities through the lens of operational need, counter-space threat, and cost.

Additionally, in implementing the National Defense Authorization Act for Fiscal Year 2022, the Secretary of Defense designated the CSO as the Force Design Architect for Space Systems of the Armed Forces. In this new role, the CSO presents the Secretary of Defense with coordinated space-mission force design recommendations for the Armed Forces. Such recommendations are informed by high-fidelity modeling and analysis which balance warfighting performance, resilience against potential adversaries, and affordability. Recommendations include a transition plan to position the Department to make programmatic and budgetary decisions related to science and technology investments, force development, and acquisition. Current force design priorities are space data transport and tactical targeting—both of which are vital to prevailing in high intensity conflicts.

Operational Test and Training Infrastructure

At its very core, Space Force readiness requires our systems and operators to be ready for full spectrum operations in a contested space domain. And while our organizational structures and processes increase our ability to assess and sustain readiness levels, the Space Force needs an appropriate infrastructure to adequately conduct test and evaluation, advanced training, and tactics development activities against a thinking adversary to effectively deliver readiness generation.

In previous testimony before this subcommittee, we described the Space Force's operating concept and core elements of its Operational Test and Training Infrastructure (OTTI). OTTI is an "umbrella" term, describing a collection of distributed, enterprise-wide test and training systems and processes, effectively integrated and synchronized to establish and sustain combat readiness across the spectrum of conflict. It aggregates multiple program elements and their associated activities, programs, capabilities, and funding.

Space Force's current OTTI is a loose federation of systems that build proficiency and procedural currency for a benign environment—it does not build warfighting capacity demanded by the current and emerging strategic environment. The Space Force does not yet have the ability to present realistic threat-stimuli to missions

specific trainers; conduct integrated—both intra-service and joint—training; or visualize and “experience” the domain.

That said, Congress’s strong support for Space Force’s OTTI efforts has greatly accelerated these priorities, and the Space Force continues to make significant strides in developing and implementing its planned OTTI architecture, governance structure, and resourcing strategy, which is appropriately reflected in the President’s Fiscal Year 2024 Budget Request and in the Department’s Future Years Defense Program.

Readiness and Training

The Space Force continues to prioritize and advance our updated readiness, training, and force generation initiatives. The new Space Force Generation model, SPAFORGEN, reached Initial Operational Capability on October 1, 2022, and cycles guardians through three phases to increase individual and overall force readiness. The “Prepare” and “Ready” phases afford guardians with the time and capacity for training to develop the tools, skills, and capabilities necessary for mission execution in a contested domain against a thinking adversary. This includes both operational procedures and high-end training to certify forces for contested operations in space.

As part of SPAFORGEN, Space Training and Readiness Command (STARCOM) is making great strides to prepare space forces to prevail in conflict, if deterrence fails, through innovative education, training, doctrine, and testing. Last August, STARCOM completed the first and largest to-date of a new series of exercises that included both live and simulated events to test combat tactics of our Total Force including both Guardians and Air National Guard space professionals. As we move forward, STARCOM will continue to increase space-related content and engagement for guardians in Basic Military Training (BMT); Non-Commissioned Officer Academy; United States Air Force Academy; Officer Training School (OTS); and Reserve Officer Training Corps.

Force Presentation to Combatant Commands

The Space Force presents space capabilities that underpin all instruments of our national power. Pursuant to law, the Space Force retains the responsibility to organize, train, and equip space forces. To that end, the Space Force generates and presents ready space forces to Combatant Commands to deter aggression and, if necessary, prevail in conflict.

Our SPAFORGEN model ensures that forces presented to Combatant Commands can execute missions and tasks and are equipped to make appropriate recommendations on the effective employment, task organization, operational synchronization, and command relationships of space forces. Unlike the previous force generation model, the new approach packages forces into optimized capabilities-based elements and standardizes the way we present forces to the Combatant Commanders.

To ensure full integration and synchronization of space activities with other domains in combatant commands’ areas of responsibility in 2022, the Space Force activated three new component field commands for U.S. Indo-Pacific Command, U.S. Central Command, and U.S. Forces Korea. Component field command guardians provide space planning and employment expertise, as well as command and control for the combatant commanders.

Unit/Mission Transfers

In accordance with existing statute and congressional intent, the DOD continues to transfer fully mission-capable space operational units, support equipment, property, and related resources from other services and organizations to the Space Force with no mission degradation or adverse personnel impact.

In fiscal year 2022, the U.S. Army transferred its Satellite Payload, Planning, Management, & Control function, which included five Wideband Satellite Communications Operations Centers, four Regional Satellite Communications Support Centers, Consolidated Satellite Communication Systems Experts, and 502 associated manpower authorizations (302 military/200 civilian). The transfer of this function and associated resources is directly in line with the USSF Military Satellite Communications mission.

Additionally, in accordance with Title 10, United States Code, Section 9086, the DOD successfully transferred the SDA to the Space Force. The Space Force continues to ensure SDA’s seamless integration within the service and remains steadfast in its commitment to ensure adequate resourcing and manning.

Looking forward, in fiscal year 2024, the United States Army intends to transfer its Theater Missile Warning Battlespace Characterization (TMW-BC) functions, including four Joint Tactical Ground Station (JTAGS) locations (Osan, Misawa, Al Udeid, Sigonella), one skill qualification Training Suite, the JTAGS Product Office (JPO), and 97 associated manpower positions to the Space Force. The transfer of

this function and associated resources is directly associated with the Space Force's Missile Warning mission. The Space Force already operates the SBIRS constellation and Strategic Missile Warning ground infrastructure; adding the Theater Missile Warning function will consolidate global Missile Warning under one military Service.

Integration with Allies and Partners

Allies and Partners represent a significant advantage for the United States. Our strategic competitors do not have the potential for establishing the coalitions and cooperation that the U.S. can establish. This is especially true in the space domain. The Space Force continuously engages with our allied and partner spacefaring nations to guarantee shared military, civil, and industrial success in space. Especially as our competitors continue to demonstrate threatening actions within the space domain, it remains imperative that the United States deepen our existing ties with Allies and Partners to maintain space stability. As the CSO has stated, spacepower is a collective endeavor, and the Space Force is prioritizing partnerships most likely to deliver combat ready forces and capability to allow the United States and our allies to deter aggression, and if deterrence fails, prevail in a fight.

Space Force is executing the CSO's Partner to Win Line of Effort which states we cannot succeed without robust joint, coalition, international, interagency, academic, and commercial partnerships. We are striving to eliminate barriers to collaboration in any form, to include over classification and incompatible systems. The Space Force must also prioritize direct collaboration and placing guardians in positions where such collaboration can organically strengthen. To that end, in January 2023 the Space Force published its Guidance for Global Partnerships, which directs the service and all its components to evolve from data-sharing agreements to operations integration, payload sharing, and mission sharing, where appropriate. Further, the Space Force continues to lead international Space Engagement Talks, and efforts to share our force design analysis, which are identifying focused resource commitments that allow trusted partners to share the burden of delivering combat-ready space forces and the spectrum of worldwide capabilities.

Weapon System Sustainment

Space Force Weapon System Sustainment directly supports Space Force's ability to sustain the day-to-day readiness of 52 weapon systems performing Space missions, to include Sensing, Navigation, Satellite Communications, Space Domain Awareness, Battlefield Command & Control, and Space Control. The President's Fiscal Year 2024 Budget Request supports missions to provide space capabilities to the joint force while balancing Service priorities and managing risk. This position takes a predictive planning and proactive approach to mitigating obsolescence as our future requirements continue to grow due to increasing costs for hardware, software, and cybersecurity maintenance driven by aging space systems.

Facilities and Infrastructure Investment

Space Force Facility, Restoration, Modernization and Military Construction total obligation authority enables the Service to prioritize requirements to reduce risk to mission and the force. Structural, electrical, and power improvements to operational facilities reduces risk to mission and enables our joint and coalition partners in the fight, while quality of life infrastructure and facility improvements reduce risk to the force by improving resiliency amongst our guardians, airmen, and their families. The Space Force derives almost all of its support from the Air Force, including logistics, security, medical services, and human resources; however, Space Force's ability to prioritize its unique requirements at our 14 installations, more than 70 sites, and other geographically separated units ensures we appropriately align responsibility, resources, accountability, and authorities for the Space Force to execute assigned missions as an independent service.

Space Force's top installation priorities include sustaining critical facilities and infrastructure that enable the full spectrum of missions—from launch and command and control to post-launch and into the operational phase of sustaining 52 Space Force Weapons Systems.

The President's Fiscal Year 2024 Budget Request reflects an increase from last year due to the Service prioritizing projects that reduce risk to Space and Combatant Command missions at Pituffik Space Base, and the Eastern and Western Ranges to support Assured Access to Space. Moving forward, the Space Force will continue to prioritize projects that increase facility and infrastructure resiliency and Service readiness.

CONCLUSION

The rich history of America's space endeavors is defined by determination, persistence, and willingness to innovate. Now is the time to invest in accelerating such innovation and fielding the capabilities to our warfighters to deter those who seek to disrupt such endeavors. We will strive to maintain access to, through, and from space in order to preserve the benefits that the domain provides for all nations.

The Department of the Air Force and the United States Space Force have made good progress in transforming our space architecture to be more resilient, more integrated, and more capable.

We must ensure that we field the greatest fighting force, systems, and capabilities necessary to deter potential adversaries from acts of aggression and, if necessary, defeat them in conflict. Our innovative approaches to space systems acquisition and integration will sustain our advantage in space and allow our Nation to pursue groundbreaking civil, military, and commercial capabilities.

As our strategic competitors, specifically China and Russia, continue to make significant space-related advances that seek to threaten our freedom of movement, maintaining our strategic edge has never been more critical. Destructive direct-ascent antisatellite missile tests, hypersonic and maneuverable missile demonstrations, and a host of dangerous behaviors by our strategic competitors require the Department of the Air Force and the Space Force to be prepared to protect and defend our national security interests in space—through a resilient, reliable, and effective set of space capabilities. Our competitors seem to have figured out speed. We must do the same.

Thank you to the Committee for your dedication to the Department of the Air Force and our United States Space Force. We look forward to your questions.

Senator KING. Thank you very much. Following up on your last comment, you talked about the Authorization Act. How about a budget? Would a continuing resolution be a problem for the priorities that you all have identified?

General THOMPSON. Senator King, it would. As a specific example, as you noted, our budget has grown by almost \$4 billion it includes—

Senator KING. That would be gone—and that would be gone and that would be the solution.

General THOMPSON. That would be gone. One example is that our missile warning, missile tracking enterprise is vital to tracking the hypersonic threats that are growing from Russia and China. That budget doubles from 2023 to 2024. We are on a path to rapidly field that by 2027. That schedule would immediately be called into question with a continuing resolution.

Senator KING. I asked the Secretary of Air Force this morning if a continuing resolution would be a threat to our national security. His answer was absolutely. Do you agree with that assessment?

General THOMPSON. Yes, Senator, I do.

Senator KING. Thank you, Mr. Plumb, every question I think of has a classified side to it, so we have to be careful. This is an open hearing. But our adversaries are not only putting up satellites for traditional communications intelligence work but have a military aspect. Is that correct?

Dr. PLUMB. Absolutely correct. They are putting up systems to attack our satellites and they are putting up systems to help them target our Joint Force.

Senator KING. Isn't it true that in a conflict, this would be the first beachhead would be space, to try to blind us, in effect?

Dr. PLUMB. There are many people that think that sir. I mean, that is certainly one theory of how a conflict might progress.

Senator KING. In your budget, which you outline—you went down, and I didn't—I may have missed it, but I didn't hear a specific line for R&D. Is that part of your—

Dr. PLUMB. It is. I didn't have a specific call out but—in dollar size in my statement. But there is significant science and technology, and research and development investment.

Senator KING. Because if ever there was an area that would require ongoing R&D investment, it would seem to me this one.

Dr. PLUMB. Yes, sir, and many of those are, of course, classified.

Senator KING. And you talked about resilience, and one of the key strategies is proliferation. In case of a conflict, what would be the relationship between our Strategic Forces and the commercial satellite industry?

Amazon is putting up a whole fleet, Starlink is up, and of course, there are multiple other private sector satellites. Is there a pre-established relationship? For example, in TRANSCOM [United States Transportation Command], we have a relationship with airlines and shipping agencies that in time of conflict they will be available to us.

Do we have similar relationships with the commercial satellite industry?

Dr. PLUMB. Senator, let me just take that in two parts. You asked about Strategic Forces. When you say that I hear nuclear. As far as—

Senator KING. I wasn't using it in that sense.

Dr. PLUMB. Okay. For that, that would be really an inherently Government problem to make sure nuclear command control is protected. As far as relationship with commercial industry and how can we ensure access to their products, to their imagery, just for an example, through a conflict?

I will just say the Secretary of Defense, the Deputy Secretary are both invested in this question. They have tasked really all of us and more, including NRO [National Reconnaissance Office], to look at this and get back to them on ways to go forward. A lot of those answers are currently in the way different contracts are structured.

I don't know, Senator, if Mr. Calvelli would want to weigh in, but we are working on this across the Department, and I will just offer that perhaps in late summer we could come back up and give you kind of a coordinated answer as to where we are along each component.

Senator KING. Thank you.

Mr. CALVELLI. Yes, the folks at Space Systems Command are actually looking at sort of a craft like model for space and how we would take advantage of that, and trying to figure out which are the mission areas like SATCOM, or satellite communications, or even space domain awareness that we could take advantage of. Like Secretary Plumb said, we are looking at that now.

Senator KING. General Thompson, you touched on this. One of your tenants is partnering to win. Space strikes me as an area where cooperation with allies would have value instead of having to reinvent everything, we do every launch. Is that an ongoing process to develop a kind of space Five Eyes, if you will?

General THOMPSON. It is. In fact, Secretary Plumb hosts a forum that we call the Combined Space Operations Initiative that has

been going on for more than a decade. It includes not only the Five Eyes partner, but we have expanded to other like-minded allies, Germany and France and Japan and even folks like South Korea. The idea is exactly that.

First of all, is not only do we not want to provide all the capabilities, we can no longer afford to provide all of the capabilities ourselves. In the area of combined operations and system acquisition and other things, we work with them consistently and continuously.

Senator KING. Senator Fischer.

Senator FISCHER. Thank you, Mr. Chairman. Secretary Plumb, I appreciated our conversation yesterday about the problem of over classification, particularly with respect to intelligence derived from space-based programs.

I think we have to strike a better balance between keeping our sources and methods protected and also then letting the American people know and understand the true nature and the severity of the threats that we face as a Nation.

Do you share these concerns? If you do, I hope you do, if you do, how do we then more effectively be able to share that information with allies?

Dr. PLUMB. Thank you, Senator. I do share your concerns, and also know the right answer when told. As far as how to share classified information better, first of all, I deeply appreciated our conversation yesterday on this.

I will just say here for the record that a lot of the issues we look at when we try to figure out how to do closer space cooperation, even with our closest allies, really comes down to the ability to share some types of classified information.

A lot of classified information is not actually DOD originated. It often originates from different parts of the intelligence community, and so we need to be able to collaborate very closely with our partners in the IC [intelligence community] to kind of break down these legacy barriers that really are legacy systems, not designed for fighting or for operationally relevant speeds, and find a way to be able to share those portions of those types of classified information that are needed for combined space operations.

We are working on it, but it is hard, and it does require a tight collaboration. But I do think that right now is the right time. We have got the right partners in the IC, and we have got a good collaboration, I would say, across the board here and working on it.

Senator FISCHER. I would be happy to work with you on that as well. I think the world we live in is going to require speed and in being able to share information, not just within our Government, but with our allies as well. And—

Senator KING. Not the 21-year-old National Guardsman—

Senator FISCHER. No, Senator King, but with the people that need to know—with the people that need to know who are with us in the event that we would need to rely on our allies even more. What steps are you taking right now to change that culture of over classification? Or what do you believe should be the first steps?

Dr. PLUMB. Senator, I have run a series of high-level meetings with Pentagon stakeholders on this. I have been out communicating with both the—not just Pentagon—Government stake-

holders on this. Been communicating with allies within the building, with my partners in the IC, and both here and at the White House, on the urgency of this. I am not the only person carrying this message and so I think it is gaining steam.

I think making sure that we have a way to develop a plan forward and understand that everything won't be solved at once, but we need to start with some test cases. I think from where I sit, and the General already referenced the combined space operations initiative that I chair.

I think that is the right place to start from where I sit. There can be other bilateral pieces, but to be able to do a multilateral operation would really be, I think, a real testament to our ability to show that we have moved past legacy systems and sharing plans.

Senator FISCHER. Thank you. General Thompson, how are Space Force's ongoing efforts to integrate itself with Joint Force progressing? I understand that Space Force is still in the process of establishing some component commands with the combatant commands, and can you provide us with an update on how that process is coming along?

General THOMPSON. Yes, Senator Fischer. Actually, we established the first three of our Space Force component commands late last year. The first one was with Indo-Pacific Command and Admiral Aquilino in November, rapidly followed by Space Force—or by United States forces Korea and United States Central Command.

We focused on those three areas first, as you might imagine, because of the pacing challenge and the fight we are in today in the Middle East. We have also been deeply engaged with United States European Command. We are in the final stages of working with them.

In that regard, it is not just a matter of United States commands because of the need to establish that in Europe or after an overseas force structure request. But we have also been from the beginning of the Ukraine conflict, our guardians who are out there have been working both with our forces and with NATO allies in terms of integrating space capabilities effectively.

Senator FISCHER. Do you feel good about the progress that you have made there?

General THOMPSON. I do.

Senator FISCHER. Do you feel that you have learned some good lessons?

General THOMPSON. Absolutely. Yes, Senator. I think we have learned some that we could share here. I think our force design moving toward proliferation is proving to be valid. I think we have learned a lot about the integration of commercial capabilities.

I think both on our side and on with commercial companies, I think we have some things to work on together there. But it has been a—we have learned a lot of lessons and work to do as a result of that interaction.

Senator FISCHER. Thank you.

Senator KING. Senator Tuberville.

Senator TUBERVILLE. General Thompson, as we look at the national security launch schedule, do you feel confident that the schedule is going to keep us ahead of China?

General THOMPSON. Senator, from the standpoint of national security needs, absolutely. I will tell you, though, our launch ranges are at this point in time about at their limit. We have actually—we are actually approaching, I think, 16 we had in—launches in 2022.

The vast majority of those were actually commercial launches. And I think in order—if we were going to be able to meet the commercial sector with the growth that they forecast, we are going to need to make some more additional investments in our launch range.

We have got a legislative proposal to let them help share some of that cost burden. But I would say we are on a path today, and assuming that we can continue that path, the launch capacity of the Nation will absolutely allow us to keep pace with China.

Senator TUBERVILLE. Would you like to answer that Secretary Calvelli?

Mr. CALVELLI. I disagree with what—I totally agree with General Thompson's statement, so—he is correct.

Senator TUBERVILLE. General Thompson, we have got in this year's budget Space Force, \$19 billion for research and development (R&D), \$4.7 for procurement. If you had a crystal ball, how long is it going to take us to get balance set up? I know there is a lot to space and this new frontier. We all know that.

General THOMPSON. Well, Senator, and that is a reflection of our nature for a very, very long time, because we have bought so many—for so many years, we bought a relatively small number of very sophisticated satellites.

For years, we have tended toward the research, development, test, and evaluation funding versus procurement. But I believe in the switch over to these proliferating constellations.

We have a force design right now for 120 low Earth orbiting, about 16 medium Earth orbit satellites for missile warning, missile tracking. I think you will see as a result of that activity, we are going to probably shift a whole lot more to a smaller investment percentage in R&D teaming and start ramping up production very quickly.

You will probably see the same thing in—as we work with the NRO on ground moving target indication, air moving target indication, and some of the other constellations as well.

Senator TUBERVILLE. But we see China moving faster. You see us being able to catch up?

General THOMPSON. I do. I would tell you that in the last several years, I have gone from very concerned to confident that we can give that we stay on the trajectory we are on.

Senator TUBERVILLE. Mr. Secretary, for the evaluation criteria you recently released in the draft request for the proposal for phase three of the National Security Space Launch Program, properly cites table performances, past performances as top criteria to choose your next launch providers for your 5-year block back cost is a secondary factor.

Within the stated criterion by limiting, it to just two providers in the block, aren't you just creating another 5-year block buy for the two incumbent carriers?

Senator TUBERVILLE. The nice thing about the phase three strategy is that includes dual lanes and two separate contracting approaches. Lane one consists of about half the launches, is for more than two providers.

In fact, we are anticipating ramping on to IDIQ [Indefinite Delivery, Indefinite Quantity] approach, maybe 5 to 7, or 6 to 9 kind of providers that can launch more commercial like missions. Then lane two is very similar to what we have today in contract or phase two where we have got two providers that would be able to provide our most stressing, high energy, complex missions to orbit to a variety of orbits.

I am actually—given that we have got the two contracts rising two lanes, I think it opens up a more folks to be able to compete.

Senator TUBERVILLE. Thank you. Secretary Plumb, U.S. policy is to have at least two space launch vehicles to launch DOD and NRO satellites. Space has changed a lot in the last 20 years since the law was written in 2004.

Meanwhile, the demand for launch vehicles, commercial, civil, and defense, has skyrocketed. Would you like to see at least three space launch vehicles for assured access?

Dr. PLUMB. Senator, thank you for the question. I know the laws are in this, too. I am aware of a study from some time ago that suggested three would be better. The NSL is really the purview of my colleagues here. But generally speaking, I do think that getting to the place where you can have more providers to certain orbits, if not all of them, is a good step in the right direction.

Senator TUBERVILLE. He has handed it off to you then, Secretary.

Mr. CALVELLI. You know, I really—and actually enjoyed our conversation this morning. You have given me some things to think about and I can get back to you on that.

Senator TUBERVILLE. Thank you. Thank Mr. Chair.

Senator KING. Senator Cramer

Senator CRAMER. Thank you, Mr. Chairman, and thanks to all of you for being here. General Thompson, you will be disappointed, I know, if I didn't bring up PARCS [Perimeter Acquisition Radar Attack Characterization System] radar modernization.

As I listened to Secretary Calvelli talk about the transition and, of course, this wonderful piece about the transition to a more modern architecture, during that transition, some legacy pieces need to be improved upon.

Maybe I would start with you, and then, Secretary, you could followup on what do you think—how do you see the PARCS integrating into this transition to the new architecture?

General THOMPSON. Senator Cramer, right now, our challenge with all of those, PARCS is one, we have got four other large ground-based radars, is understanding how they fit into the future.

The first is when you talk about missile warning and missile tracking and hypersonic vehicles, because we are no longer in an era of ballistic missiles, we are now in an era of maneuvering vehicles, we are going to have to understand how those warning systems contribute and how they need to be changed or perhaps improved to be able to adjust to that.

The second piece is to continue to evaluate how they fit into our overall space domain awareness enterprise. Those sensors play a tremendous role in keeping track of all the objects in orbit.

What we need to do is understand how we are using them today and what improvements can be made to continue in the future. But right now, it is a matter of thoughtful design and investment before we commit large dollars to how we are going to modernize.

Senator CRAMER. That is a good point, and Secretary, you can followup, but as I think about, I think, are we talking about something that is like a stopgap during the transition, or are we talking about something that becomes a dynamic part of the future? I suspect that is part of what you are still trying to discover, but.

Mr. CALVELLI. Yes, thanks to Congress, there was an upward of \$3 million in 2023 that we are using to help digitize some components. And I think you will find in our 2024 POM [Program Objective Memorandum], a \$6.4 million additional dollars to continue to renovate the PARCS radar systems.

Senator CRAMER. Yes, unless somebody has seen it, you almost can't believe what you are talking about in terms of just digitizing the images is a big deal.

So anyway, as you know, watch it carefully. Grateful that you were able to get some more money to do that. But at the same time, I am not advocating we waste it, so I appreciate the thoughtful approach.

The acquisition timeline. The timeline is going to get back to that—I know all of you have something to say about that, particularly rapid acquisition. As I said this morning in the briefing, I mean, the reason we stood up Space Force—not the reason, but we still have Space Force and SDA specifically with some ability—a white sheet of paper, like I like to say, a white sheet of paper, not bound to too many traditions.

And of course, the juxtaposition and the important role that the private sector in commercial space plays is both helpful to that, but we could do a lot to arm it as well. So maybe elaborate, Secretary, both Secretary Plumb, Secretary Calvelli on the acquisition timeline is, how we can be more helpful.

I want to be the guy that watches it, has appropriate oversight, but that doesn't get in the way and become the gotcha person. In other words, do it well, report regularly. If things need to change, yes, change quickly.

Mr. CALVELLI. The trick is to quit building big, right—

Senator CRAMER. Yes.

Mr. CALVELLI. Big satellites take time. It doesn't matter if you even have an existing design, big satellites take a long time to go build. The fundamental model we need to drive to is to build much smaller systems, to use existing technology, and do it on about 3 year's center.

So, from contract start to launch in about 3 years, and then what we will find by doing that is not only will we gain speed, but we will do technology refresh dramatically faster because every 3 years or updating the technology.

Compared to today, where we might build a satellite over 7 to 9 years, and then upgrading that technology till the next block which is another 7 to 9 years. So, you are taking 15 years to up-

grade the technology. We can move faster, get more on orbit, and upgrade technology faster by building smaller, and that is what we are driving to go do.

Senator CRAMER. Yes. Who would have ever thought that rockets and satellites would be a commodity? I mean, really with what you guys are doing in space, if that could be duplicated with the other systems that would do better than the other way around. Secretary Plumb.

Dr. PLUMB. Yes, Senator. I would just add to what Mr. Calvelli said, which is, you asked how you could help, and I think, moving at speed is really important. I think it is going to unlock things we haven't even considered yet.

But we should also remember that if we are going to buy a lot more things and move faster, that some of those things may fail, and we cannot afford to have systems shut down because some small percentage of them failed.

I think that has been the tendency for large, exquisite systems, which has added cost and time. When we try to move faster, we are going to have to have some tolerance for failure in there so we can keep moving fast.

Senator CRAMER. Well, that is where the R&D question was—again, all of this has to work together. We don't want to ever stop innovating, obviously. Wasn't it Napoleon that said, the logical conclusion of defense is defeat? Being a Viking fan, I am very familiar with the concept. But yes, we want you to be nimble with appropriate oversight, and I hear you loud and clear. Thank you.

Senator KING. Senator Rounds is returning from the vote, and Senator Fischer.

Senator FISCHER. Thank you, Mr. Chairman. Secretary Calvelli, to followup on the acquisition discussion that we had here, you have some tools that are available to be able to utilize that rapid acquisition like the OTA and mid-tier acquisition.

Can you tell me how much focus is being given to software and ground systems on acquisition to help us better operate the satellites?

Senator CRAMER.

[Technical problems]—making sure that we have our ground systems, our software systems in place is really critical to speed. We have a history, unfortunately, of delivering satellites to orbit and not having the ground or the user equipment ready to go.

And so, I put out, when I put out my guidance, one of my key things I put in there was deliver ground before a launch. And I think the way we do that is we need to get away from building very large software developments and break things up into more manageable pieces that can be more quickly done.

I think when Government tries to build large monolithic software systems, we all tend to struggle with that. So, build smaller.

Senator FISCHER. The history of the acquisition programs of the Air Force isn't necessarily a good one, you know, with overruns and late. Do you feel confident that that program, if you build smaller ones, is going to be able to help?

Mr. CALVELLI. I do. And I think also—

Senator FISCHER. Is that going to be your main focus or are you looking at other areas as well?

Mr. CALVELLI. For software? I think taking advantage of cloud computing is important, especially commercial clouds. There are a lot of great environments out there from commercial companies, and the intelligence community has done a lot of great work in cloud computing, and the Department Defense is moving in that direction as well.

I think again, moving software into small, manageable pieces is something to help out. So, you get into the fact where you run applications on the cloud environment, as opposed to building your own solutions.

I think that is a big help. I think just a fundamental focus on program management discipline, which is basically really focusing the team on delivering on schedule and delivering on cost is an important facet of that as well.

Senator FISCHER. Thank you.

Senator KING. One point on cloud, I think all of us assume that there is greater security in the cloud because it is a larger entity.

I think we have to be careful with that assumption because even though it may be more secure, if an adversary penetrates that security, they hit the jackpot because there is so much data there.

So, cybersecurity has to be a high priority. Even though we are dealing with the cloud, we can't be lulled by the assumed cyber defenses of the cloud. Senator ROUNDS.

Senator ROUNDS. Thank you, Mr. Chairman. Dr. Plumb, first of all, I want to thank you for being one of the first leaders in the Department of Defense to speak out very publicly about the concern with the sale of certain portions of the electromagnetic spectrum, particularly that which is a 3.1 to 3.45 gigahertz, or the S-band area.

I appreciate what you have said. I think that gave a lot of other people confidence to speak up as well about how serious that part is, and the fact that we really need to get this assessment completed before we start deciding that we are going to sell parts of that asset, and I thank you for that.

I would also like to just ask, Dr. Plumb, the Commander of Space Command cited space domain awareness as the Command's top priority amid escalating threats from China and Russia in his March 2022 testimony in front of the Committee.

What is DOD's assessment of its current ability to maintain the space domain awareness required to predict potential adversary activity?

Dr. PLUMB. Thank you, Senator. I would just say thank you also for your continued conversation on spectrum.

On space domain awareness, I think we probably have agreement at this table, and I hope you will ask my colleagues here, that we need to be doing better. I think there is a recognition that, one, there is a lot more things in space now, and a lot more players in space now, and a lot more things that are maneuvering constantly in space now.

To be able to have an understanding of all of that and be able to pick out which pieces could be a threat in one time or attract pieces of interest is hard. The kind of legacy systems that we have, that we publish, these two elements are not suitable for that job, and I think the Department is looking hard at this.

I might ask General Thompson if he has—

General THOMPSON. Senator, a couple of things in that regard. First of all, I will start by saying that nobody does, and nobody can do space domain awareness today the way U.S. Space Force and Armed Forces to U.S. Space Command do. However, you are right, and the Commander of U.S. Space Command is right, it is not good enough for what we need. And so, a couple of things we are doing in that regard.

First is an increased number of sensors that we are putting in space to get a whole lot more data on what is happening. One example is the deep space advanced radar concept that operates in the 3 gigahertz band.

Senator ROUNDS. Specifically, the area that we are concerned with.

General THOMPSON. Correct. The second is using others' data, partners' and allies' commercial data. Then the third is really applying AI [artificial intelligence] and machine learning to help sense and make sense of all that data so that we do exactly what you are describing.

Senator ROUNDS. Thank you. Secretary Calvelli, I really appreciate our conversations earlier today. I would like to just walk this through a little bit.

As I told General Saltzman this morning, I have gone on record many times regarding my concern about the DOD's approach to providing space based, ground and moving target indication capabilities to tactical DOD users, following the divestment of the JSTARS [Joint Surveillance Target Attack Radar System] platform.

We supported the divestment of that under the assumption that we would have this space capability available. I am even more concerned now as it is my understanding that funding for this capability was moved to the military intelligence program and out of Space Force funding lines.

This is a program that was developed for a tactical title 10 mission executed by the Space Force in support of the Joint Force to provide target tracking in custody of immediate effects. This means life and death for folks on the front line.

Now, we do not have to get into the fine details here, but can you share with me how you are assuring that the JROC [Joint Requirements Oversight Council] validated requirements are captured in the acquisitions process of a platform whose acquisition is executed by the intelligence community as opposed to the title 10 DOD community? Will the DOD maintain milestone authority?

Mr. CALVELLI. Yes, sir. On the good news side, the Space Force, we are writing what is known as this capability description documents. We are also writing the concept of employment. And we will own those, and those match up with the JROC requirements, and those will be allocated to the IC to execute.

So that is a good thing. The DOD will remain milestone in authority. I believe it is at the Undersecretary to build a plans level for now. The good news about this approach is this really fits my priority of speed, speed, and speed.

The IC had an existing design that we could scale up and we can get there years earlier with, and that was really a deciding factor for partnering with them. And also, the IC has other assets in their

constellation that we need to augment and integrate in with at GMTI to make it even more useful for the troops.

From a speed perspective, it is a win for the Department. We are going to control the requirements. We will control milestone decision authority. It should be a really great partnership that is going to enable us to get capability to the warfighter much faster than we had originally planned.

Senator ROUNDS. In plain English, priority will be for the tactical needs when lives are at stake.

Mr. CALVELLI. Correct.

Senator ROUNDS. Thank you. Thank you, Mr. Chairman.

Senator KING. Senator Rounds, you can continue if you wish. Senator Gillibrand is on the way. I just received a note. If you have further questions.

Senator ROUNDS. Well, I would just add one—here is Senator Gillibrand right now, so I will defer to Senator Gillibrand as she is ready to go.

Senator GILLIBRAND. Yes.

[Laughter.]

Senator ROUNDS. If—

Senator GILLIBRAND. Questions—okay. At the start of Russian's renewed invasion of Ukraine last year, Russian forces targeted a satellite operation with a cyber-attack to degrade communications during the initial invasion.

Since then, Russia has targeted Starlink systems relied on by Ukraine. Increasingly, commercial providers play critical roles in our space program, and the Space Force is exploring the idea of a commercial augmentation space reserve. From a policy perspective at DOD, how should we approach hostile acts against U.S. commercial space assets?

Dr. PLUMB. Thank you, Senator. First of all, we are looking throughout the Department at how to engage and maintain relationships with these commercial partners that we have, and we are trying to develop more of those.

One of the questions we have to be faced with is, how can we guarantee access to their products in a time of crisis or conflict? We are looking at a number of ways we could do that and how we might do that. A lot of these pieces are being solved maybe contract by contract.

We say one basic thing is being able to share threat information with commercial partners. We have some mechanisms for that, both through the NSA [National Security Agency] and through other places to allow us to share the classified level threat activities so they are aware, and our goal is to make sure that that is actionable.

In other words, it is no good to say Russia is interested in coming after Starlink. That doesn't tell Starlink anything useful, and they already know that. If we have specific information that they can take action on.

As we look at this across the Department, there are efforts underway through the Air Force, through the Space Force—I am sorry, through the Department of the Air Force, through the Space Force in policy, at NRO, and I have already offered to some senators, but I am hoping to come back in late summer with an expla-

nation of kind of where we are in all of those lines of effort. It is a new, but we are seized with this in the building.

Senator GILLIBRAND. The example I used was an international example. But if it happened to a U.S. domestic provider for supplies for troops abroad, let's say in Guam or in Hawaii, do you have the ability to be the point person for those particular contracts with the private sector?

Dr. PLUMB. I do not have any contract authority. Certainly, Secretary Calvelli has some, but I have no contract authority.

Senator GILLIBRAND. I think it is—we just had a hearing on this topic about the first 3 months of a cyber-conflict with China and how they would attack critical infrastructure around the country, but also supply chains and critical supply chains for the military.

One thought that I have is that you should have MOUs [Memorandums of Understanding] in place in advance, that you can—you have agreements that they will not only share cyber intel, but they will work with you in a cyber-defense capacity.

Something like that with Starlink in advance of the Russian conflict would have meant that you could immediately go in, tell them what is happening, give them guidance, and make sure they can continue to do the work that is necessary for the defeat of Russia. Is that something that the DOD should look at?

Dr. PLUMB. Madam Senator, I would say we already are, and a lot of it driven by—certainly, we have thought about it for years, but Ukraine has definitely amped up the understanding that on both sides as to what that would really look like and the considerations.

I would tell you, the General Counsel of the Department of the Air Force is helping us with the ideas of contractual, but other policy implications that they are also working with us to sort out.

Senator GILLIBRAND. I find in these conversations that the DOD is more comfortable if these things are happening abroad. But that same comfort level needs to be if it is happening domestically, because if it is your supply chain as warfighters, it is going to be a huge problem.

Being able to be very facile with domestic targets that are being attacked by China, Russia, or Iran, to—that you need to do—to conduct defense or warfighting, you need to have the same ability to be able to reach out to those private sector participants, to say, we need your commitment and we need your first in line commitment in a time of war or at a time of adversarial attacks from a nation State.

Do you agree with that?

General THOMPSON. Ma'am, speaking from a standpoint of commercial space companies, absolutely, and that is the conversation we are having with them. I can't speak to the larger supply chain and other elements of—

Senator GILLIBRAND. Secretary Plumb.

Dr. PLUMB. In one of my hats, ma'am, I also do cybersecurity and these pieces are also—we are working on this very same problem set with the defense industrial base and providers through cyber. There is a good relationship being built there because you are correct, we need to be able to move fast and it is geography independent.

Senator GILLIBRAND. Secretary Calvelli.

Mr. CALVELLI. I agree with you, ma'am. The more we can share across the board in terms of these kind of things across the private sector and with the Government, the faster we can respond.

Senator GILLIBRAND. Thank you. Thank you, Mr. Chairman.

Senator KING. I think Senator Gillibrand has a good point that these arrangements should be made in advance, not on the fly in the middle of conflict. MOUs, as she suggests—I commend that suggestion. This completes our hearing. We all have—how long until questions?

Senator FISCHER. Two weeks.

VOICE. A week?

VOICE. Close of business, tomorrow?

Senator KING. Close of business, Thursday afternoon for additional questions, additional statements from the witnesses. Thank you very much, gentlemen, for joining us today, and for the work that you are doing on behalf of our country. The hearing is adjourned.

[Whereupon, at 5:35 p.m., the Subcommittee adjourned.]

[Questions for the record with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR JACKY ROSEN

EMERGING TECHNOLOGIES

1. Senator ROSEN. Secretary Calvelli, utilizing emerging technologies like machine learning and artificial intelligence (AI) to maintain and build our space capabilities is a critical component in combating our adversaries' counter-space capabilities. What are the innovative ways the Department of Defense (DOD) is leveraging data and AI to boost U.S. space capabilities, and have such developments kept up with those of our near-peer adversaries like Russia and China?

Mr. CALVELLI. The Department recognizes the rapidly increasing impact of data and AI in the space domain, and the ability to enhance resiliency, bolster counter-space capabilities, and improve space domain awareness. The USSF space architecture offers on-ramps for emerging technologies and incorporates innovative machine learning techniques for dynamic sensor management, precision orbital maneuvers, and data exploitation. For example, the USSF has an autonomous space domain awareness sensor management prototype to autonomously task, collect, and exploit data from a worldwide network of optical sensors. The prototype uses AI for autonomous operations, and it uses machine learning and deep learning for data exploitation. The prototype is not yet operational, but the USSF is investing in demonstrating this prototype at the end of 2023, with plans to operationalize it after successful demonstration. By actively pursuing these capabilities, the Department will maintain a technological advantage in the contested space domain.

QUESTIONS SUBMITTED BY SENATOR TOM COTTON

OFFENSIVE SPACE WEAPONS

2. Senator COTTON. Secretary Plumb and General Thompson, both China and Russia have developed several types of offensive space weapons capable of damaging or destroying U.S. satellites in space. Can you discuss the role that U.S. offensive space weapons would play in securing U.S. interests in space?

Secretary PLUMB. Space is essential to the U.S. way of war. My job, along with my colleagues in the Department, is to ensure that we are able to support the Joint Force and support the four Defense priorities of the National Defense Strategy in, from, and through space throughout competition, crisis, and conflict. We will defend our national security interests from the growing scope and scale of space and counterspace threats, as directed in the 2021 U.S. Space Priorities Framework, by leveraging a breadth of options across all operational domains.

General THOMPSON. The increasingly contested nature of the Space Domain means that potential adversaries are fielding space systems that threaten our mili-

tary forces and will seek to deny the use of our space systems in conflict. The Space Force is fielding combat credible forces that are prepared to protect U.S. interests, defend our own assets, deny adversaries use of Space, and ensure national decision-makers have a full spectrum of options to deter aggression and respond to attack.

MISSILE WARNING/MISSILE TRACKING

3. Senator COTTON. Secretary Calvelli, the Space Force intends to launch satellites that are part of its missile warning and missile tracking system through fiscal year 2027, but the Chinese and Russian hypersonic missile threats are already here today. Are there satellites up and running already that have any capability yet to detect and track hypersonic missiles?

Mr. CALVELLI. The Space Based Infrared System (SBIRS) constellation currently on-orbit provides high fidelity missile warning capabilities, but it does not have the capability to track against hypersonic threats. SBIRS provides early detection of ballistic missile launches, tracks their trajectory, and offers real-time data for threat assessment and response planning. SBIRS plays a vital role in cueing missile defense systems, which direct interceptors to engage and destroy incoming threats. The Space Force is working to launch and field proliferated constellations with the sensitivity, accuracy, and latency to track hypersonic missiles and other advanced missile targets from low and medium earth orbit (LEO and MEO) by 2026. This new architecture will be more resilient and provide detection and tracking of not only traditional missile threats, but also advanced maneuvering threats like hypersonic glide vehicles. In April 2023, we launched two LEO Tracking Layer satellites that will demonstrate tracking of advanced missile threats. Later this fall, we will launch six more LEO Tracking Layer satellites and the Missile Defense Agency will launch the Hypersonic and Ballistic Tracking Space Sensor (HBTSS) prototypes to demonstrate Fire Control sensor capabilities to enhance missile targeting capabilities. The Space Force will leverage these demonstrations to reduce risk for operational implementation in subsequent iterations for detection, tracking, and closing the kill chain against advanced missile threats.

FRACTIONAL ORBITAL BOMBARDMENT SYSTEM (FOBS)

4. Senator COTTON. General Thompson, as you know, in 2021 China tested a fractional orbital bombardment system that orbited the globe before releasing a hypersonic glide vehicle toward its target. This type of weapon is greatly concerning for many reasons, but primarily because it would be difficult for us to detect and then track once it goes into orbit. Can you describe the Space Force's ongoing efforts to improve our ability to surveil objects in orbit, like this Chinese orbital missile?

General THOMPSON. The Space Force is pivoting to a resilient, proliferated missile warning/missile tracking (MW/MT) architecture. The resilient MW/MT systems will utilize satellites in both low earth orbit and medium earth orbit, which will be better able to track fractional orbital bombardment systems and hypersonic glide vehicles. This flight data is also shared with Missile Defense Agency systems for targeting purposes. The Next Gen Overhead Persistent Infrared (OPIR) program has a proven, heritage from the SBIRS program and will provide a legacy ballistic missile warning capability that will minimize risk during the transition to the resilient MW/MT architecture.

**DEPARTMENT OF DEFENSE AUTHORIZATION
REQUEST FOR APPROPRIATIONS FOR
FISCAL YEAR 2024 AND THE FUTURE YEARS
DEFENSE PROGRAM**

TUESDAY, MAY 9, 2023

UNITED STATES SENATE,
SUBCOMMITTEE ON STRATEGIC FORCES,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

**DEPARTMENT OF DEFENSE MISSILE DEFENSE
ACTIVITIES**

The Subcommittee met, pursuant to notice, at 4:47 p.m., in room 222, Russell Senate Office Building, Senator Angus S. King Jr. (Chairman of the Subcommittee) presiding.

Subcommittee Members present: Senators King, Gillibrand, Rosen, Kelly, Fischer, Cramer, and Tuberville.

OPENING STATEMENT OF SENATOR ANGUS S. KING JR.

Senator KING. Before we begin today's hearing, I want to acknowledge that Lieutenant General Karbler, and General VanHerck, and Admiral Hill, this may be your last hearing before this Subcommittee, before you enter retirement. So I want to thank you especially for your work. We are hoping to be able to replace you, but we will see.

Thank you very much for the work and support that you have provided to the men and women and to the entire country, but particularly the men and women under your commands. I want to thank the witnesses again for appearing before us and for your service.

The purpose of our hearing is to examine the President's Budget submission for the missile agency and missile defense policies in preparation for the Fiscal Year 2024 National Defense Authorization Act, which we plan to go to work on in June. Last year, the Department of Defense submitted to the Congress a Missile Defense Review.

It continues the policy of defense of the Homeland, as well as deterring attacks against the United States, while assuring our allies through a regional missile defense strategy. I note that it also continues the policy that we rely on our nuclear deterrent against large and sophisticated missile attacks against our Homeland from near-peer adversaries such as Russia and China.

Missile defense has two new aspects that we hope to examine in today's hearing. First and foremost is the defense against hypersonic missiles. They do not follow a ballistic trajectory. Second is the requirement to protect Guam against any threats that China might impose.

This is a daunting task that integrates missile defense systems from the Army, Navy, and Missile Defense Agency, and what I hope we will learn more about in today's hearing. The Fiscal Year 2023 National Defense Authorization Act (NDAA) tasks the Secretary of Defense with designating a senior official, a senior individual for this effort by March 23, 2024.

To date, this Committee has not heard anything about this. I will want to know its status. The President's Fiscal Year 2024 Budget submission for Missile Defense Agency is \$10.9 billion. This is an increase from the fiscal year 2023 enacted level of \$10.5 billion.

I would like to know how the Fiscal Year 2024 Budget Request continues your effort for Homeland and regional missile defense, as well as defense against new threats such as hypersonic weapons.

Again, let me thank today's witnesses for agreeing to appear and for their extraordinary service to the country. After opening statements, we will have rounds of 5-minute questions to the witnesses. Senator Fischer.

STATEMENT OF SENATOR DEBRA FISCHER

Senator FISCHER. Thank you, Mr. Chairman. I, too, would like to thank our military members today, General VanHerck, General Karbler, and Admiral Hill for your many years of service to this country. What you do every single day may not be known by every American, but you keep every American safe. Thank you.

We appreciate you appearing before us today and we look forward to hearing from each of you. As we continue to develop and field integrated air and missile defense capabilities, it is important to recognize that the threat landscape has evolved significantly since the inception of our missile defense programs.

This evolution of adversary missile and offensive strike technology, including hypersonic weapons and unmanned aerial systems, increasingly holds at risk+, not only our military installations, but also civilian populations and critical infrastructure.

As you know, for many years now, this Subcommittee has strongly advocated for getting more capability on Guam and getting it there as fast as we can. I look forward to hearing more about the Department's plan for the defense of Guam and how the investments proposed by this budget would strengthen the missile defense of the island.

The incursion of the Chinese spy balloon earlier this year also highlights the need for increased domain awareness. We cannot intercept what we cannot see and track. It is critical that we continue to invest in terrestrial over-the-horizon radars (OTHR) and space-based missile warning and missile tracking systems, including the hypersonic ballistic tracking space sensor or HBTSS.

I look forward to hearing more from our witnesses about these issues and about how the fiscal year 2024 would impact their mission. Thank you, Mr. Chairman.

Senator KING. Secretary Plumb, are you leading off?

**STATEMENT OF THE HONORABLE JOHN F. PLUMB, ASSISTANT
SECRETARY OF DEFENSE FOR SPACE POLICY, DEPARTMENT
OF DEFENSE**

Dr. PLUMB. Yes, sir. So, thank you. Chairman King, Ranking Member Fischer, distinguished Members of the Committee, thank you for this opportunity to testify today on the fiscal year 2024 missile defense budget, and I am honored to appear alongside my colleagues here, General VanHerck and Vice-Admiral Hill and Lieutenant General Karbler. If it is all of your last hearing, then I just—I have really appreciated working with all of you. Look how sad they are, sir.

Today, our competitors are using advanced offensive missile capabilities as a principal means to execute their war fighting strategies. We know China is our Department's pacing challenge. China has accelerated its efforts to develop, test, and field thousands of missile systems across all classes and ranges. Russia remains our acute threat.

Russia has conducted thousands of missiles and drone strikes to terrorize the civilian population of Ukraine and degrade Ukraine's warfighting capability. Iran has launched missile attacks into neighboring states and provided rockets and drones to non-State actors who in turn use them to target United States Forces and partners.

Of course, they have also provided unmanned aircraft systems (UAS) to Russia, which is using them in the battle in Ukraine, and North Korea continues to conduct ICBM [intercontinental ballistic missiles] and other missile tests to threaten and coerce its neighbors.

Given these threats, missile defense has never been more important. The 2022 Missile Defense Review was released in unclassified form last fall, and this review updated U.S. policy to reflect the current security environment, with three kinds of large updates.

One, emphasizing that we will stay ahead of the North Korean missile threat to the Homeland through a comprehensive missile defeat approach, which will be complemented by the credible threat of direct cost imposition.

Second, it makes crystal clear that an attack on Guam or any other United States territory by any adversary will be considered a direct attack on the United States and it will be met with an appropriate response. We are committed to the missile defense of Guam to simultaneously protect United States civilians, United States Forces, and our ability to project power in the region.

Third, to deter attempts by adversaries to stay under the nuclear threshold and achieve strategic results with conventional capabilities, the U.S. is pursuing active and passive measures to decrease the risk of adversary cruise missile strikes against critical assets in the Homeland.

The President's Budget invests \$29.8 billion in missile defeat and defense capabilities. This is an increase of nearly \$3 billion over last year—well, this year, actually, fiscal year 2023. Specific to missile defense, this includes \$3.3 billion for the ground-based mid-course defense, including \$2.2 billion for the next generation interceptor, \$1.5 billion for the defense of Guam. Nearly \$5 billion for missile warning, missile track, both the new P-LEO [proliferated

low Earth orbit] Constellation and the next generation overhead persistent infrared architecture, \$2.2 billion for Standard Missile 3 (SM3), terminal high altitude area defense (THAAD), and Patriot Advanced Capability-3 (PAC-3) interceptors. Nearly \$1.5 billion to counter lower tier missile threats, and hundreds of millions of dollars for over-the-horizon radars, hypersonic defense, and directed energy development. Finally, the fiscal year 2024 budget continues to prioritize U.S. support to allies and partners.

The U.S. does not face missile threats on our own. Missile defense cooperation strengthens our common protection, enhances deterrence, and provides assurance that bolsters the cohesion of our alliances.

The President's Budget makes significant investments in missile defense. Those missile defenses are foundational to integrated deterrence. I would just like to thank the Committee for your tireless support of the Department and U.S. national security, and for your support of the President's Budget, and I look forward to your questions.

[The prepared statement of Dr. John Plumb follows:]

PREPARED STATEMENT BY DR. JOHN PLUMB

INTRODUCTION

Chairman King, Ranking Member Fischer, and distinguished members of the Committee: Thank you for the opportunity to testify on the Fiscal Year 2024 budget request for missile defeat and defense programs on behalf of the Office of the Secretary of Defense. I am honored to join General Glen VanHerck, Commander of the North American Aerospace Defense Command (NORAD) and United States Northern Command; Vice Admiral Jon Hill, Director of the Missile Defense Agency; and Lieutenant General Daniel Karbler, Commanding General of the Army's Space and Missile Defense Command.

Integrated air and missile defense has never been more relevant to U.S. defense strategy, plans, and posture. The increasing development and use of advanced missiles—including ballistic, cruise, and hypersonic—as well as Uncrewed Aircraft Systems (UAS) has become a defining feature of modern warfare.

Today, I will review how air and missile threats have evolved over the last year, provide a policy update on the Department's response, and explain how the Department's fiscal year 2024 budget request of \$29.8 billion for missile defeat and missile defense programs supports this response.

ADVANCED AIR AND MISSILE THREATS

As Secretary Austin has said since his first days in office, the People's Republic of China (PRC) is the Department's pacing challenge, while Russia remains an acute threat. Our competitors are rapidly developing, fielding, and integrating advanced offensive air and missile capabilities into their strategies to favorably shape the course of a potential crisis or conflict.

People's Republic of China

The PRC has accelerated its efforts to develop, test, and field advanced missile systems of all classes and ranges, including ballistic, cruise, and hypersonic glide vehicles. The PRC is also rapidly expanding its ability to deliver nuclear payloads through the development of new intercontinental ballistic missiles (ICBMs) and the construction of new ICBM missile fields. In August 2022, the PRC launched ballistic missiles over and around Taiwan in an unsuccessful attempt to intimidate and demonstrate its capability to forcefully unify with Taiwan.

Russia

In its illegal war of aggression in Ukraine, Russia has employed thousands of air and missile platforms of all types ranging from hypersonic missiles to short range UAS. Russia's use of missiles, often against non-military targets, is designed to terrorize the Ukrainian people while degrading Ukraine's warfighting capability. Russia is trying also to diminish Ukraine's will to fight through the destruction of infra-

structure, including hospitals, schools, and the energy grid. Russia has even converted thousands of surface-to-air missiles to surface-to-surface mode and launched hundreds of Iranian UAS systems in attacks against Ukrainian critical infrastructure targets. Russia also continues to invest in long-range cruise missiles, ballistic missiles, and hypersonic glide vehicles—capabilities that place the United States Homeland at risk.

Iran

Over the last several years, Iran has launched missile attacks into neighboring states while providing ballistic missiles and UAS to non-State actors, who in turn used them to target United States Forces and partners in the Middle East. Iran has become the world's leading proliferator of missiles and UAS as demonstrated through its UAS transfers to Russia as well as its provision of these systems to armed groups throughout the Middle East. Iran continues to invest in space-launch vehicles that could shorten the pathway to a future long-range missile capability.

The Democratic People's Republic of Korea (DPRK):

The DPRK continues to test and demonstrate a growing number of developmental ballistic and cruise missiles, including test launches of missiles that have directly over-flown and landed near the sovereign territory of regional neighbors. This year alone, DPRK has showcased a vast array of missile systems, including 11 Hwasong-17 ICBM missiles and associated launchers, in an extensive military parade celebrating the 75th anniversary of the DPRK army; conducted two ICBM tests and more than a dozen shorter range missile tests; and unveiled a new, purported nuclear warhead dubbed the Hwasan-31.

Non-State Actors

Non-State actors pose an increasing danger to United States regional interests, particularly in the Middle East and Africa. This is evidenced by the attack against United States Forces in Syria in late March. These armed groups—operating autonomously or as proxy forces—are employing more complex UAS, rocket, and missile capabilities and continue to benefit from the proliferation of dual-use commercial air, UAS, and missile systems and technology.

UNITED STATES MISSILE DEFENSE POLICY

As outlined in the 2022 National Defense Strategy (NDS), the Department is focused on a strategy of integrated deterrence, which incorporates our efforts to prevent and, if necessary, defeat air and missile threats to the United States Homeland, our allies and partners, and regionally deployed forces. Integrated deterrence weaves together all instruments of national power—with the diplomacy in the forefront—to work seamlessly across warfighting domains, theaters, the spectrum of conflict, and our network of alliance and partners.

Nested within the NDS, the 2022 Missile Defense Review (MDR) describes how missile defense contributes to integrated deterrence as a deterrence-by-denial component against competitors that seek to use missiles as a means to project conventional and nuclear military power. Missile defense undermines adversary confidence in offensive missile use by introducing doubt and uncertainty into attack planning; by raising the threshold for conflict by reducing the incentive to conduct small-scale coercive attacks; by reinforcing U.S. diplomatic and security posture; and by reassuring allies and partners that the United States will not be deterred from fulfilling its global security commitments. Missile defenses expand the decision space for our military and civilian leaders and preserve our forces' freedom to maneuver.

The Department's top priority is to defend the U.S. Homeland, including U.S. territories. As the scale and complexity of North Korean missile threats to the Homeland increase, we are staying ahead of the threat through improvements to the Ground-based Midcourse Defense (GMD) system as part of a comprehensive missile defeat approach, complemented by the credible threat of direct cost imposition through nuclear and non-nuclear means. A key component of the GMD system will be the Next Generation Interceptor (NGI), which is scheduled for delivery beginning in 2028. The NGI will greatly enhance our ability to defend the country against North Korean intercontinental ballistic missile threats.

The 2022 MDR states clearly that Guam, along with all United States territories, is part of the United States Homeland and will be protected against any and all provocations and attacks. The Integrated Air and Missile Defense (IAMD) architecture for the defense of Guam, for example, will simultaneously protect United States Forces and our ability to project power in the region. Similarly, we are investing in efforts to strengthen our protection of Hawaii, Alaska, and the continental United States.

Broadly speaking, different adversary capabilities—from ballistic to cruise to hypersonic threats—present unique missile defense challenges depending on the technology and the theater in which they are employed. We are taking steps to ensure we can defeat these threats now and into the future.

The conflict in Ukraine illustrates the importance of air and missile defense. Russia's ruthless barrage of attacks in Ukraine have been a wake-up call to the power and destructiveness of missiles and the extent to which they have become a defining feature of modern warfare, especially in the absence of air superiority. Ukrainian sovereignty endures today in large part because Ukrainian forces have made air defense a top priority. The United States has provided Ukraine with over 1,600 stinger missiles, a Patriot battery, two National Advanced Surface-to-Air Missile (NASAM) systems, and 12 Avenger air defense systems. In addition, we are providing equipment to integrate Western air defense launchers, missiles, and radars with Ukraine's current inventory of air defense systems. Our allies and partners have also stepped forward to provide vital advanced air and missile defense systems to Ukraine.

INVESTMENTS

The \$29.8 billion budget request for missile defeat and defense provides \$10.9 billion of Missile Defense Agency (MDA) programs, as well as another \$18.9 billion for investments across all Services that contribute to our total missile defeat and missile defense capability. These investments are tied to the strategic objectives of the national defense strategy.

Homeland Missile Defense

As stated previously, the Department's top priority is to defend the Homeland and deter attacks against the United States. To achieve this strategic objective, the President's budget requests \$3.3 billion to improve the reliability, capability, and cyber resiliency of GMD. This request includes \$2.2 billion for the continued development of the NGI, which will improve the reliability and performance of our system against advancing ICBM threats from North Korea and against potential future ICBM threats from Iran.

As an element of Homeland defense and regional defense, the Department is committed to strengthening the defense of Guam through a layered IAMD architecture. As such, the Department is requesting \$1.5 billion in Fiscal Year 202024 to strengthen missile defense of the island, which is a critical operational hub in the Indo-Pacific region. The Department is also in the process of designating, as required by statute, a single senior official to manage the missile defense effort on Guam.

The Department is requesting \$64 million to improve the defense of Hawaii through investments in upgrades to its air surveillance radar capabilities, which will enhance air domain awareness and support defense against cruise missiles and a variety of other emerging air and missile threats. Hawaii is already defended from North Korean long-range attacks by the GMD system, comparable to the other 49 states and the District of Columbia.

The Deputy Secretary of Defense designated the Department of the Air Force as the acquisition authority for air and cruise missile defense of the Homeland in July 2022. To that end, the Department is requesting \$428.7 million in Fiscal Year 202024 for the continued fielding of four new over-the-horizon radars. These radars will provide long-range sensor coverage of likely air and cruise missile threats to North America, as well as capability against hypersonic threats, and maritime surface vessels.

We are also investing in the modernization of space sensor capabilities that are crucial to missile warning, missile tracking, and missile defense and that support the protection of our Homeland and the missions of our forces globally. This includes \$4.8 billion in Fiscal Year 202024 to develop new proliferated resilient missile warning/missile tracking architectures and the Next-Gen Overhead Persistent Infrared (OPIR) space and ground architecture. We are optimizing existing missile defense radars and other sensors in support of our broader all-domain awareness objectives.

Regional Missile Defense

The Department is strengthening our regional missile defenses to counter all missile threats—including hypersonic threats—regardless of origin. The United States must continue to develop defenses against regional missile threats, to include building a persistent and resilient sensor network to characterize, track, and improve attribution while also developing and delivering capabilities to enable engagement of all missile threat types, including hypersonic missiles. The President's budget re-

quest makes substantial investments in regional ballistic, cruise, and hypersonic missile defense capabilities to accomplish these objectives, including:

- \$259 million for regional hypersonic and ballistic missile defense space sensors and development of the Glide Phase Interceptor (GPI);
- \$1.024 billion for Aegis Standard Missile-3 and Terminal High-Altitude Area Defense (THAAD) interceptors; and
- \$1.2 billion for additional PAC-3 interceptors.

U.S. deployed forces, allies, and partners also face a proliferation of lower-tier threats, such as rockets and armed UAS. Our adversaries will continue to seek ways to use these relatively inexpensive, flexible, and expendable systems to achieve their purposes. The Department is working to field technical and integrated counter-UAS solutions to ensure we can collectively meet the range of threats and appropriately hedge against future advancements. We are requesting nearly \$1.5 billion in Fiscal Year 2024 to support this effort.

Today directed energy plays an increasingly important role in countering UAS. In the future, directed energy could complement our current programs to defeat more complex air and missile attacks. The Department is requesting \$308 million this year to continue work in this area.

STRENGTHENING INTERNATIONAL COOPERATION WITH ALLIES AND PARTNERS

Air and missile defense cooperation with our allies and partners continues to expand. Not only do allied and partner missile defense capabilities offer important value during

peacetime, but they also allow our alliances and coalitions to plan collectively and to counter missile threats together in crisis and conflict and in ways that reduce the potential for escalation. The United States does not face international threats on its own; we need a unified, collective presence of integrated allied and partner missile defense capabilities to deter and defeat growing missile threats.

The United States also continues to work with our allies and partners to improve our ability to share sensing and tracking data in real time and support each other in air and missile defense engagements to maximize our collective capabilities. Multilateral air and missile defense exercises, such as Formidable Shield and Pacific Dragon, and bilateral test activities such as Japanese Aegis destroyers launching SM-3 Block IIAs to intercept ballistic missiles at United States test ranges, give us opportunities to work together to accomplish these goals.

In Europe, initial acceptance testing is ongoing at the Aegis Ashore site in Poland, which will become operational in 2024 after completion of all testing and receiving additional software upgrades. The Aegis Ashore site in Poland will complete the European Phased Adaptive Approach—the United States voluntary contribution to NATO Ballistic Missile Defense—as it joins the Aegis Ashore site in Romania, the BMD capable ships homeported in Spain, and the AN/TPY-2 radar in Turkey. We also recently deployed two Patriot batteries to Poland and one Patriot battery to Slovakia in support of NATO's defense. Overall, our Patriot and THAAD forces are deployed worldwide, including throughout the Middle East and Indo-Pacific regions, where they defend United States forward-deployed forces and other national security interests in concert with our allies and partners.

The United States is increasing our ally and partner capabilities through Foreign Military Sales of equipment as well as through training, co-development, and co-production programs.

We are also exploring joint opportunities to invest in the cooperative development of complementary IAMD technologies and capabilities such as hypersonic defenses. In particular, the Department welcomes Japan's interest in pursuing cooperation on the GPI program.

We engage regularly throughout the year with key allies and partners through a series of bilateral and multilateral dialogs to enhance our collective regional missile defense efforts in Europe, the Middle East, and the Indo-Pacific region. Our missile defense cooperation strengthens our common protection, enhances deterrence, and provides assurance that bolsters the cohesion of our alliances.

CONCLUSION

The commitment of adversaries to the use of offensive missile systems as a central component of their military strategies and tactics has never been more evident. As a result, missile defeat and integrated air and missile defenses can no longer be viewed as peripheral capabilities. These capabilities must be foundational elements of integrated deterrence and modern defense in U.S. national security. The United States remains committed to improving our Homeland and regional missile defeat and defense capabilities as we work to deter conflict, and to prevail in battle if de-

terrence fails. The Department's Fiscal Year 2024 budget request supports this approach.

I look forward to working with the Congress to advance this shared goal. Thank you.

Senator KING. Admiral Hill.

**STATEMENT OF VICE ADMIRAL JON A. HILL, USN, DIRECTOR,
MISSILE DEFENSE AGENCY**

Vice Admiral HILL. Chairman King, Ranking Member of Fischer, distinguished Members of the Subcommittee, thank you for the opportunity to discuss missile defense today. I would like to take a quick moment to thank the women and men of the Missile Defense Agency (MDA) for the hard work they do every day, delivering capabilities to the services to meet joint combatant command requirements to counter ballistic maneuvering, and hypersonic, and missile threats.

If I were to summarize missile threat, it is three things. It is large numbers, it is high speed, and heavy maneuver. Those are the challenges right now and they are the challenges for the future. MDA is requesting, as mentioned, \$2.9 billion to continue our mission of meeting these threats, and I am going to talk to you about three priorities. The first is Homeland ballistic missile defense.

Then I will talk about defense of Guam and hypersonic defense. The first priority of homeland ballistic missile defense, which includes Alaska and Hawaii, the ground-based midcourse defense system (GMD) has protected the Homeland from rogue nation ballistic missile attacks since 2004.

Our current focus is on new capabilities to counter the limited but advancing North Korean long range ballistic missile threat. The GMB system is undergoing a service life extension program to improve reliability and extend the GBI fleet to ground-based interceptors beyond 2030. These upgrades mitigate the risk until the Nation fields the next generation interceptor (NGI), which is on track for first emplacement no later than the end of 2028.

NGI development is executing to deliver advanced interceptors featuring multiple kill vehicle technology, which we will add to the current fleet of interceptors at Fort Greely, Alaska, and Vandenberg Space Force Base in California. Finally, we are on track for operational acceptance of the long range discrimination radar in Clear, Alaska next year. This advanced radar will ensure a stronger homeland defense posture against long range missiles.

To achieve priority two, the defense of Guam, also part of the Homeland, the Department is developing an integrated air and missile defense system to defend against diverse missile threats. Working with the services and other stakeholders, we are driving to meet INDOPACOM's [United States Indo-Pacific Command] requirement for a persistent 360-degree layered defense capability on the island against simultaneous rates of cruise, ballistic, maneuvering, and hypersonic missile threats. We are delivering operational capability in phases to meet these clear warfighting needs.

For the third priority, hypersonic defense, we have integrated tracking capabilities into existing space, ground, and sea-based radars. That capability is here today. Today's sensor architecture and

command and control can track hypersonic threats to support warning and domain awareness.

Aegis ships equipped with a sea-based terminal capability can engage some hypersonic threats in the terminal phase today. Due to the global maneuver capabilities of hypersonic missiles, a space-based tracking and targeting capability is a clear need. In collaboration with the Space Force, the Missile Defense Agency is developing the hypersonic ballistic tracking space sensor.

Later this year, HBTSS will start on orbit operations to demonstrate unique tracking and targeting to support hypersonic engagements. HBTSS will participate in flight tests and real-world threat collections throughout fiscal year 2024. The capability will be proliferated and operated by the Space Force.

We continue to work closely with the Navy to upgrade sea-based terminal (SBT) defenses to counter more advanced maneuvering and hypersonic threats. Based on threat evolution, we will deliver the next SBT incremental upgrade in 2025. Aegis sea-based terminal is the only active defense available today to counter hypersonic missile threats.

In order to expand the battle space against hypersonic threats, we have initiated the Aegis Glide Phase Interceptor Program (GPI). GPI leverages proven Aegis weapon system, engage on remote network sensors to provide a depth of fire needed to thin the raid for terminal defenses.

One final regional defense note, we continue ship upgrades and SM3 Block 1B and 2A missile deliveries and have made significant progress with the Aegis ashore site in Poland, which is on track for operational acceptance at the end of this fiscal year.

Also, we are working toward fielding THAAD and Patriot integration enhancements that were successfully delivered to the United States Forces of Korea to other THAAD batteries to expand engagement battle space against shorter range stress.

Chairman King, Ranking Member Fischer, Members of the Subcommittee, thank you and I look forward to answering questions. It has been an honor serving as the Director of MDA.

[The prepared statement of Vice Admiral Jon A. Hill follows:]

PREPARED STATEMENT BY VICE ADMIRAL JON A. HILL

Chairman King, Ranking Member Fischer, and distinguished Members of the Subcommittee, thank you for taking my testimony today. The Missile Defense Agency (MDA) budget request of \$10.9 billion for Fiscal Year (FY) 2024 enables the continued execution of the MDA mission to design, develop and deploy a layered Missile Defense System to defend the United States and its deployed forces, allies, and international partners from increasingly diverse missile threats.

Potential U.S. adversaries are developing more advanced ballistic, hypersonic, and cruise missile systems, making them more mobile, survivable, reliable, accurate, and capable of achieving longer ranges. Ballistic and hypersonic missiles capable of high velocity and heavy maneuver, and their use in large numbers and combination attacks, which may also involve cruise missiles and unmanned aerial systems, could undermine the effectiveness of our missile defenses without continued development.

We are in the process of updating the September 17, 2009 DOD Directive for Missile Defense Agency acquisition authorities.¹ The update is needed to reflect changes

¹The review is led by the Office of the Secretary of Defense (OSD) with participation by the Office of the Director of Administration and Management (ODA&M) and in consultation with OSD Research and Engineering (R&E), Acquisition and Sustainment (A&S), Director, Cost As-

incorporated in Directive-Type Memorandum 20–002 Missile Defense System Policies and Governance, the organization of the Department of Defense, and statutory law impacting MDA. The Department established MDA in 2002 as a capability-based develop and field a missile defense capability rapidly and incrementally improve that capability over time. The update will finalize the MDA Director’s acquisition authorities.

I continue to believe the Warfighter Involvement Process (WIP) is essential to the missile defense enterprise, and MDA is working with stakeholders to update the WIP to better support the Warfighter. MDA continues a very fruitful and important collaboration with the Combatant Commanders and Services to address the rapidly advancing and expanding threat with speed and agility. That collaboration includes the establishment of Service and MDA agreements, hybrid program offices, and regular Service and MDA Board of Directors meetings to address manning, training, and equipping requirements for fielded missile defense systems and sustainment support throughout the element’s life-cycle.

WORKING WITH THE SERVICES TO MEET COMBATANT COMMAND REQUIREMENTS

MDA is developing, delivering, sustaining, and improving affordable, proven, and leading-edge capabilities to counter advanced ballistic and hypersonic missiles.

Space and Terrestrial Sensors

Space-based sensors are critical to integrated sensor-to-shooter capabilities used to defeat ballistic and hypersonic missile threats. MDA will continue collaborating with the U.S. Space Force (USSF) to deliver integrated capabilities that meet Warfighter requirements for missile warning, tracking, and defense.² USSF and MDA are enable the tracking, targeting, cueing, and intercept of ballistic and hypersonic missiles. In fourth quarter fiscal year 2023, the Hypersonic and Ballistic Tracking Space Sensor (HBTSS) will launch and begin demonstration of unique tracking and targeting capabilities needed to defend against hypersonic glide vehicles. HBTSS will participate in flight tests and real-world target-of-opportunity collections throughout fiscal year 2024, and the proven capability will be proliferated and operated by the Space Force.

The current Space-based Kill Assessment (SKA) network of infrared sensors hosted on commercial satellites will continue demonstrating hit assessment capabilities for homeland defense. SKA sensors provide hit situational awareness to U.S. Northern Command and participate in flight tests and engineering activities to characterize sensor capabilities and provide valuable data to support future Post Intercept Assessment capabilities. Additionally, the Discriminating Space Sensor (DSS) continues to mature ballistic missile birth-to-death tracking and discrimination technology to provide a pivotal capability as part of MDA’s space architecture.

MDA also is developing, deploying, and sustaining a robust, cyber-secure and networked ground-and sea-based radar architecture. The Long Range Discrimination Radar (LRDR) will complete acceptance testing and participate in an operational flight test in fiscal year 2023. Development of LRDR software will continue to enhance tracking and discrimination, hit assessment, space domain awareness (SDA), space-intelligence data collection, and modeling and simulation capabilities. Following operational fielding in fiscal year 2024, LRDR will support the Ground-based Midcourse Defense (GMD) capability against Pacific theater long-range missile threats.

The Sea-Based X-Band (SBX) radar provides precision midcourse tracking and discrimination capabilities to support homeland defense operations, Missile Defense System testing, data collection, and SDA. SBX completed an in-port maintenance and capability upgrade period this past March, and it is again deployed at-sea. Fabrication of the SBX replacement radome continues on schedule for installation in fiscal year 2025.

assessment and Program Evaluation (CAPE), Office of General Counsel (OGC), Policy (P), the Joint Staff, U.S. Strategic Command (USSTRATCOM) and U.S. Northern Command (USNORTHCOM). The directive update is expected to be signed by the Deputy Secretary of Defense by March 1, 2024 in compliance with 10 USC 205 120-day congressional notification and waiting period.

²In 2022, MDA collaborated with the USSF Space Systems Command and the Space Development Agency to form a Combined Program Office for missile warning, tracking and defense. MDA is also a member of the Program Executive Officer level Program Integration Council that facilitates cooperation and de-conflicts efforts enabling the National Security Space Enterprise force design to provide the Warfighter with integrated and synchronized space-based capabilities; and a member of the larger space acquisition community’s Space Acquisition Council. MDA is also a full participant in the USSF Space Warfighter Analysis Center future Force Design studies and analysis to integrate missile defense space sensor capabilities into space enterprise architectures.

AN/TPY-2 radars deployed abroad support Terminal High Altitude Area Defense (THAAD) batteries for regional defense. Radar 13, planned for delivery in March 2025, will be part of THAAD Battery 8 and be a fully modernized configuration that includes significant obsolescence redesigns leveraged from our ongoing Foreign Military Sales (FMS) cases. AN/TPY-2 radars deployed abroad in forward-based mode support homeland defense to provide early warning, precision tracking, discrimination capabilities, and space domain awareness.

MDA sustains and updates the USSF Upgraded Early Warning Radars (UEWRs) in Alaska, Massachusetts, United Kingdom, Greenland, and California, and the Cobra Dane radar in Alaska. UEWRs support homeland missile defense and improve midcourse Missile Defense System sensor coverage by providing critical early warning, tracking, object classification and cueing data. The UEWRs and Cobra Dane radar provide space object detection and tracking data to the Space Surveillance Network.

MDA provides software upgrades to Aegis integrated missile defense destroyers equipped with the SPY-1 radar to support the USSF SDA mission. The Aegis SDA capability is fully compatible with deployed U.S. Navy operations and has appropriate 2022, we supported the Navy's first demonstration of SDA capability with the USS *Nimitz* (CVN 68) Carrier Strike Group during their Composite Training Unit Exercise. In fiscal year 2024, we will continue to develop, test, and deliver this upgrade and support the Navy in future SDA demonstrations.

Command and Control, Battle Management and Communications

C2BMC is the integrating element of the Missile Defense System, providing Combatant Commanders and decisionmakers with a global, persistent, and near-real-time missile defense common operating picture. C2BMC joins space-based infrared, land-, and sea-based sensor threat observations to provide acquisition, tracking, cueing, discrimination, and targeting data to engagement elements in support of U.S. and coalition-partner missile defense and SDA operations. C2BMC also connects with Service, NATO, and international systems.

Funding in fiscal year 2024 sustains the C2BMC planner, situational awareness, battle management, training, and SDA capabilities within Combatant Command user nodes as well as the global missile defense network. Additionally, this funding continues integrating space surveillance sensors with C2BMC in order to enhance the missile warning, missile tracking, missile defense, and SDA missions and address trans-regional threats. We continue to develop new capabilities to improve overall C2BMC system resiliency, enhance system discrimination of threat objects, and refine space track data to improve Missile Defense System operational effectiveness. MDA recently fielded a key software upgrade to integrate LRDR and the Ballistic Missile Defense System Overhead Persistent Infrared (OPIR) Architecture in order to bring a prototype System. This spiral upgrade significantly expands SDA capabilities for U.S. Space Command using LRDR and the Aegis SPY-1 radar and integrates the U.S. Army's Integrated Air and Missile Defense Battle Command System with the Missile Defense System.

Homeland Defense

The GMD system has protected the U.S. Homeland from rogue long-range ballistic missile attacks since 2004. Today, we are delivering new capabilities to address the limited but increasingly advanced North Korean long-range ballistic missile threat. Earlier in this fiscal year, we increased US Northern Command Ground Based Interceptor capacity in the most advanced configuration with Capability Enhanced-II Block 1 Exo-atmospheric Kill Vehicles integrated on new Configuration 2 boost vehicles. These interceptors will help mitigate the risk until the Next Generation Interceptors are fielded no later than the end of 2028. The Ground Based Interceptors continue to undergo a Service Life Extension Program to improve reliability and availability, which we anticipate will extend portions of the existing fleet beyond 2030. In parallel, MDA continues to upgrade the ground system infrastructure, communications network, fire control system, Warfighter training systems, and missile fields to improve the reliability, capability, cybersecurity, and resiliency of the GMD weapon system.

In fiscal year 2024, we will execute an intercept flight test demonstrating the capability to select a 2-or 3-stage burn of a Ground Based Interceptor booster, which enables an earlier release of the kill vehicle to expand significantly the engagement area and time to counter inbound threats. This flight test also will demonstrate the latest incremental representative long-range target equipped with countermeasures.

We awarded two Next Generation Interceptor contracts in March 2021, and our competing Industry prime contractors are on track and rapidly advancing through the design development process with full technical rigor to deliver this new capa-

bility as soon as possible. Both designs feature multiple kill vehicle payloads to reduce the number of interceptors required to defeat a single ballistic missile threat to our Nation. Our fiscal year 2024 budget request transitions the programs from Technology Development to the Product Development Phase.

Regional Defense

Globally deployed ship-based and land-based Aegis BMD capabilities are critical to the Nation's defense of our deployed forces, allies, and partners against short-, medium-, and intermediate-range missile threats. In fiscal year 2024, MDA is designing improvements to the Aegis BMD capability, to include procuring and delivering Standard Missile (SM)-3 Block IB Threat Upgrade (TU) and Block IIA missiles, improving Sea-Based Terminal (SBT) defense, advancing weapon system and missile reliability, and enhancing Aegis BMD engagement capacity and lethality. We will continue to develop Aegis BMD weapon system software to enhance functionality and leverage more-capable radars and national technical means.

MDA continues to support defense of NATO's European territory and forces against the ballistic missile threat from the southeast of the Alliance's border. Aegis Ashore in Romania is operational, and we are working to complete and prepare Aegis Ashore in Poland for Navy acceptance, followed by transfers of authority to U.S. European Command and NATO. We recently completed installation and testing of the combat system equipment at Naval Support Facility Redzikowo, Poland, in parallel with construction activity. Both Aegis Ashore sites are designed to launch the SM-3 Block IBTU and Block IIA missiles.

In fiscal year 2022, MDA successfully executed PACIFIC DRAGON 22 (PD-22). Event 1 marked the first use of a SM-3 Block IA engagement of a Short Range Ballistic Missile (SRBM) in a fleet exercise. Event 2 demonstrated J7.1 Sea-Based Terminal capability by conducting a simulated SM-6 engagement with the new *Maya*-class Japanese destroyer against a live target. We also executed an intercept flight test campaign (Japan Flight Test Aegis Weapon System-07, or JFTM-07) with Japan, demonstrating the newest engagement capability of the Japan (J7) Aegis BMD configuration with SM-3 Block IIA against a Medium Range Ballistic Missile (MRBM). JFTM-07 also demonstrated Aegis ship-to-ship engage-on-remote in a simulated engagement, an integrated missile defense capability using SM-2 surface-to-air defense missiles, and an engagement of an SRBM with a SM-3 Block IBTU.

MDA plans to conduct a Tracking Exercise, Flight Test Other (FTX)-23, with two Aegis ships to perform target scene data collection of an MRBM with countermeasures. We will also demonstrate Aegis SBT with a salvo engagement in Flight Test Aegis Weapon System (FTM)-32, firing two (salvo) SM-6 Dual II software upgrade guided missiles against a MRBM. In FTX-40 we will fire a simulated SM-6 missile against a hypersonic glide vehicle.

The THAAD Weapon System is a globally transportable, ground-based system that is highly effective against short-, medium- and intermediate-range missile threats inside and outside the atmosphere in the terminal phase of flight. MDA currently supports forward-deployment of two batteries stationed in the U.S. Indo-Pacific Command (INDOPACOM) area of responsibility, cooperates with the United Arab Emirates in support of two operational FMS THAAD batteries, and supports the Kingdom of Saudi Arabia in the production of seven additional FMS THAAD batteries scheduled to begin fielding in fiscal year 2025. In fiscal year 2024, we will continue THAAD interceptor procurement, production of battery hardware, obsolescence mitigation efforts, fielding and training support, the THAAD Stockpile Reliability Program, and modifications to meet growing cybersecurity threats.

In October 2022, MDA, in conjunction with the U.S. Army, successfully delivered capability and enhancements to one of the forward-deployed THAAD batteries in support of INDOPACOM. The battery can now execute THAAD remote launch capability, execute Patriot Launch-on-Remote, and integrate Patriot Missile Segment Enhanced (MSE) launchers and missiles into the THAAD battery. This capability increases Patriot-defended area and engagement opportunities by allowing the MSE interceptor to leverage the highly effective THAAD AN/TPY-2 radar. In August 2022, the U.S. Army validated the requirement for accelerated fielding of this capability to all other U.S. THAAD batteries. MDA is currently coordinating fielding of this capability with the U.S. Army and will begin global fielding this fiscal year.

Rigorous testing will continue in fiscal year 2023 with the execution of Flight Test THAAD Weapon System-25, which will demonstrate for the first time the THAAD weapon system's concurrent control of both a THAAD interceptor and firing a salvo of two Patriot MSE interceptors in an engagement of multiple MRBM targets. In fiscal year 2024, we will execute FTX-28 to demonstrate interoperability with Patriot by exchanging Link-16 messages and assess THAAD's capability to detect, track, and discriminate SRBMs with countermeasures (no interceptors).

The Department is continuing development of a missile defense system for defense of Guam against diverse missile threats. We will expand capability and capacity as the threat evolves. In collaboration with the Army and Navy, we are moving toward meeting an INDOPACOM requirement for a persistent 360-degree layered defense capability on Guam against simultaneous raids of cruise, ballistic, maneuvering, and hypersonic threats. Today we are in the early stages of developing the Homeland Defense Radar-Guam (now designated as the AN/TPY-6 radar) and the Aegis Guam System to provide persistent long-range midcourse discrimination, precision tracking, missile engagements, and hit assessment to protect Guam.

We also are developing a layered defense capability against regional hypersonic threats and have initiated a development program for a Glide Phase Interceptor, leveraging existing systems where possible, including proven engage-on-remote and launch-on-remote capabilities. We are focusing on the proven Aegis Weapon System to provide the depth-of-fire needed for a layered defense against hypersonic threats. In fiscal year 2024, MDA will continue to develop and mature the GPI capability and leverage the Aegis Weapon System. Today, MDA already provides the Navy an initial terminal defense capability. We also are working closely with the Navy to develop, field, and upgrade SBT defenses to counter more advanced maneuvering and hypersonic threats. We anticipate delivering these Increment 3 capabilities in 2025. In fiscal year 2024, Aegis SBT will demonstrate an engagement against an advanced target in the terminal phase (FTM-32) and a simulated engagement against a hypersonic glide vehicle (FTX-40). In fiscal year 2025, SBT Increment 3 will demonstrate an engagement against a hypersonic glide vehicle firing an SM-6 Block IAU missile (FTM-43).

We are continuing our cooperative missile defense relationship with Israel, jointly developing and delivering systems to strengthen its missile defenses and increase interoperability between United States and Israeli forces. In fiscal year 2024, our two nations continue to cooperate on engineering, development, co-production, testing, and fielding of the Arrow Weapon System, the David's Sling Weapon System, and co-production for the Iron Dome Defense System. I would like to highlight the March 22, 2022 ceremony for the transfer of the David's Sling Elevated Sensor System from the Israel Missile Defense Organization (IMDO) to the Israel Air Force, a significant milestone for our joint program, with final validation and testing occurring this year. MDA also executed the \$1 billion Iron Dome Replenishment funding to Israel, and participated in contract negotiations and awards, where agreement with suppliers and IMDO increased the U.S. workshare to 30 percent. This increase of U.S. workshare is \$50 million above the mandated 25 percent, thus providing more funding back to the U.S. industrial base.

DEVELOPING TECHNOLOGY TO SUPPORT MISSILE DEFENSE

MDA has an integrated, strategic Science and Technology (S&T) approach to identify, develop, and transition key enabling technologies to the Missile Defense System and the Warfighter. Our S&T investment strategy balances rapid development and fielding of capabilities with leap-ahead technologies for the future system.

MDA is collaborating with the Office of the Secretary of Defense, the Services and Warfighters, National Laboratories, Universities/ Academia, International partners, and industry (traditional and non-traditional defense partners) to implement a coordinated S&T approach to develop advanced missile defenses. We are aligning our S&T roadmap to close capability gaps, develop strategic thrusts, deliver Warfighter requirements, and enhance the future architecture to maximize the transition of cutting-edge and transformational technology to outpace the current and future threat. Specifically, MDA is developing key technologies to support hypersonic defense with the Hypersonic Defense Architecture Risk Reduction and Testing, High Operational Tempo for Hypersonics, and Hypersonic Test Bed efforts, including axial upper stage throttling, communications, seeker windows, material characterization, hypersonic wind tunnel testing, and thermal protection systems.

In the future, MDA seeks to enhance current kinetic kill capabilities with directed energy and other non-kinetic solutions to keep pace with the volume and complexity of threats. MDA is working with OSD and the Services to develop the technologies to support the development and integration of lasers and high power microwave systems, and we are participating in studies to assess the viability of various directed energy weapons to optimize tracking, typing, targeting, and engagement management. MDA continues to work closely with OSD to develop and transition Diode-Pumped Alkali Laser technology out of the laboratory to Industry, and MDA is determining lethality mechanisms using pulsed lasers. We are also developing advanced sensors to improve position accuracy and range estimates of missile threats. The NanoSat Testbed Initiative is a collaborative, experimental approach leveraging

commercial satellite platforms to mature technology and perform risk reduction for encrypted communications in a meshed network in space to support Service and Agency initiatives.

MDA has started Left Through Right-of-launch Integration (LTRI) activities, which will enhance offensive-defensive integration. LTRI will optimize the efficiency and effectiveness of situational awareness between intelligence activities, offensive attack operations, and right of launch defenses, improving overall missile defeat capabilities. MDA has developed a medium fidelity model to simulate LTRI and is beginning to apply Artificial Intelligence and Machine Learning to LTRI. MDA's LTRI activities and collaboration with other partners will optimize missile launch operations and provide data to inform decisionmaking in time critical situations.

CONCLUSION

Chairman King, Ranking Member Fischer, Members of the Subcommittee, we are committed to attracting and building a strong, talented future workforce to meet the mission challenges of tomorrow. I would like to recognize and thank the men and women who serve in our Armed Forces at home and abroad and who operate the integrated Missile Defense System with the support of our dedicated civilian and contractor workforce. I appreciate your continued support for MDA and the missile defense mission, and I look forward to answering the Committee's questions. Thank you.

Senator KING. Thank you very much, Admiral. General VanHerck.

STATEMENT OF GENERAL GLEN D. VANHERCK, USAF, COMMANDER, UNITED STATES NORTHERN COMMAND AND NORTH AMERICAN AEROSPACE DEFENSE COMMAND

General VANHERCK. Chairman King, Ranking Member Fischer, and distinguished Members of the Subcommittee, thank you for the opportunity to appear today and to represent the men and women of United States Northern Command and North American Aerospace Defense Command.

To address today's strategic environment, for nearly 3 years I have focused on four key priorities domain awareness, or the ability to see and detect potential threats in all domains; information dominance, which is the use of artificial intelligence and machine learning to process data more rapidly for strategic advantage; decision superiority, which is the dissemination of data and information to the right leader at the right time from the tactical to the strategic level; and finally, global integration, addressing today's environment with a global and all domain approach vis legacy regional policies and practices.

Those priorities are critical to the successfully defending the Homeland and providing our national leaders with the only thing I can never give them enough of, and that is time. Time to create deterrence options, and if required, defend and defeat options. I believe the greatest risk for the United States stems from our inability to change at the pace required by the changing strategic environment.

Homeland defense must be recognized as essential to contingency plans at home and for power projection abroad, and it is vital that all military planning account for that in reality. In an area of incredible innovation and technological achievement, inflexible, outdated processes are a greater impediment to success than many of our competitors' advancements.

I would like to highlight two areas for the Subcommittee. First, today I remain confident in our current capability to defend the Homeland against a limited Democratic People's Republic of Korea

(DPRK) ballistic missile threat. Looking forward, I am concerned about future capacity and capability to respond to advancing DPRK ballistic missile threats, making it crucial to field the next generation interceptor on time, if not faster.

Second, Russia and the People's Republic of China (PRC) continue to aggressively pursue and field a number of advanced capabilities, including hypersonic weapons and delivery platforms designed to evade detection across multiple domains to strike targets anywhere on the globe, including North America.

Hypersonic weapons are extremely difficult to detect, and counter given the weapons speed, maneuverability, low flight paths, and unpredictable trajectories. Hypersonic weapons challenge North American Aerospace Defense Command's (NORAD's) ability to provide threat warning and attack assessments for Canada and the United States.

Finally, I would like to recognize the tremendous work done by Vice Admiral Hill and the Missile Defense Agency. In my view, the Missile Defense Agency should be the Department's technical integrator to best leverage ongoing multi-domain design and experimentation efforts against current and future air and missile threats regardless of geographical area.

It is clear that the missile threats we face at home and abroad will only continue to grow, and I have been fortunate to work together with a great partner like Vice Admiral Hill in the ongoing efforts to outpace those threats. I look forward to your questions.

[The prepared statement of General VanHerck follows:]

PREPARED STATEMENT BY GENERAL GLEN D. VANHERCK

Chairman King, Ranking Member Fischer, and distinguished members of the Subcommittee: thank you for the opportunity to testify, and for the honor of representing the men and women of U.S. Northern Command (USNORTHCOM) and North American Aerospace Defense Command (NORAD). From the day I assumed Command in August 2020, USNORTHCOM and NORAD have worked tirelessly to defend the Homeland and North America in an extraordinarily challenging strategic environment requiring the commands to adapt new approaches to how we plan, prepare, and operate. That innovation and evolution is necessary to outpace our competitors and is a testament to the devotion of our military and civilian personnel who stand constant watch over the United States and Canada.

The commands have made tremendous progress in a short time, yet much work remains. While the United States military remains the most powerful and professional force in history, and our alliances and partnerships provide a vital strategic advantage over any potential adversary, it is clear that our competitive advantage is eroding. The successful defense of North America requires the Department of Defense to move beyond outdated assumptions and plans that do not fully reflect competitor capability, capacity, and intent to threaten the Homeland. Likewise, continued action is required to build enduring advantages and outpace the gains made by competitors around the globe. This will require the Department to invest in modernization, implement innovative processes, prioritize our personnel and improve civilian hiring practices, and increase agile decisionmaking at all levels.

STRATEGIC ENVIRONMENT

Today's strategic environment is the most complicated and potentially dangerous in my 35+ years of service. Our competitors and potential adversaries, particularly the People's Republic of China (PRC) and Russia, continue to challenge the rules-based international order that has provided global stability and prosperity over the last seven decades. They seek to advance their interests and gain global advantages through political intimidation, economic coercion, cyber and information operations, asymmetric attacks on infrastructure, and the direct threat or actual employment of military force.

The People's Republic of China (PRC)

The PRC remains NORAD and USNORTHCOM's long-term pacing challenge. Beijing continues ambitious military modernization at an alarming pace. It would be naive to think their sprint to develop advanced cyber tools, maritime capabilities, and hypersonic technology has only regional applications, as the PRC continues to develop advanced long-range conventional and strategic capabilities and the infrastructure necessary to project military power at greater distances. Underpinning this growth is a rapid nuclear expansion that is on pace for the PRC to expand their nuclear stockpile from what DOD estimates is over 400 today to about 1,500 by 2035. While less observable, the PRC's aggressive efforts to exploit the information technology sector are accelerating an increasing threat to North America.

The PRC's aggressive actions in the Pacific in mid-2022 following congressional visits to Taiwan illustrate how regional events create geostrategic ripple effects that can quickly reach our shores. President Xi is likely to use his next term in office to double down on the PRC's revisionist foreign policy, and is likely to include global efforts to undermine the United States and bolster partnerships with U.S. competitors, including Russia. In February 2022, Xi signaled his intent to follow this path when he declared the PRC-Russia friendship would have no limits in a public pronouncement just weeks before Russia's illegal and unprovoked full-scale invasion of Ukraine. The PRC has almost certainly watched the war to draw lessons that will inform its next steps toward Taiwan.

Xi's statement also proved to be more than rhetorical when, in May 2022, the PRC and Russia conducted a combined bomber patrol over the Sea of Japan coinciding with the Quad Leaders' Summit in Tokyo. The May 2022 bomber patrol was followed by a second bomber patrol in November 2022. The cooperation is not confined to the air domain. PRC and Russian naval forces conducted a combined patrol in the fall of 2022 that covered 7,000 nautical miles in the Pacific, included a first-ever combined naval transit of the Aleutian Islands, and came on the heels of Xi sending scores of troops to Russia to participate in Moscow's largest annual military exercise. For years, the PRC has relied on Russian military materiel to build its armed forces, and I am aware of reports that the PRC has transferred materiel with military applications to Russia during Russia's war against Ukraine. These actions are more than symbolic and demonstrate the PRC's growing power projection capabilities, which will likely encompass the Arctic in the next decade—a region the PRC is eying with its self-proclaimed status as a near-Arctic State.

Russia

As USNORTHCOM and NORAD take necessary measures to defend against a growing PRC threat, the commands continue to defend the United States and Canada every day against Russian aggression in all domains. Russia's brazen and unprovoked full-scale invasion of Ukraine in 2022 proved that Russia has the capability and capacity to inflict significant damage to infrastructure and other critical targets with its all-domain long-range strike capabilities. Russia also has a history of conducting clandestine operations in other nations to achieve its political objectives. While Russia has overplayed its hand, suffered significant losses to the heroic Ukrainian defense forces, and inadvertently helped to unify NATO, it has gained real-world combat experience as it enters its second year of the full-scale invasion. The meager performance of Russia's ground forces in Ukraine should not overshadow other capabilities it has showcased in Ukraine, including air-and sea-launched cruise missiles capable of striking North America, cyber activities, and economic coercion. For the first time, we also saw Russia employ its new KILLJOY air-launched hypersonic missile in combat.

Concurrent with its war against Ukraine, Russia has also continued to conduct major military exercises and test developmental capabilities that will compound the threat to North America once fielded. In April 2022, Russia tested the massive SARMAT ICBM, a highly capable strategic weapon that helps reinforce the critical importance of a modern and reliable U.S. strategic deterrent. Meanwhile, Russia is testing its special mission Belgorod nuclear submarine, a modern platform capable of carrying the nuclear-capable Poseidon torpedo, designed to hold the Homeland at risk by striking coastal targets from thousands of miles away.

The test of the Belgorod followed Russia's Arctic military exercise that included live-fire cruise missile launches designed to test Moscow's readiness for a conflict in the high north. Last fall, Russia added its first *Severodvinsk*-class conventional and nuclear capable cruise missile submarine to the Pacific Fleet, which poses a new challenge to our defense of the western approaches to North America. In October 2022, in the midst of elevated international tensions stemming from Russian threats to escalate its already brutal campaign in Ukraine, Russia chose to proceed with its annual strategic forces exercise, including demonstrations of multiple nu-

clear strike capabilities. Finally, in January 2023, a Russian *Gorshkov*-class frigate transited the western Atlantic while armed with Tsirkon hypersonic cruise missiles.

I believe it would be shortsighted to view Russia's war against Ukraine as a limited regional crisis. Russia's actions increase the very real risk of miscalculation and the conflict's expansion beyond its current boundaries—scenarios that could rapidly increase the risks to North America and continental defense. If Russia should seek to compel allies to reconsider their support for Ukraine through escalatory actions or follow through with the desperate threats to use nuclear weapons in Ukraine, the risks to the Homeland would increase.

DPRK and Iran

The Democratic Peoples' Republic of Korea (DPRK) tested at least 65 conventional theater and long-range nuclear capabilities over the last year. That number includes the first tests of a new larger, longer range, and more capable ICBM, adding another missile that can likely reach the entire Homeland and one the regime claims is capable of carrying a hypersonic glide vehicle payload. The DPRK tested more missiles in 2022 than any time in its history, showing that the regime will continue to prioritize military capabilities at the expense of needed food and pandemic relief for its people. Public reports of renewed nuclear test preparations further highlight the grave danger this regime poses to regional and global stability. We must remain ready for multiple contingencies and potential crisis on the Korean Peninsula.

The DPRK's reckless pursuit of advanced nuclear capabilities and robust ballistic missile research, development, and testing threatens regional stability, our allies and partners, and potentially the Homeland. However, today I remain confident in our current capability to defend the Homeland against a limited DPRK ballistic missile threat. Looking forward, I am concerned about future capacity and capability to respond to advancing DPRK ballistic missile threats, making it crucial to field the Next Generation Interceptor (NGI) as funded in the fiscal year 2023 Consolidated Appropriations Act (P.L. 117–328).

Iran has not shied away from pursuing malign global activities, including in North America; the regime continues to pose a significant threat to the United States, as well as our partners in the Central Command region. The August 2022 disclosure of an Iranian plot to assassinate a former senior United States official on United States territory illustrated the brazenness of the Iranian Government. The regime's decision to provide Russia with unmanned loitering munitions used to attack civilian infrastructure in Ukraine provides further evidence of Iran's embrace of destabilizing activity. A future decision by the regime to pursue an ICBM-class missile would add yet another threat vector capable of striking North America.

Regional Security Threats

I remain concerned about transnational organized crime in Mexico and the Western Hemisphere and the unrelenting violence it spawns and insecurity it creates, as cartels vie for control of lucrative illicit markets. Cartels control fentanyl, cocaine and methamphetamine trafficking as well as other drugs, and are demonstrating the capability to use improvised explosives and small-unmanned aerial systems against Mexican security forces in Mexico, which will likely embolden the cartels and challenge our partners. As USNORTHCOM supports our law enforcement and international partners in countering transnational criminal organizations in our area of operations, I remain steadfast in my commitment to our military partners in Mexico and The Bahamas.

I commend Mexico's arrest last summer of the cartel member who brutally murdered a DEA agent decades earlier, as well as the recent arrests of Ovidio Guzman Lopez, the son of Sinaloa Cartel leader Joaquin "El Chapo" Guzman, and Jose Rodolfo Villareal-Hernandez, a Mexican cartel leader known as "El Gato." These arrests are examples of a shared commitment to justice, buttressed by shared values and our decades-long partnership, which stands in stark contrast to PRC and Russian malign and self-serving activities in the Western Hemisphere.

I am committed to deepening the already strong partnership with the Mexican and Bahamian militaries to advance our mutual goals, from upholding human rights to ensuring hemispheric defense. I was proud to host my counterparts from the Mexican Department of National Defense (SEDENA) and Department of the Navy (SEMAR) in early 2022 and visit The Bahamas in late 2021, and we will continue to work with Mexico and The Bahamas to stamp out attempts by the PRC or Russia to divide our countries and our partnerships.

Transnational challenges

USNORTHCOM's 20th anniversary offered a reminder of the transnational challenges that have shaped the Command from its inception. Foremost is the enduring transnational terrorist threat to North America, led by Sunni extremist groups and

their supporters in North America. The arrest in August 2022 of an ISIS-inspired individual in New Mexico who had surveilled a United States military base is a stark reminder that military facilities remain attractive targets to terrorists. More broadly, the Taliban's return to power in Afghanistan and violent extremist groups' ongoing presence in the region indicate a renewed threat to the region that we cannot discount. This extremist threat transcends south Asia and extends to other regions with security challenges, including the Middle East and sub-Saharan Africa, where terrorists continue to operate, train, and plan.

Where We Are Today: 20 Years of USNORTHCOM and 65 Years of NORAD

USNORTHCOM was established on October 1st, 2002, in the immediate aftermath of the 9/11 terrorist attacks against the United States, marking the first time since the colonial era a single commander was responsible for the defense of the U.S. Homeland. Twenty years later, the likelihood of a major attack inside the United States by a foreign violent extremist organization has diminished following a generational, whole-of-nation effort. However, the primary threat to the Homeland is now far more significant and consequential. Multiple peer competitors and rogue states possess the capability and capacity to threaten our citizens, critical infrastructure, and vital institutions. These competitors possess, or are developing, the modern capabilities that limit the time and options available to decisionmakers responsible for defending our interests. In addition to destructive kinetic and cyber capabilities, malign actors actively exploit our democratic society by spreading disinformation that drives wedges between our citizens, undermines democracy, and weakens our alliances.

In crisis or conflict, potential adversaries will likely seek to interfere with the Department's ability to project power abroad. Disruptions of military and civilian transportation infrastructure in North America could impede the ability of the United States and Canada to project combat power. Today I assess, as I have for nearly 3 years, that homeland defense is a potential limiting factor to ensuring rapid and effective implementation and execution of global contingency plans. This is due to my lack of domain awareness, limited timely access to forces that are ready to operate throughout my areas of responsibility, including the Arctic, and a lack of resilient infrastructure enabling the Joint Force to fight in and from the Homeland while ensuring forward power projection.

Defending the Homeland against an ever-growing array of kinetic and non-kinetic threats will continue to require a collaborative, whole-of-nation approach to assessing vulnerabilities and developing appropriate deterrence, denial, and defense strategies. Cyber risks to critical infrastructure remain a significant concern and a domain awareness gap. DOD is tasked only with defending defense networks, but military facilities and missions frequently rely on civilian lifelines such as energy grids, transportation infrastructure, and other critical infrastructure. USNORTHCOM, due to law and policy, has limited insight into potential risks to commercial networks, which could lead to uncertainty in planning for consequence management. DOD's establishment of policy regarding the defense of critical infrastructure is a necessary step forward, and USNORTHCOM will continue to work with the Department and key mission partners, to include agencies with critical infrastructure security and cybersecurity responsibilities, to ensure key defense infrastructure is defended from attacks.

NORAD, the unique United States and Canadian bi-national command, was established in May 1958 to defend North America from cold war-era Russian strategic bombers entering United States and Canadian airspace from the Arctic approaches. Sixty-five years later, Russia has restored its capability to threaten North America with modernized bombers, surface ships, and submarines armed with long-range, highly precise nuclear and conventional cruise missiles. The PRC is making rapid progress in developing similar capabilities, which will further complicate NORAD's warning missions and affect national strategic decisionmaking.

While NORAD's missions to provide aerospace warning, aerospace control, and maritime warning remain critical to homeland defense, action and investment are needed to keep pace with competitors that clearly seek to hold North America at risk above and below the nuclear threshold. For decades, NORAD has relied heavily on the North Warning System arrayed along the Arctic coasts of Canada and Alaska to detect potential airborne threats to North America. It is clear that our competitors possess long-range strike capabilities that could be used to attack the United States and Canada from outside the detection range of legacy sensors.

In order to maintain domain awareness and ensure integrated threat warning and attack assessment to national leadership, the United States and Canada must continue to move swiftly to field Over the Horizon Radar (OTHR), as funded in the fiscal year 2023 Consolidated Omnibus Appropriations Act (P.L. 117-328). OTHR is

a proven, affordable technology that will ensure our ability to detect threats from surface to space in the approaches to North America. I commend both the Department of Defense and the Canadian Department of National Defence for their commitment in fiscal year 2023 to investing in OTHR, and I respectfully urge both Governments to ensure this vital capability is fielded as quickly as possible.

NORAD's contributions to homeland and continental defense will remain vital for many years to come, and will continue to rely on strong cooperation and shared investment between the United States and Canada. The United States and Canadian continental defense framework has an unrivaled legacy of success and serves as an international model of defense cooperation. I remain encouraged by the bi-national commitments to modernizing the platforms, sensors, and capabilities necessary to execute NORAD's missions; this collaborative approach to deterring and defending against threats to North America is critical. NORAD must continue to look to the future and take necessary measures today to counter the threats of tomorrow, and investments by the United States and Canada must address kinetic and non-kinetic threats to our nations.

Potential threats to North America routinely transit international borders and the boundaries between United States geographic combatant command areas of responsibility. NORAD's ability to provide timely aerospace warning and control and maritime warning will be bolstered by the United States and Canada's joint commitment to improving global domain awareness, modernizing command and control systems to provide faster, better-informed decisionmaking, and continuing collaborative research, development, and innovation. These efforts will ensure NORAD's ability to compete with the PRC and Russia for years to come while clearly signaling a lasting commitment to a robust, modern, and effective defense of North America.

USNORTHCOM and NORAD Priorities

My priorities for NORAD and USNORTHCOM directly reflect the need to inform the rapid, agile decisions required of senior leaders in this dynamic and complex strategic environment. Our competitors continue to field capabilities specifically intended to strike with limited warning, which decreases the time and options available to national leaders in a crisis. Continuing to trust legacy processes and capabilities increases risk to the Homeland and compounds the risk of miscalculation and inadvertent escalation. USNORTHCOM and NORAD are working urgently to increase the domain awareness, information sharing, and global integration necessary to ensure national leaders have as much time and as many options as possible.

As competitors and potential adversaries continue to field advanced all-domain capabilities with the potential to create significant effects in the Homeland, it is imperative that the United States and Canada move quickly to improve domain awareness from the seafloor to space and cyberspace for all approaches to North America. The Over-the-Horizon Radars (OTHR) funded in the fiscal year 2023 President's Budget, along with the OTHRs announced by the Government of Canada as part of NORAD modernization, will leverage proven technology and will significantly improve the ability of USNORTHCOM and NORAD to detect and track potential threats to North America and the Homeland from the Earth's surface to space. That capability, in turn, will directly correlate to more time available to leaders at all levels, enabling the creation and employment of better deterrence options and if required, defeat options.

U.S. Space Force investments in advanced space-based missile warning sensor capabilities show great promise with particular regard to hypersonic and advanced missile threats. These future systems will detect, track, and identify threats, including hypersonic threats, enable better warning and assessment, and develop actionable targeting solutions, at a much faster pace than we currently experience, while also delivering an inherent operational resilience. Given our competitors' advanced maritime domain capabilities, I fully support the Navy's investment in a modernized Integrated Undersea Surveillance System. These capabilities, in turn, will directly correlate to more time and options available to produce a favorable outcome for the United States and Canada.

Canada's plans to fund a layered surveillance system that will improve shared domain awareness in the northern air and maritime approaches to North America will have significant, long-term benefits for both NORAD and USNORTHCOM's missions. Planned Canadian investment in Arctic and Polar radars and spaced-based surveillance systems, along with advanced munitions, communications, and infrastructure clearly demonstrates shared commitment to NORAD and the combined defense of the United States and Canada.

In addition to the investment in OTHR, NORAD and USNORTHCOM have also demonstrated the potential for linking existing platforms and sharing data with

multiple commands, interagency and international partners. By sharing data previously trapped in bureaucratic and organizational stovepipes through innovative programs like Pathfinder, Northstar, and the Global Information Dominance Experiments (GIDE), USNORTHCOM and NORAD have proven that it is possible to rapidly improve domain awareness and streamline global information sharing without the costs associated with fielding exquisite new capabilities. It is crucial that the Department of Defense and the Services, as well as the Canadian Department of National Defence, continue the work to unlock the remarkable potential of these initiatives.

I am encouraged by the establishment of the Department's Chief Digital and Artificial Intelligence Office (CDAO), and I believe that the CDAO must be empowered to rapidly integrate systems, software and platforms in order to maintain our competitive advantage across the Joint Force. Over the past several years, actions by each of our competitors and potential adversaries have made it clear that regional actions have global diplomatic, economic, and military ramifications. It is simply unrealistic to assume that crises will remain confined by artificial boundaries, and we must adapt plans and perspectives to account for that global reality.

The feasibility of every other Geographic Combatant Command's plans will require active campaigning in and from North America, and successful defense of the Homeland is necessary to deter adversaries and assure allies and partners. Therefore, I have also directed that USNORTHCOM and NORAD prioritize homeland defense campaigning to demonstrate our readiness, capabilities, and resiliency. I am also operationalizing the commands to accelerate the flow of information from sensor to decisionmaker. Our competitors and potential adversaries have shown that they will hold the Homeland at risk in a conflict, and USNORTHCOM and NORAD are acting today to ensure homeland defense plans are understood, exercised, and resourced.

While USNORTHCOM and NORAD have made strides in the Homeland defense mission, building a resilient Joint Force is a fundamental element of all Department planning, exercises, and operations. The DOD's worldwide missions and responsibilities must evolve from regionally focused approaches to globally integrated efforts that account for finite resources and associated risks. At present, I am concerned for the commands' ability to execute assigned missions—including contingency and operations plans in support of homeland defense. I am limited by a lack of timely access to forces that are organized, trained, and equipped to operate throughout the NORAD area of operations and the NORTHCOM area of responsibility, as well as by insufficient supporting infrastructure.

A strong homeland defense is the foundation of our Nation's ability to project power globally while deterring aggression and achieving our strategic objectives in competition, crisis, and conflict. As such, every plan, exercise, and policy decision must consider the necessity of defending the Homeland when evaluating competing demands for forces and threats to global campaigning. That, in turn, will require the Department of Defense and the Canadian Department of National Defence to place greater focus on developing the depth, flexibility, advanced technologies, and supporting infrastructure required to respond to future challenges while addressing growing threats to the Homeland.

Defense Support of Civil Authorities (DSCA)

When directed by the Secretary of Defense, USNORTHCOM provides Defense Support of Civil Authorities (DSCA) in the Continental United States, Alaska, and Puerto Rico. In preparing for and responding to major natural and human-caused disasters, USNORTHCOM serves as the DSCA synchronizer to support assessment and recovery while simultaneously acting as the supported combatant command in the command's area of operations.

USNORTHCOM often supports Federal, State, tribal, territorial, and local (FSTTL) disaster relief efforts. These collaborative, whole-of-government efforts demonstrate national resilience that should reassure the American public, while also making clear to potential aggressors, that the United States routinely executes interagency domestic relief operations that allow our Nation to recovery quickly following even large-scale disasters. It is equally important for our FSTTL partners to identify and address their capabilities and capacity gaps to fully perform the roles, missions, and operations under their authorities. This kind of response, particularly when it is accomplished with little or no military support, can generate a deterrent effect by casting doubt in competitors' minds about their ability to produce significant effects from an attack on the Homeland.

USNORTHCOM is uniquely suited to support our Federal partners in the aftermath of a chemical, biological, radiological, or nuclear (CBRN) attack. The Department must remain committed to this crucial mission to ensure these highly trained,

specialized elements stand ready to respond immediately in the event of a weapon of mass destruction event in the United States.

I continue to stress the importance of USNORTHCOM's defense support of civil authorities, as rapidly executed, well-planned, multi-agency responses to wildfires, hurricanes, pandemics, and other significant disruptions are perhaps the most visible demonstration of the military's support to the American people. USNORTHCOM works year-round with our mission partners at every level to strengthen relationships, improve communications, and incorporate lessons learned from previous responses in order to deliver rapid and effective support to lead Federal agencies. Our command takes tremendous pride in supporting our FSTTL partners, while helping to highlight the resourcefulness and solidarity of the American people in the face of adversity. It should be clear to competitors and potential aggressors that the United States routinely responds to and recovers quickly from large-scale disruptions—and USNORTHCOM is always ready to support those efforts with military capabilities as directed by the Secretary.

USNORTHCOM support to civil authorities includes the command's ongoing support of Federal law enforcement efforts to counter the transnational criminal organizations (TCOs) that have caused so much harm to our Nation. Illicit drugs trafficked by transnational criminal enterprises kill more than one hundred thousand U.S. citizens each year, and the number of fatal overdoses have risen dramatically as cartels have increased the volume of fentanyl smuggled into the United States. As directed by the Secretary of Defense and in accordance with my direct guidance, USNORTHCOM's subordinate command, Joint Task Force North (JTF-N), provides U.S. Federal law enforcement partners with intelligence and counter-threat finance analysis and other support as requested to disrupt the sophisticated financial and physical networks used to infiltrate illicit goods and exploited human traffic into the United States. The important work done by USNORTHCOM and JTF-N in countering transnational criminal organizations and disrupting the flow of illegal drugs into the United States is a national security imperative that directly supports homeland defense.

Natural disasters, public health threats, and transnational irregular migration will likely continue to require DOD support for our lead Federal partners. Environmental change will also continue to have a direct impact on military readiness and resources, as was made clear by the massive destructive power of Hurricane Ian in September 2022 and by western wildfires that are growing in scale and frequency as fire seasons now extend throughout most of the year. It is necessary to plan and account for the growing likelihood of natural disasters that disrupt military operations and damage critical infrastructure, while units involved in response operations require time to reset and recover after completing their missions. The long-term consequences of extreme weather, rising sea levels, and increased flooding will continue to affect DOD missions, infrastructure, and personnel, especially those in the Homeland.

Security Cooperation

In addition to our more visible homeland defense and DSCA operations, USNORTHCOM continues to reap tremendous benefits from our military-to-military relationships with our allies and partners in Canada, Mexico, and The Bahamas. Security cooperation with our neighbors is crucial to regional security, countering the influence of peer competitors, and addressing shared challenges. Security cooperation provides a critical and lasting advantage over our more isolated competitors, and I am grateful to the Department and to this Committee for your ongoing support of USNORTHCOM's vital work with our allies and partners. I am proud to work with my military counterparts in Canada, Mexico, and The Bahamas as we support one another's efforts to defend our nations and stand united against malign actors seeking to expand influence and presence in the Western Hemisphere.

The military-to-military relationship between the United States and Canada remains extraordinary and vital. In addition to standing side by side as partners in NORAD for nearly 65 years, Canada has been a stalwart ally in continental defense and operations overseas for decades. The unique trust between our militaries is immediately apparent within the USNORTHCOM and NORAD headquarters, as United States and Canadian personnel work side-by-side in pursuit of shared missions and objectives. The Canadian Armed Forces' shared commitment to improved domain awareness, information sharing, and modernization of the capabilities necessary for deterrence and continental defense is essential to our united efforts to defend North America, and I am fortunate to serve alongside such steadfast and trusted allies.

The Mexican Department of National Defense (SEDENA) and Department of the Navy (SEMAR) continue to meet daunting internal and external security challenges

with professionalism and resiliency. Keenly focused on enhancing regional defense, our Mexican military partners continue to make major investments in a modern, capable, and reliable force capable of interoperability with the United States and other partners. In light of that important effort, USNORTHCOM strongly supports SEDENA and SEMAR modernization initiatives, including the potential divestment of their fleet of MI-17 helicopters in favor of Western helicopters.

In April 2022, it was my honor to host the Secretaries of SEDENA and SEMAR at USNORTHCOM for the Bilateral Military Cooperation Roundtable (BMCR). During this important annual dialog, USNORTHCOM and our Mexican military partners conducted a candid and highly productive assessment of our mutual security challenges, associated requirements, and shared commitment to addressing threats to our nations. Over the course of 3 days, Secretary General Sandoval, Secretary Admiral Ojeda, and I reaffirmed our military-to-military relationship and committed to a number of concrete steps that will have significant and lasting positive impacts on regional security.

Our partners in the Royal Bahamian Defence Force (RBDF) continue to punch above their weight as they continue to provide important contributions to regional security. USNORTHCOM and the RBDF operate maritime surveillance systems at Great Inagua and Coral Harbour, and plans are on track to add a third site in the coming years. That shared capability has significant benefits for domain awareness in the southern approaches to North America and demonstrates The Bahamas' ongoing commitment to security cooperation with USNORTHCOM. Our collaboration has taken on added importance as the PRC's diplomatic corps in Nassau continues to produce anti-United States public statements while highlighting Chinese economic investment and humanitarian relief efforts in The Bahamas.

USNORTHCOM is strongly committed to a long-term partnership with the RBDF, and continued whole-of-government engagement and investment by the United States. As you know, the United States has been without a confirmed Ambassador to The Bahamas since 2011. No action was taken on the President's nominee last year, and the nomination was resubmitted in January 2023. This senior diplomatic position is critical to demonstrating the importance of the relationship between the United States and The Bahamas and to mitigating the PRC's efforts to gain a foothold only 50 miles from the United States east coast.

The Arctic

The ability of the joint force to operate and campaign in the Arctic remains a pressing concern for USNORTHCOM and NORAD. The PRC and Russia continue to invest in Arctic capabilities as both seek to increase presence and influence in the region while shifting the rules-based international order to their advantage. More than 50 percent of USNORTHCOM's area of operations is in the Arctic, and USNORTHCOM and NORAD's priorities in the region continue to focus on increased presence, campaigning through joint training and exercises, and close collaboration with allies and partners.

The effects of environmental change in the Arctic will have significant impacts on accessibility, infrastructure, and competition for the foreseeable future, and the region remains the most unforgiving operational environment on earth. As the Department balances the demands of global mission requirements with difficult budgetary choices, USNORTHCOM and NORAD require access to trained and ready forces capable of operating throughout the commands' areas of responsibility—to include the Arctic. The Joint Force must keep sight of the fact that special training and purpose-built equipment are necessary to operate in a region in which extreme climate, distance, and geography quickly overtake the unprepared.

Over the last year, USNORTHCOM and NORAD collaborated with USEUCOM, USINDOPACOM, USTRANSCOM, USSOCOM and the military Services while conducting joint exercises in Alaska, Greenland, and northern Canada. These demanding events expose Joint Force participants to the demands of the Arctic operating environment and help to reinforce the necessity of a force trained and equipped to survive in the extreme cold and remoteness that defines much of the region. I am encouraged by the strategic objectives stated in the United States National Strategy for the Arctic that support better understanding of the region, exercising presence, and capitalizing on the definitive advantage of our international alliances and partnerships.

While the military Services' respective Arctic strategies acknowledge the importance of the Arctic and the need to develop the capabilities needed to operate and compete in the region, direct investment in Arctic-capable platforms, training, and infrastructure continues to lag. It is necessary that the Joint Force has the ability to compete, fight, and win in the Arctic in the coming years, and the time for the Services to invest in the required equipment, infrastructure, and training is now.

The PRC and Russia have clearly demonstrated their intent to expand their Arctic presence and operations, and I urge the Department of Defense, the Services, my fellow combatant commanders, and the Canadian Department of National Defence to move faster toward improving our collective ability to succeed in this strategically vital region.

Conclusion

Homeland defense remains the core mission of both USNORTHCOM and NORAD. The one constant throughout my time in command has been the extraordinary pace at which our competitors have advanced their capabilities to threaten the Homeland. Despite those clear risks, the processes used by the Department of Defense and the Canadian Department of National Defence for planning, acquisitions, personnel hiring, technology development, and other activities necessary to the success of the defense enterprise remain largely unchanged from when I received my commission nearly 36 years ago.

As competitors develop greater capability, capacity, and intent to challenge the United States, Canada, and the rules-based international order, I believe that the greatest strategic risk for the United States stems from our own inability to adapt at a pace required by the changing strategic environment. In an era of incredible innovation and technological achievement, inflexible, outdated processes are a greater impediment to success than many of our competitors' capability advancements. We cannot continue to rely on Industrial Age practices and legacy platforms to compete in a digital age, and if we fail to evolve at the pace demanded by the strategic environment, our competitive advantage will continue to erode.

The Department and Congress must also be more willing to accept the relatively low risks associated with retiring legacy platforms in order to ensure our ability to fight and win against advanced and well-resourced competitors. Over the last decade, the PRC and Russia have made extraordinary technological advancements while the Department remains encumbered by obsolete capabilities and associated costs. To defend the Homeland, USNORTHCOM and NORAD require a modern force with the capacity and capability to deter and if required defeat advanced peer competitors. Retiring systems that have exceeded their operational lifespans—to include fighters and command and control platforms at the end of their service lives—is necessary to accelerate the arrival of next generation capabilities.

Along with faster, more flexible development and acquisitions, the Joint Force requires predictable and timely funding to maintain readiness and increase capability, capacity, and resilience. The Continuing Resolutions that have become commonplace over the last decade have direct and lasting adverse consequences for military readiness, modernization, and planning. Predictable, on-time annual budgeting and appropriations, along with streamlined Department processes and greater tolerance for risk in developing and testing new capabilities, are essential to maintaining our competitive advantage.

The need to move faster is clear. The PRC and Russia have already fielded highly advanced hypersonic capabilities, while the United States' hypersonic program, although accelerating, still languishes well behind our competitors' efforts. Further, DOD faces operational challenges with civilian hiring processes for recruiting and hiring the innovative and experientially diverse workforce needed to drive innovation and advancement on pace with the civilian tech sector. Simply put, the Department must continue to strategically tackle hiring and personnel management improvements to move its workforce goal of being an employer of choice forward.

Finally, the PRC high altitude balloon (HAB) incursion into our national airspace was obviously a significant event that shined a light on the PRC's brazen intelligence collection against the United States and Canada. It was the first time USNORTHCOM conducted an engagement over the United States in our history, and it made it clear that our competitors have the capability and intent to reach the Homeland. The three Unidentified Aerial Phenomena (UAPs), also shot down days later by USNORTHCOM and NORAD, clearly demonstrated the challenges associated with detecting and identifying unmanned objects in U.S. airspace. As for NORAD and NORTHCOM, I commit to you that this event has already generated critical lessons learned for my commands and our mission partners, and I can guarantee that NORTHCOM and NORAD are going to continue to learn from it and do whatever is necessary to keep our country safe.

While we face significant challenges, there should be no doubt we have the finest military on the planet and that the commands will defend our nations with tenacity and resolve. In what is likely my final appearance before this subcommittee, I remain deeply humbled and immensely proud to lead the noblest mission of any Combatant Command—defending the Homeland. I am grateful to the subcommittee for your longstanding support of our missions and of the men and women who stand

watch over our Nation every day. I thank you for the honor of representing our soldiers, sailors, airmen, guardians, marines, and civilians.

Senator KING. Thank you, General. General Karbler.

**STATEMENT OF LIEUTENANT GENERAL DANIEL L. KARBLER,
USA, COMMANDING GENERAL, UNITED STATES ARMY SPACE
AND MISSILE DEFENSE COMMAND**

Lieutenant General KARBLER. Chairman King, Ranking Member Fischer, distinguished Members of the Subcommittee, I am honored to again testify before you and to represent an incredible people-first organization of 2,600 soldiers and civilians across 13 time zones in 19 dispersed locations.

Every day these amazing professionals provide space, high altitude, and missile defense forces and capabilities to the Army and joint warfighters. First, let me express my sincere appreciation for your steadfast support of our people and their families.

I serve as the Commanding General of the U.S. Army Space and Missile Defense Command, the Commander of the Joint Functional Component Command for Integrated Missile Defense, and as the Army's Proponent for Air and Missile Defense, or AMD.

I provide U.S. Northern Command the soldiers who stand ready to defend our Nation from intercontinental ballistic missile attack, serve as the Army's Service Component Commander to both U.S. Strategic Command and U.S. Space Command, and I am the Chief of Staff of the Army's AMD enterprise integrator.

I would like to first discuss the threats that confront us worldwide. In Europe, we see daily the continuation of the largest employment of offensive missiles since World War II and the unprecedented use of attack unmanned aerial vehicles (UAVs) in Russia's nearly 15-month war against Ukraine. In the Pacific, against the backdrop of multiple missile tests by the DPRK and China, threats of regional and trans regional, complex missile attacks still loom.

In the United States Central Command area of responsibility (CENTCOM AOR), our adversaries continue to attack partner nations and U.S. Forces using missiles, UAVs, and rockets, artillery, and mortars. I have been an air defender for 36 years, stationed and deployed in the European, Pacific, and Middle Eastern theaters, and I have never seen adversary threat activity, whether that be test or operational use, as great as I see it today.

Adversary actions in the space domain are equally as aggressive as they continue to challenge us across multiple space-enabled mission areas critical to supporting our missile defense mission. To address these threats, we must strengthen our capabilities to deny our adversaries the benefit of aggression.

We must continue investment in sustainment of combat ready, capable, and lethal space and air and missile defense capabilities. Fortunately, we do not face these threats alone. We have allies and partners who contribute significantly to the air and missile defense and space missions. Please allow me to briefly outline just a couple of milestones accomplished by our space and missile defense soldiers and civilians.

This past year, we have partnered with U.S. Army Special Operations Command and U.S. Army Cyber Command to create a Space, Cyber, Special Operations triad to provide deterrence and

response options through the integrated use of our unique capabilities.

We have continued to mature the triad through multiple exercises to include the Army's Project Convergence 22 and U.S. Army Special Operations Command Capability Exercise, which was held just last week.

Recently, we reached a historic milestone in the air defense enterprise, with the full rate production decision for the Integrated Air and Missile Defense Battle Command System, IBCS. This any-sensor, best shooter construct allows us to integrate the right quantity and mix of air and missile defense capabilities across all echelons, building an effective, tiered, and layered defense.

We need to greatly add incredible soldiers to the any sensor, best shooter construct, as these men and women will play the most critical role in this transformative capability. This is the linchpin of the Army's broader air and missile defense modernization efforts, crucial to enhancing our air and missile defense capabilities well into the future.

In closing and on a personal note, this will be my last opportunity to address the distinguished Members of this Subcommittee, and I went to, again, thank you for your support. I am confident in the direction and momentum of the Army's air and missile defense, and space enterprises. I look forward to addressing your questions. Thank you.

[The prepared statement of Lieutenant General Karbler follows:]

PREPARED STATEMENT BY LIEUTENANT GENERAL DANIEL L. KARBLER

INTRODUCTION

Chairman King, Ranking Member Fischer, and distinguished Members of the Subcommittee, thank you for your continued support for our servicemembers, civilians, and families and your continued support for the Army, U.S. Strategic Command (USSTRATCOM), U.S. Space Command (USSPACECOM), Department of Defense (DOD), and the space and missile defense community. Thank you also for inviting me to highlight the importance of space and missile defense capabilities and ongoing enhancements that enable the defense of our Nation, forward stationed and deployed forces, allies, and partners.

Today, with my assigned roles, I bring both an Army and a joint perspective on effective space and missile defense concepts and capabilities. Within the Army and joint communities, my responsibilities encompass several mission areas.

As commander of the U.S. Army Space and Missile Defense Command (USASMDC), I serve as the Army's force modernization proponent and operational integrator for space, missile defense, and high-altitude capabilities. In short, USASMDC provides trained and ready space and missile defense forces and capabilities to the warfighter and the Nation. With regard to missile defense, I am the Army Service Component Commander responsible for planning, integrating, coordinating, and providing Army missile defense forces and capabilities in support of USSTRATCOM missions. Additionally, I am a supporting commander to the Commander, U.S. Northern Command (USNORTHCOM), for the Ground-based Mid-course Defense (GMD) System. In the space mission area, I am the Army Service Component Commander to USSPACECOM, providing trained and ready Army space warfighters and capabilities to compete, fight, and win in the space domain.

As the Army's air and missile defense (AMD) enterprise integrator, I synchronize the balanced execution of the Army's AMD posture across the functions of force planning and sourcing requirements, combat and materiel development, AMD acquisition, and life cycle management. I coordinate with the AMD community of interest to balance priorities, inform resourcing decisions, and pursue innovative approaches to fulfill our AMD mission requirements.

Finally, as Commander of USSTRATCOM's Joint Functional Component Command for Integrated Missile Defense (JFCC IMD), I am responsible for providing operational-level comprehensive missile defense expertise in support of

USSTRATCOM's Unified Command Plan (UCP)-assigned trans-regional missile defense (MD) mission. This trans-regional MD mission includes plans and policy support and assessment, integration of MD security cooperation activities, operations support, joint MD training, education, and exercise support, and support to missile defense capability development on behalf of the combatant commanders (CCDRs), the Joint Staff and the Secretary of Defense. These efforts contribute to an integrated deterrence approach that denies the benefits of missile attack to adversaries, assures allies, and defends U.S. deployed forces, allies, and partners.

The operational environment continues to evolve at unprecedented speed. China continues to bolster its anti-access/area denial strategy in the Western Pacific and pressure its neighbors with increasingly provocative behavior. In their unprovoked invasion of Ukraine, the Russian Federation launched an unprecedented number of offensive missile systems, including hypersonic weapons. China, Russia, and other potential adversaries form a globally capable, mutually supporting, threat set. The United States and our allies face significant increases in the density, diversity, and operational reach of lethal offensive missile systems. The proliferation, range, and maneuverability of these weapons require an increasingly trans-regional approach to missile defense. The sensors; battle management, command, control and communication and intelligence (BMC3I) architectures; and other supporting components of trans-regional missile defense will progressively migrate to space-based platforms such as the Space Development Agency's Proliferated Warfighter Space Architecture in the years to come. This greater emphasis on the convergence of space and missile defense is the logical extension of our need to evolve our means for birth-to-death tracking and targeting complex missile and hybrid hypersonic threats from a position of advantage. However, given the scale of the problem, these new tracking and warning capabilities must be complemented by a broader whole-of-government approach to comprehensive missile defeat, leveraging the full range of available activities and capabilities to counter both the use of adversary missiles, and their development, acquisition, and proliferation. The trans-regional missile defense contribution to this missile defeat initiative includes existing as well as new and novel approaches to negate adversary systems both before and after launch without reliance on the increasingly difficult hit-to-kill mechanisms of our legacy missile defense systems. Integrating this diverse set of capabilities focused specifically on this initiative is critical to its success.

We must advance trans-regional missile defense through continued investment and sustainment of combat-ready, integrated, capable, and lethal air and missile defense and space capabilities, combined with those of our allies' and partners' as part of a comprehensive approach to missile defeat supporting integrated deterrence. This remains essential in ensuring our Nation's security.

PEOPLE FIRST

USASMDC and JFCC IMD, comprised of multi-component Soldiers, Airmen, Sailors, Marines, Guardians, and dedicated civilians and contractors, cannot carry out our wide-ranging, no-fail national security missions without the commitment of our greatest asset—our people. We prioritize “People First” as we recruit, train, and develop space and missile defense professionals. Our People First mandate has six values: communication, recognition, trust, teamwork, transparency, and empowerment. Despite the many challenges introduced by the COVID-19 pandemic, our professionals continued providing space and missile defense capabilities that support combatant command (CCMD) plans and operations. It is our people who make us strong; it is our people who make winning possible.

U.S. ARMY SPACE AND MISSILE DEFENSE COMMAND

To accomplish our vision of providing space, missile defense, and high-altitude forces and capabilities to support joint and combined warfighting readiness in all domains, USASMDC is organizationally aligned to accomplish three major tasks. These are: providing forces and capabilities for current operations; preparing forces and capabilities for the future fight; and researching and developing Army technologies to provide future advancements in space, air, and missile defense capabilities.

The command aligns its activities to these priorities:

- Accomplish our mission as a People First team of empowered, innovative, ready, and resilient professionals.
- Provide trained and ready forces for space, missile defense, and high-altitude missions.
- Conduct integrated planning and synchronized operations in the execution of our space and missile defense missions.

- Prepare for future conflict.

RECENT CONTRIBUTIONS AND UPGRADES TO ARMY SPACE AND MISSILE DEFENSE
CAPABILITIES

The people of USASMDC and JFCC IMD continue to learn new ways to operate, accomplish our missions, enhance capabilities, and support global theaters. Throughout the last several months, we have realized essential space and missile defense operational, capability, and training successes, a few of which follow.

- We are currently upgrading our Joint Tactical Ground Stations (JTAGS) configuration at our four theater missile warning company locations. Once fielded, this upgrade will significantly improve our missile warning, missile defense cueing, and battlespace characterization capabilities in support of multidomain operations, and it will enable us to keep pace with rapidly growing, complex, and capable threat systems.
- In March 2022, the Army relocated two European-based Patriot missile defense batteries to Poland. This defensive relocation reinforces our Nation's commitment to Article 5 and to proactively deter any threats on NATO's Eastern flank.
- During a March 2022 joint exercise, a subordinate air defense regiment under the European-based 10th Army Air and Missile Defense Command successfully deployed four Maneuver-Short Range Air Defense (M-SHORAD) Stryker-based platforms to the eastern NATO region. This deployment demonstrated the Army's newest short-range air defense system's ability to defend maneuver forces against unmanned aerial systems (UAS), rotary-wing, and fixed-wing air threats.
- Our Army Space Training Division (ASTD) served as the lead proponent for equipping Army divisions and training centers with essential training aid devices that enable organizations to train in a degraded and disrupted space operations environment. With fielding completed, ASTD will lead future efforts on life cycle replacement of these devices.
- The USASMDC Technical Center leveraged commercial synthetic aperture radar imaging of current interest locations and, using artificial intelligence and machine learning algorithms, provided key operational data to tactical warfighting organizations.
- Support to significant testing and exercises remains a priority. Earlier this year, Air Defense Artillery (ADA) soldiers participated in the Terminal High Altitude Area Defense (THAAD) Flight Test-21, where two Patriot Advanced Capability-3 (PAC-3) Missile Segment Enhanced (MSE) interceptors were integrated with THAAD software to successfully intercept two short-range ballistic missiles. This integration enables earlier interceptor launch and results in a longer fly out time, which increases the defended area or battlespace. Our ADA soldiers also recently participated in the initial operational test and evaluation of the successful Integrated Air and Missile Defense Battle Command System (IBCS) test. During this event, IBCS maintained continuous tracking of two cruise missile targets by fusing data from multiple sensors while degraded by an electronic attack. Finally, we continue to deploy Army space professionals to numerous joint and partner nation exercises and wargames.
- In addition to exercise support, operational deployments to CCMDs continue. Our 1st Space Brigade rotated an Army Space Control Crew to U.S. Indo-Pacific Command (USINDOPACOM), an Army Space Support Team to both U.S. Central Command (USCENTCOM) and U.S. European Command (USEUCOM), and Space Control Planning Teams to USEUCOM and USSPACECOM.
- Our Force Tracking Mission Management Center continues to support global operations in the USCENTCOM, U.S. Africa Command, and other CCMD geographic areas of responsibility. The Center provided vital management and dissemination of friendly force tracking data to theater commands.
- Our Advanced Warfare Environment / Tactical Geospatial Environment system developed to provide AMD Intelligence Preparation of the Battlespace for Army AMD units has proven to be a primary analysis system used by the Missile and Space Intelligence Center to analyze and document Russia-Ukraine missile operations for intelligence community assessments.

PROVIDING FORCES AND CAPABILITIES FOR CURRENT OPERATIONS

In accordance with Title 10 responsibilities, USASMDC is a force provider of missile defense capabilities. Our first major task is to provide trained and ready missile defense forces and capabilities to CCDRs. USASMDC soldiers serving in the Homeland and stationed in remote and austere forward locations operate the GMD and AN/TPY-2 Forward-Based Mode (FBM) radars. Highlights of the capabilities pro-

vided to current operations and readiness by our missile defense professionals include:

Support to Homeland Missile Defense: Soldiers from the 100th Missile Defense Brigade (MDB), headquartered in Colorado Springs, Colorado, and 49th Missile Defense Battalion, headquartered at Fort Greely, Alaska, stand ready to defend our Nation from intercontinental ballistic missile (ICBM) attack 24/7/365. In support of USNORTHCOM, Army National Guard and Active Component soldiers operate the GMD Fire Control Systems located at the Fire Direction Center in Alaska; Missile Defense Element in Colorado; a detachment that oversees operations at Vandenberg Space Force Base, California; and a detachment that secures GMD sensor infrastructure at Fort Drum, New York. At the Fort Greely Missile Defense Complex, the 49th Missile Defense Battalion military police, with augmentation from the Mississippi National Guard, secure interceptors and command and control (C2) facilities from physical threats. These security soldiers perform their duties in some of the most austere conditions in the United States, with winter temperatures plummeting to 50 degrees below zero and fewer than 4 hours of sunlight in the winter months.

1st Space Brigade soldiers provide CCDRs certified AN/TPY-2 FBM missile defense batteries that support strategic and regional missions. These batteries are globally located in five strategic, yet remote and austere locations, where they provide ballistic missile search, track, and discrimination operations, as well as Space Domain Awareness, in support of both homeland and regional defense and USSPACECOM's Global Sensor Manager responsibilities. These soldiers continuously demonstrate our Nation's commitment to defend deployed forces, allies, and partners from ballistic missile attacks.

Support to Global Missile Defense Test and Development: Soldiers from the 100th MDB and 49th Missile Defense Battalion participate in GMD test activities and work with Missile Defense Agency (MDA) developers on enhancements to the GMD. The MDA's testing regime, conducted through a series of ground-based and operational flight tests, emphasizes operational realism during test design and execution. This realism enables system operators to sustain and improve their proficiency and validate the system's operational employment.

Global Missile Defense System Development: MDA continues to evolve the GMD weapon system to enhance existing capabilities, as well as deliver new capabilities. The Next Generation Interceptor (NGI), once developed and fielded, will be a significant upgrade compared to the current interceptor fleet, providing the warfighter with improved system performance and greater reliability.

Space Support to Missile Early Warning: Space-enabled capabilities are essential for missile defense operations. They provide and enable communications; positioning, navigation, and timing (PNT); intelligence; and surveillance to meet the demands of modern warfare. In support of joint force commanders, USASMDC continues to provide missile warning within the USEUCOM, USCENTCOM, and USINDOPACOM theaters of operations. The 1st Space Brigade's forward stationed JTAGS theater missile warning companies are essential for USSPACECOM's assured missile warning mission. They are operated by USASMDC soldiers who monitor launch activity and other events observed by infrared sensor platforms and quickly provide information to members of the AMD and operational communities. The JTAGS forward stationing reduces the risk of solely relying on long-haul communications and ensures the resilience of USSPACECOM's comprehensive missile warning system.

PREPARING FORCES AND CAPABILITIES FOR THE FUTURE FIGHT

USASMDC's second major task is to develop future missile defense forces and mature current capabilities. The Space and Missile Defense Center of Excellence (SMD CoE) is the Army's force modernization proponent responsible for managing change to Army doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPF-P) requirements for space, strategic missile defense, and high-altitude capabilities. The SMD CoE trains and educates soldiers and leaders to be agile, adaptive, and ready; executes life cycle management for Army space operations officers; develops Army Space soldiers; and enables informed decisionmaking.

To carry out its mission, the SMD CoE executes practices established by U.S. Army Training and Doctrine Command and Army Futures Command to meet force management and Army modernization enterprise responsibilities. These functions include performing concept development, capabilities determination, and capabilities integration relative to DOTMLPF-P for process change, integration, and transition for materiel development.

Specifically, in the training arena, SMD CoE conducts the Army's institutional soldier qualification training and education for space and GMD mission areas. The SMD School writes, coordinates, and publishes Army doctrine for space and GMD while also integrating space training and education in curriculum across all Army proponent schools, operational unit home stations, and pre-deployment training events. These efforts prepare soldiers across all warfighting functions to integrate Army and joint space and missile defense capabilities and effects in the conducting of multidomain operations.

RESEARCH AND DEVELOPMENT OF ARMY TECHNOLOGIES

USASMDC's third major task is to provide critical technologies to address future needs that will enhance warfighter effectiveness. USASMDC's Technical Center supports joint warfighters by providing science, technology, and test and evaluation expertise to enable warfighter dominance both today and in the future. The Technical Center contributes to warfighter and joint force success in four major areas: directed energy (DE); tactical responsive space and high altitude; test and evaluation; and hypersonic and strategic weapons.

Directed Energy: The Technical Center, in coordination with the Army's Rapid Capabilities and Critical Technologies Office, is the Army lead for high-energy laser technology development. High-energy lasers complement kinetic systems in addressing threats from rocket, artillery, and mortars; small UASs; and cruise missiles. Additionally, the Technical Center is exploring high-power microwave technology for use in interdicting a multitude of improvised threats. As systems are fielded, the Technical Center will continue developing new and improved DE technologies for insertion into weapon systems to maintain warfighter dominance.

Tactical Responsive Space and High Altitude: As the Army lead for space and high-altitude research, development, and engineering, the Technical Center identifies, develops, demonstrates, and integrates technologies in the areas of responsive space, space superiority, and high altitude. Working with other Army, DOD, and industry partners, the Technical Center focuses on persistent beyond line-of-sight communications for forces in remote areas; functionally effective resolution imagery; solutions for assured PNT; ground C2 systems; and direct downlink of data from space-based systems to deployed forces.

Test and Evaluation: As an invaluable part of the Army test and evaluation enterprise, the Technical Center supports developmental and operational AMD defense testing with a suite of low-cost ballistic missile targets, transportable and configurable launchers, and test execution and evaluation. These ballistic missile targets are critical to threat-representative, operationally realistic testing of high-priority Army systems such as Patriot, THAAD, and IBCS, with ongoing testing for the Lower Tier Air and Missile Defense Sensor (LTAMDS).

Hypersonic and Strategic Weapons: Since completing the Nation's first successful hypersonic testing for the Army, Navy, and Air Force, from test planning and design through mission execution and post-flight analysis. Additionally, the Technical Center continues to develop capabilities that enable rapid systems development and fielding through integration and interoperability testing, sensor and C2 design, flight test analysis, verification and validation, and warfighter training within an independent laboratory infrastructure.

Missile Defense Testing Assets and Range: The Technical Center also oversees the Ronald Reagan Ballistic Missile Test Site (RTS) at U.S. Army Garrison-Kwajalein Atoll, Republic of the Marshall Islands. The RTS is a vital national asset that provides live-fire developmental and operational flight testing of offensive and defensive missile, hypersonic, and space systems; equatorial satellite launch capability; space object tracking and characterization; and atmospheric science research. This unique range and test facility, located 2,300 miles west-southwest of Hawaii, provides test support to MDA, NASA, the U.S. Air Force, and other agencies.

The RTS supports developmental and operational testing of both homeland and regional missile defense systems, as well as unarmed ICBM testing for the Air Force Global Strike Command, ensuring the safety, security, and reliability of the Nation's nuclear deterrence forces. Hypersonic system testing has also become a significant element of near-term test planning at RTS. In concert with its testing mission and using a suite of the world's most sophisticated radar systems, including the U.S. Space Force's Space Fence, RTS also supports space object identification and space domain awareness missions in support of USSPACECOM. This mission includes space object tracking and characterization, providing critical orbital information on new foreign launches and high-resolution images in support of space situational awareness.

ARMY CONTRIBUTIONS TO THE NATION'S MISSILE DEFENSE CAPABILITIES

The DOD adopted new strategic guidance documents in 2022, with a new National Defense Strategy, Nuclear Posture Review, and Missile Defense Review, which elaborated on the President's National Security Strategy. To achieve an AMD force capable of supporting the Army of 2030, we must continue modernizing and developing AMD capabilities, building sufficient AMD capacity for multidomain operations, and ensuring AMD forces are trained and ready. We must also ensure that our capabilities and associated C2 systems are resilient and interoperable with joint and allied forces. Accomplishing these essential tasks will allow us to provide deterrence through deployments and forward stationing enabling a more robust, comprehensive defense by coordinating and integrating with our allies and partners.

Army AMD is undergoing its most significant modernization in the last four decades, as it is one of the Army's six modernization priorities receiving substantially increased investment. The AMD Cross Functional Team (CFT) supports Army modernization efforts and works closely with the other Services, Joint Staff, and MDA toward joint integrated AMD (IAMD) capabilities. The Program Executive Office Missiles and Space is the Army's materiel developer for these capabilities and works closely with AMD CFT and U.S. Army Aviation and Missile Command. A summary of the Army's AMD strategic direction and major programs follows.

Air and Missile Defense Readiness: Multiple factors—including the enduring demand from CCDRs, the transition to great power competition and its associated complex threat set, and the overdue and critical need to modernize the Army's AMD force—have all converged to impact Army AMD force readiness. High operational demand of missile defense forces to support joint warfighters continues stressing Army AMD force readiness, modernization, and soldier welfare. Enduring high operational tempo and limited deployment predictability negatively impact soldier readiness and family well-being. Currently, twice as many ADA soldiers are dwell restricted as compared to the overall Army.

Our focus on the ADA force has seen positive results, specifically in the retention of our soldiers. In fiscal year (FY) 2022, 32d Army Air and Missile Defense Command was the first overall in the division-size category in Headquarters, Department of the Army (HQDA) with a 109.7 percent overall retention mission rate. Currently in fiscal year 2023, 32d remains first within HQDA with over a 70 percent mission completion rate and the highest stabilization rate within U.S. Forces Command at 39 percent. What this tells us is, despite our high operational tempo, our ADA soldiers believe in the mission and are confident the Army, the ADA branch, and leaders are taking care of them and their families.

Mission Command: Closely linked to AMD readiness is the ability to provide low density, high demand AMD mission command elements. These elements are pivotal to laying the foundation for and creating an environment that supports integration of Army AMD forces into joint and combined Command and Control architectures. During the past few years, the Army has activated an additional Active component ADA brigade headquarters in USINDOPACOM (38th ADA BDE at Sagami General Depot, Japan) and in the USEUCOM theater (52d ADA BDE at Sembach, Germany). The Army has also rotated a National Guard ADA brigade headquarters to USEUCOM.

Integrated Air and Missile Defense Battle Command System: The IBCS program is a top Army AMD modernization priority that integrates current and future AMD sensors and weapons into a common integrated fire control capability, allowing warfighters to fully integrate AMD capabilities across all echelons. The IBCS is the direct replacement for mission command nodes in the PATRIOT weapon system, headquarters elements, and air defense airspace management cells. IBCS also allows rapid convergence of sensors, shooters, and mission command components on an integrated fire control network. Once fully fielded, IBCS will provide a game-changing capability that allows appropriate tailoring and scaling of AMD forces to meet the given threat. The quantity and mix of capabilities can be dynamically retasked into a formation with an inherent, integrated mission command system to build tiered and layered defenses. The IBCS open architecture enables rapid integration of legacy and developmental sensors and shooters that provide capabilities to defeat emerging threats in multidomain operations. The program completed Initial Operational Test and Evaluation in the first quarter of fiscal year 2023 and is progressing to a Full Rate Production Decision Review in March 2023 and Initial Operational Capability in April 2023.

The IBCS program will field common mission command nodes for Army AMD forces to defend against manned aircraft, UAS, air-to-ground missiles, tactical ballistic missiles, cruise missiles, and rockets, artillery, and mortar (RAM) attacks. Ultimately, IBCS will operate with air surveillance and fire control capabilities across

the Army, Air Force, and Navy, and with joint and multinational AMD forces at all echelons, thereby enhancing AMD force lethality. By dismantling the current system-centric mission command paradigm, it will dramatically increase systems capability and facilitate open industry competition in support of the AMD community. The IBCS is one of the Army's contributions to the Joint All Domain Command and Control concept currently in development. Additional efforts are currently underway to support IBCS interoperability with MDA's Ballistic Missile Defense System, exploring the feasibility and potential benefits of integrating IBCS with MDA's Command and Control, Battle Management, and Communications (C2BMC) capability.

Terminal High Altitude Area Defense System: THAAD is a key component of the ballistic missile defense system-of-systems architecture and designed for area defense against short, medium, and intermediate range ballistic missiles. It is a mobile and globally transportable, low density, high demand asset that has a unique endo- and exoatmospheric intercept capability using proven hit-to-kill technology. There are currently seven operational THAAD batteries, two of which are forward-stationed in Guam and the Republic of Korea in response to the North Korean nuclear and missile threat. Development efforts associated with U.S. Forces Korea Joint Emergent Operational Need improved Patriot and THAAD interoperability, as successfully demonstrated in a recent THAAD/Patriot MSE developmental and operational test where THAAD software used two MSE interceptors to engage a ballistic missile target. The Army, in conjunction with Office of the Secretary of Defense (OSD) and MDA, reassessed the THAAD requirement to eight batteries.

PATRIOT/PATRIOT Advanced Capability-3 (PAC-3) Missile Segment Enhancement (MSE): The Army PATRIOT force remains the cornerstone of AMD protection for our deployed forces and allies. The PAC-3 MSE is a high velocity, hit-to-kill, surface-to-air missile capable of intercepting and destroying tactical ballistic missiles and air-breathing threats. The PAC-3 MSE, a follow-on variant of the PAC-3, is in full-rate production and the latest generation hit-to-kill PAC-3 interceptor in the PATRIOT force to meet global capability requirements. The PAC-3 MSE fills the engagement gap between THAAD and PAC-3 missiles while also defeating advanced threats earlier, at greater range, and with increased lethality. The PAC-3 MSE's improved capability is achieved through a high-performance solid rocket motor, modified lethality enhancer, more responsive control surfaces, upgraded guidance software, and insensitive munitions improvements.

PATRIOT must continually modernize through software and hardware upgrades to address obsolescence and evolving threats, and best utilize extended battlespace performance afforded by the PAC-3 MSE interceptor. Modernization efforts provide combat identification enhancements, address upper-tier debris mitigation, improve PAC-3 MSE interceptor performance, and enable increased Army and joint interoperability. The Army leverages the program's stable funding profile to reduce price risk to the Government through firm fixed price contracting and value engineering initiatives. The Army mitigates obsolescence and counters emerging threats through the improvement of the hardware and software systems. In addition to the LTAMDS and IBCS integration efforts with PATRIOT, the Army supports the MDA-led integration of PAC-3 MSE interceptors and launchers into the THAAD weapon system. PAC-3 MSE integrated with THAAD, LTAMDS and IBCS expand the battlespace by leveraging the THAAD AN/TPY-2 and PATRIOT radars together to detect threat targets at greater ranges. The Army is continuously improving PATRIOT while moving toward an IBCS architecture that enables kill-chain contributions from a wider spectrum of Army and joint sensors and weapon components to overmatch the near-term evolving threat.

Lower Tier Air and Missile Defense Sensor (LTAMDS): LTAMDS replaces the current PATRIOT radar and provides networked sensing capabilities in lower tier air and missile defense battlespace while enabling the full capability of the PAC-3 MSE interceptor. The LTAMDS significantly improves legacy PATRIOT radar capabilities by providing expanded range and 360-degree coverage combined with the benefits of a networked sensor on the Army IAMD integrated fire control network. LTAMDS technology will reduce current PATRIOT radar operations and sustainment costs by offsetting system equipment requirements and enhancing reliability and maintainability. The Army will begin testing LTAMDS prototypes with IBCS and the PATRIOT family of interceptors in the second quarter, fiscal year 2023, with the objective of providing initial early operational capability to a PATRIOT battalion by the end of 2023 with follow-on testing in 2024.

Indirect Fire Protection Capability (IFPC) Increment (Inc) 2: The IFPC Inc 2 is a mobile, ground-based weapon system designed to defeat cruise missiles, Groups 2 and 3 unmanned aircraft systems, rockets, artillery, and mortars and other fixed-wing and rotary-wing threats. The Army's IFPC Inc 2 system will integrate with IBCS as its C2 and leverage the Sentinel sensor to enable multidomain operations—

ready Army by 2030. The Iron Dome Defense System-Army (IDDS-A) is the interim cruise missile defense solution against the IFPC threat set until IFPC Inc 2 is available. The Army completed acceptance and fielding of two IDDS-A batteries in accordance with the Fiscal Year 2019 National Defense Authorization Act. The Army is on schedule to field and train two operational IDDS-A units in the second quarter, fiscal year 2023.

IFPC Inc 2 will be an industry-built solution for a launcher platform and an all-up-round-magazine capable of firing the AIM 9X missile. The IFPC Inc 2 system features a modular open system architecture to integrate future kinetic effectors to defeat advanced threats. The Army is on track to execute developmental tests, system qualifications, and operational assessments in fiscal year 2023, as well as a system of systems operational assessment prior to transitioning to a Major Capability Acquisition pathway.

Army Long-Range Persistent Surveillance: The Army Long Range Persistent Surveillance (ALPS) passive sensor provides continuous, 360-degree, long range surveillance against fixed and rotary wing aircraft, UAS, and cruise missile threats. ALPS is integrated into joint and Army C2 systems, including IBCS and is deployed in support of operations in USEUCOM and INDOPACOM.

Counter-small Unmanned Aircraft Systems (C-sUAS): Technological advances and the proliferation of commercial and tactical UAS in both reconnaissance and attack capabilities have matured to the point where they present a significant threat to Army operations from both State and nonState actors. The Secretary of Defense designated the Army as the executive agent for countering UAS threats and established the Joint Counter-Small UAS (C-sUAS) Office (JCO). Key JCO focus areas include developing joint requirements and materiel solutions, as well as joint training and doctrine. The Army deployed more than 500-man portable, fixed site, and mobile C-sUAS systems in response to a warfighter JUONS. The Army is continually improving equipment to mitigate ever-evolving threats. The Army is providing critical C-sUAS capabilities to Army operational divisions while also establishing C-sUAS protection of vital CONUS and OCONUS fixed and semi-fixed sites. The Army provided kinetic and non-kinetic C-sUAS capabilities in support of the Immediate Response Force in Europe to facilitate the detection, tracking, and the defeat of sUAS threats.

Maneuver-Short Range Air Defense (M-SHORAD): M-SHORAD provides maneuver forces a dedicated, Stryker-based air defense kinetic capability against fixed-wing, rotary-wing, and UAS threats. In fiscal year 2018, the Army approved the development of kinetic energy M-SHORAD systems that integrate existing Army capabilities into Stryker combat vehicles. The program successfully delivered four prototype systems with residual combat capability to an Air Defense Artillery Regiment in April 2021. The Army will deliver four M-SHORAD battalions by fiscal year 2026. The Army is maturing high energy laser and electronic warfare technologies to increase M-SHORAD capabilities in support of the maneuver force. Ultimately, the Army envisions M-SHORAD battalions will contain a mix of complementary direct energy and kinetic intercept systems to protect the maneuver force. The Army is initiating an acquisition program in fiscal year 2023 to develop a Next Generation Short Range Interceptor (NGSRI) to replace the aging Stinger missile. The NGSRI capability will provide increased lethality, range, and target acquisition, and is expected to be available to the warfighter in fiscal year 2028.

JOINT FUNCTIONAL COMPONENT COMMAND FOR INTEGRATED MISSILE DEFENSE—
INTEGRATING AND SYNCHRONIZING TRANS-REGIONAL MISSILE DEFENSE

The Joint Functional Component Command for Integrated Missile Defense (JFCC IMD) is USSTRATCOM's integrating element for trans-regional missile defense. USSTRATCOM formed JFCC IMD to execute its UCP-assigned trans-regional missile defense responsibilities as the "deny benefit" contribution to its overall strategic deterrence strategy. Established in 2005 and headquartered at Schriever Space Force Base, Colorado Springs, Colorado, JFCC IMD is manned by a cohesive team of subject matter experts from the Army, Navy, Air Force, Space Force, and Marine Corps, as well as government civilian and contractor personnel.

JFCC IMD is the recognized subject matter expert across the joint missile defense enterprise in matters of trans-regional missile defense operational support, policy, plans, intelligence, communications, training and education, and operational risk assessment. The command's principal mission is to integrate these trans-regional missile defense functions across the joint and combined warfighting force. In coordination with of the Joint Staff, and on behalf of USSTRATCOM and other CCDRs, JFCC IMD champions warfighter priorities and operational needs. These include continued development of robust terrestrial and space-based missile defense sensors, integrated discrimination capabilities, redundant and resilient BMC3I networks

with enhanced cybersecurity defenses, and improved means of intercepting or negating all missile and hybrid threats.

The JFCC IMD works across DOD and alongside allies and key partners to improve integration of existing capabilities, maximizing efficiency and effectiveness in trans-regional missile defense missions. Integration is the essential force multiplier—a critically important mission enabler that JFCC IMD directly supports. As a functional component command of USSTRATCOM, JFCC IMD supports designated UCP responsibilities along four lines of effort:

- Conducting global missile defense planning and security cooperation activities.
- Conducting trans-regional missile defense operations support, cyber operations/security, and provide Intelligence Community-coordinated intelligence.
- Executing joint and combined global missile defense training and education.
- Assessing warfighter missile defense needs in support of capability development, testing, and fielding.

To accomplish these efforts, JFCC IMD maintains close collaborative relationships with CCDRs, the MDA, the OSD staff, the Joint Staff, Services, the Intelligence Community, and our allies and partners. JFCC IMD continually seeks to enhance deployed forces' missile defense capabilities while increasing operational effectiveness and confidence in our collective ability to defend the Nation, deployed forces, allies, and partners. Some key efforts to enhance missile defense planning and capabilities for homeland and regional architectures follow.

Policy and Planning Support: JFCC IMD worked closely with the Joint Staff and the Combatant Commands in developing modifications to strategic guidance and operational planning documents to posture the Joint Force in planning and assessing trans-regional missile defense operations to include Global Campaign Planning and Geographic Combatant Commander specific plans. Additionally, JFCC IMD methodically examined the mission's roles, responsibilities, and authorities in an enterprise-wide Joint Staff effort ensuring the best alignment of responsibilities across the joint force to ensure effective warfighter support. JFCC IMD also provided OSD with policy support as the Missile Defense subject matter experts supporting the Department's development of strategic guidance documents and security and defense strategies addressing the integrative challenges in this important mission space.

Allied and Partner Missile Defense Integration: Given that we will never have enough active defense capacity, integrating our allies and partners into a common and mutually supportive architecture is a critical warfighter priority. The continued integration of space and missile defense will see greater opportunities for allies and partners to contribute to both missions. We must evolve beyond existing cooperation mechanisms with allies and partners to an environment of mutual trust and information sharing that empowers truly integrated planning and operations enabled by combined force development, simulation, and execution. Future conflicts will not be fought alone, and our greatest strategic advantage is the power of our alliances and partnerships. We should not hamstring this historic advantage with continued information-sharing policies and practices that preclude operational planning and hinder collective action.

The Nimble Titan Campaign of Experimentation, a biennial series of multinational missile defense experiments, is one venue to promote this increased cooperation. This event brings together subject matter experts from allied and partner nations to explore the national policy and military interfaces and dynamics involved in collaborative coalition and alliance missile defense planning. Meeting this intent is necessary for developing regional defense designs, C2 relationships, and collective, bilateral, and multilateral policy. Nimble Titan fosters greater confidence in combined missile defenses and provides a means to advance U.S. efforts in collaboration, interoperability, and operational integration with our allies and partners.

Expansion and Integration of the Trans-regional Missile Defense Architecture: In response to the evolving strategic environment, JFCC IMD continues to bolster trans-regional, homeland, and regional missile defense capabilities through advancement of new capabilities. These advancements include the Defense of Guam, Aegis Ashore site in Poland; continued development of the Standard Missile-3 Block IIA; the Long-Range Discrimination Radar; Space-based Kill Assessment; MDA's Hypersonic and Ballistic Tracking Space Sensor, the MD and Missile Warning elements of SDA's Proliferated Warfighter Space Architecture; the Next Generation Interceptor for homeland defense; and the Glide Phase Interceptor for regional hypersonic defense. Given the challenges associated with integrating these capabilities into a global architecture, JFCC IMD, in support of USSTRATCOM, provides essential collaboration with CCDRs to assess and address gaps in planning, policy, capabilities development, and operations.

Warfighter Inputs to Capability Development: The JFCC IMD is making every effort to help streamline and accelerate MDA's efforts to provide warfighters integrated kill chain capabilities (sense, C2, and effect) as quickly as possible to meet increased threat developments. As multiple reviews have identified, the Nation must have requirement, acquisition, and fiscal processes and cultures that enable MDA, Defense Agencies, and the Services to quickly develop, test, and deliver effective, reliable, and sustainable missile defense capabilities. We must do more to improve these processes and cultures from the top down to the lowest levels. Our adversaries are not waiting, so we must change our typical ways with innovation, adaptability, risk acceptance, and speed. The JFCC IMD collaborates with CCDRs, MDA, and the Services, as well as their respective test agencies, to leverage emerging technologies to enhance existing systems, explore innovative operational concepts, and prioritize maturing technological advancements with the most promising near-term potential. To that end, JFCC IMD continues to optimize the collaboration inherent in the warfighter involvement process as an operational proponent for required missile defense capabilities and performance enhancements.

Sustaining our competitive advantage through innovation and expedience depends on well-resourced and operationally relevant test campaigns, high fidelity modeling and simulation infrastructure and forward looking wargaming to challenge assumptions regarding our future missile defense readiness and posture. In testing over the past year, JFCC IMD supported an Aegis organic engagement of a Medium Range Ballistic Missile (MRBM) using a Standard Missile-3 (SM-3) Block IIA missile; a U.S. 3d Fleet interoperability and live-fire exercise with allied Navies; several data collections of hypersonic vehicle flight tests to characterize sensor performance; and initial testing to demonstrate the Long-Range Discrimination Radar's capabilities.

Joint Integrated Air & Missile Defense Training and Education: The Joint Ballistic Missile Defense Training and Education Center of Excellence (JBTEC), in coordination with USSTRATCOM, the Joint Staff, Services, and CCMDs, continue developing and delivering comprehensive and innovative joint training programs to close gaps between Service, joint, and regional air and missile defense training and education. The JBTEC, as DOD's only Joint Center of Excellence and the joint training center for IAMD, offers 18 mission-focused resident, online, and mobile training team joint-certified courses, including orientation, staff and planning, all domain operations, asset management, C2BMC situational awareness, and general and flag officer executive seminar training. In 2022, JBTEC instructors executed 222 courses that trained more than 3,500 students worldwide. These courses supported ranks from E-1 through O-10/SES encompassing almost every DOD agency. Meeting strategic and theater security cooperation plans, JBTEC also provided training to 27 allied and partner nations through both military-to-military and foreign military sales training venues increasing warfighter readiness. In 2022, the Chairman, Joint Chiefs of Staff; Commander, U.S. Strategic Command and Commander, U.S. Space Command identified Joint Missile Warning as an area where warfighters needed training. Based on the success of joint IAMD training, USSPACECOM designated and funded JFCC IMD's JBTEC to rapidly develop and field validated Joint Missile Warning training.

Integrated Trans-regional Missile Defense Asset Management: The JFCC IMD, in coordination with USSTRATCOM and the CCDRs, manages trans-regional missile defense operational readiness posture, coordinates trans-regional missile defense system maintenance, and supports MDA and Service tests. The asset management process allows JFCC IMD to continually assess system readiness to defend against missile attacks and recommend adjustments to optimize overall missile defense architecture.

Cybersecurity of the Missile Defense System: JFCC IMD, in coordination with USSTRATCOM and MDA, serves as the cybersecurity service provider for missile defense architecture to ensure cyber defenses and operations are planned and executed across the globe. Working with key stakeholders, JFCC IMD enhances the cyber defense posture of the missile defense operational architecture against malicious activity. The JFCC IMD also collaborates with mission partners to incorporate realistic cybersecurity testing to support the warfighter capability acceptance process. Additionally, JFCC IMD works closely with the Joint Staff, CCMDs, and MDA to educate, train, and exercise cybersecurity protocols to ensure the highest levels of global missile defense readiness.

Comprehensive Missile Defeat: As I have highlighted above, adversary offensive missile and hybrid systems are increasingly complex and challenging in their delivery means, range, maneuverability, and lethality. As such, an optimal missile defeat approach requires the ability to counter the use of adversary missiles and their development, acquisition, and proliferation. The Department's contribution to this approach must integrate offensive and defensive capabilities to defeat trans-regional

missile defense threats across the full spectrum of conflict. By developing and sustaining these capabilities, we lower overall costs and reduce the risk of failure.

Importantly, as we continue developing innovative capabilities to empower this effort, we must implement these actions as part of an integrated deterrence framework using all instruments of national power. These actions include diplomacy at the forefront and advancing cross-domain deterrence with the capabilities and actions of allies and partners to ensure the costs and risks of adversary aggression remain disproportionate to any conceivable benefit. Within the Department, these capabilities must include conventional kinetic attack operations, directed energy and electromagnetic attack, cyber, and special operations activities. Each capability provides opportunities to reduce the eventual burden on prohibitively expensive hit-to-kill active defenses. However, none of these alone is a “silver bullet” against the threat. Our future material solutions should consist of a mutually supportive portfolio of capabilities with the associated integrated development, testing, and fielding within the joint force. To this end, we must understand how these systems complement one another and, more importantly, have the appropriate planning and execution authorities and BMC3I systems in place to maximize their effect.

In summary, JFCC IMD continues to expand our Nation’s trans-regional missile defense architecture and explore developing capabilities across all domains to maintain an operational advantage against current and future threats. We maintain our competitive edge through integrated planning and operational support, the development of warfighters through education and training, the expansion of collective capabilities in collaboration with our allies and partners, and the rapid delivery of innovative and impactful capabilities to warfighters to enhance our national security.

CONCLUSION

Chairman King and Ranking Member Fischer, as members of the joint missile defense community, the Army continues pursuing enhancements to the Nation’s IAMD systems, from tactical to strategic levels of warfare. As outlined here, USASMDC and JFCC IMD perform a broad set of critical national security missions. These missions include providing professional warfighters and capabilities to support current operations, ensuring they are prepared for tomorrow’s fight, and developing the new technologies required to achieve and maintain a technological advantage against our adversaries. Our trained and ready soldiers, operating GMD elements in Colorado, Alaska, New York, and California, and from remote, globally deployed locations, remain prepared to defend the Homeland against ICBM attack. As a force provider to CCDRs, we provide essential regional sensor capabilities, ballistic missile early warning, and space-enabled communications. Our regional forces continue to leverage allied collaboration and planning efforts in developing integrated and interoperable defenses against various threat sets. USSTRATCOM, through JFCC IMD, continues to integrate missile defense capabilities to counter global missile threats and protect our Nation, deployed forces, and allies and partners.

While operational, doctrinal, and materiel developments are essential, our most important assets are the thousands of soldiers, sailors, airmen, marines, guardians, civilians, and contractors who deploy and employ our IAMD systems. As recognized by Department leadership, the strength behind our outstanding workforce is their families. Their contributions and sacrifices are foundational to the dedication and performance of our workforce—the role and support of our families empowers mission accomplishment.

Senator KING. Thank you. I am going to start with a sort of odd first question because my problem, Secretary Plumb, is I don’t know who to address my question to. Does that suggest that we need a more integrated central functionality?

Here we have three people in front of us, all of whom have different responsibilities. Maybe Admiral Hill, you are nodding. I mean, I just wonder if we need to need to clean up the organizational chart a bit. It bothers me that we have got missile defense and then you are the operational piece.

General, you are in the middle of it for homeland defense. Do we have the proper organization to allow sufficient timely response and deterrence, frankly? Who wants to take the question?

Dr. PLUMB. I am happy to start, Senator.

Senator KING. Please.

Dr. PLUMB. I do think we do have a good organizational structure here. I think what you are seeing is that missile defense kind of runs throughout our forces, right?

The Navy needs missile defense, the Army needs missile defense, the Homeland is missile defense, and so, and of course, the Pentagon has multiple layers. But I actually think this is structured quite well. I think we have good working relationships and I think we are making significant progress.

Senator KING. You don't think we need a kind of combatant command that would centralize these functions?

Dr. PLUMB. Well, since you asked, so the unified common plan (UCP) change—of course we have NORTHCOM, we will do defense of the Homeland, and so General VanHerck can speak to that much better than I can.

The UCP change that has just been signed will transfer Joint Functional Component Command for Missile Defense (JFCC IMD) to Space Command, which makes sense because we had already transferred all the sensors to Space Command, and so that aligns.

Missile defense sensors and space domain awareness sensors are often the same sensor, and it is good to have a kind of a global sensor management piece there, too. But every combatant commander with geographic responsibility still has missile defense responsibilities.

Senator KING. Well—all right, let me go back to what would have been my first question, and I will—I guess I will ask it of Admiral Hill. THAAD, Aegis, GBI, Patriot, do all—are all or any of those systems effective against a hypersonic missile?

Vice Admiral HILL. Thanks for the question. I would say that we have capability within Patriot. It was not a requirement that flowed to the system, but it is got the natural ability to do it because it is a cruise missile killer, and if you have a fast-moving cruise missile, it can bite off part of that threat.

When you look at the SM-6 within Aegis, Aegis has been dealing with maneuvering low on the deck threats for years, I would say decades. Taking that missile with its ability and going after hypersonics makes good sense, which is why we use it for sea-based terminal.

THAAD operates right on the edge of the atmosphere. It is an energetic missile. It has got a great hit to kill record behind it.

We haven't tested against hypersonic threats, but I believe there is like Patriot and like Aegis, there is likely some capability that can be leveraged there.

Senator KING. Why not more emphasis on directed energy? A missile—a bullet on a bullet is an expensive proposition. How much—well, let me ask that question, how much is a single THAAD bullet?

Vice Admiral HILL. Well, I will give you a range between Patriot up to SM3, and they range everywhere from \$4 million up to \$10 million or so.

Senator KING. Per shot?

Vice Admiral HILL. Per shot, yes, sir.

Senator KING. Okay—

Vice Admiral HILL. I will also, just to kind of followup on direct energy. You know, to be effective, you have to be on a target for

some period of time with high energy, right. Today, that high energy is scaling its way there. It is also going to be on a platform where it can be transported. That scaling effort to draw down the amount of power usage and those space and weight, that work is being done today. But when you—

Senator KING. Is it being done with a sense of urgency? I have been asking these questions for about 5 years and I don't get a sense of urgency in the Department on directed energy, which to me is clearly preferable to a \$4 million bullet.

Vice Admiral HILL. Yes, sir, and I agree. I think the Department has done great work by consolidating those efforts to specifically talk to scaling in terms of power, power out of the laser, what it takes to put that laser on the target. But let's talk about the target for a second, right.

We are using it now generally for unmanned air vehicles, right, smaller, loitering, that kind of vehicles. When you talk about very fast-moving targets that were designed to operate in very high heat environments, and you are going to try to take them out with high heat, that is a really tough equation to close.

So, more investment is required, more focus on getting to those areas. But it is science and engineering right now. That just happens to be where we are today, sir.

Senator KING. Thank you. Senator Fischer.

Senator FISCHER. Thank you, Mr. Chairman. Dr. Plumb, how does the budget request support the development and fielding of an integrated air and missile defense system for Guam?

Dr. PLUMB. Thank you, Senator. There is \$1.5 billion in the budget for fiscal year 2024 between, I think, roughly \$900 million MDA and \$600 million for the Army—although I may have those reversed.

But there is a lot of money toward that, and we are working to try to get initial capability there and then build out on that. I actually think—well, actually, frankly, I think Admiral Hill might have some to add on the sequencing of that. But the goal is how fast can we get some capability and then build out on it.

Of course, the challenge of 360 degrees against all the different types of missile threats, is a new one for that sizable area.

Senator FISCHER. Admiral Hill, in this setting, what can you add to that and the progress that we are making, and if you can, some of the challenges that you are facing on deployment?

Vice Admiral HILL. Yes, ma'am. First, I will say we have a great partnership with the Army in terms of the system development, great partnership with the Navy, in terms of identifying the sites on where this equipment would go.

We have a really tough customer named Admiral Aquilino who constantly drives us to get there as early as we can, and he removes barriers for us to do that. One of the hardest things we are doing right now, this year in 2023, is site selection and the start of the environmental impact surveys.

You have to do that. We have the sites selected. We know that once we go to those sites and do more work, that we may not be able to land on all those sites. There is a dozen or so sites. About half of those are for MDA and the other half are Army. That is a real challenge.

But the good news is, while we are doing that, we haven't slowed down on the development. The Army is moving very quickly on the integrated battle command system (IBCS). MDA is moving very quickly on the Aegis capability.

We are doing something different with Aegis. It is not a consolidated deck house like you see on a ship. It is not radars overlooking the launcher so they can immediately capture the missile upon launch.

The radars are external to get to the 360-degree coverage, along with the Army radar systems associated with IBCS. So, it is a tough engineering challenge just because of the physical lay down, and the land use, and the environmental impact surveys are definitely a challenge, but we are going to come through those within the next couple of years and you will start to see the capability land on the island progressively.

I owe Admiral Aquilino a year-by-year status update on where we are with the integration and the operations of that material.

Senator FISCHER. Thank you. Secretary Plumb, section 1660 of the Fiscal Year 2023 NDAA required the Secretary to designate a single senior official to be responsible for the missile defense of Guam. How close is the Department to making that designation?

Dr. PLUMB. Senator, we are pretty close. We already held a missile defense executive board that is run by Under Secretary LaPlante, and on this issue, we still have to get the recommendation staffed up and through the Secretary, but it is in train.

Senator FISCHER. Okay, and General Karbler, how does the high ops-tempo rate for air defenders in Guam impact the quality of life for soldiers with their families that they have there as well?

Lieutenant General KARBLES. [Technical problems]—okay. We have had soldiers on Guam since 2013, so for 10 years we have had a THAAD battery there. Initially, it was a year deployment and then we transitioned that into a 3-year permanent change of station (PCS) so that they could bring dependents and families there.

We have learned lessons from the THAAD battery being in Guam that we will apply as we go forward. One of the critical elements is the fact that the infrastructure—in addition to the missile defense capability that we will bring, we also have got to ensure that the infrastructure is there to support soldiers and family.

That is a key point that we have brought up, and I know General Flynn at United States Army Pacific Command (USARPAC) is making sure that he emphasizes as well.

Senator FISCHER. Yes, thank you. As we move forward on the timeline that the Admiral pointed out, it is important to get that infrastructure in place, correct?

Lieutenant General KARBLES. Yes, ma'am, and that structure will be added to the Army. That will not come from the current structure that we have, recognizing the op-tempo challenges that we have within the air and missile defense force today.

Senator FISCHER. Thank you. General VanHerck, United States Northern Command (NORTHCOM) and NORAD are required to track various threats to our Homeland, and I appreciated our discussions earlier this year on some of the items on your unfunded priorities list that would help increase that domain awareness.

Are there additional changes that the Department can make in order to field capabilities faster, for example, using digital engineering during the development or increasing testing tempo? We had some good examples that you gave us earlier on limits that you face.

General VANHERCK. Certainly, Senator. I think culturally we are an industrial age department transitioning into a digital age. I recently went to a major defense firm, I will just say that, who is building that capability, who has embraced the digital aspect of buying down risk during multiple portions.

So, I think there are things that we can do in a virtual environment. We can do things—now, what I would say is in parallel, not serial, as we develop capabilities to buy down risk and to go faster in the long run.

Senator FISCHER. Can I just have one followup there? Secretary Plumb, do you have anything to add to that? To me what the General just said, it kind of shows the importance of the organizational setup that is currently in place with you guys here at the table, that Senator King referred to in his first question to you. Am I reading that right?

Dr. PLUMB. Senator, I am not—

Senator FISCHER. You can—so you can work in parallel instead of in serial, or am I just going to—tease my colleague here a little bit—

Dr. PLUMB. I think what General VanHerck is getting at is if you can transition to digital design, you can change your plans and your structure and even what you build faster because you have a much quicker feedback loop into your system.

I think some of the more forward leaning parts of the industrial base, and even the commercial base, have figured this out. I am happily not the acquisition person, but I fully support moving faster and smarter, especially when it saves money and gets us capability sooner.

Senator FISCHER. And we do as well, which I think is important to be able to have the focus that General Karbler has, and that Admiral Hill has to be able for them to have that focus on what they are trying to accomplish and get done under the current organization. Does that make sense? No?

Dr. PLUMB. Yes.

Senator FISCHER. Yes. Thank you.

Senator KING. Senator Gillibrand.

Senator GILLIBRAND. Thank you, Mr. Chairman. General VanHerck, last July, you told reporters at the Aspen Security Forum that AARO's [All Anomaly Resolution Office] formation did not change how NORAD did business.

Following the events involving the Chinese high-altitude balloon and three unidentifiable anomalous phenomenon (UAP), has NORAD increased its coordination with AARO? And have you begun to identify a higher volume of unidentified aerial phenomenon?

General VANHERCK. Senator, absolutely. As a matter of fact, the lead of AARO came out to NORAD, NORTHCOM, gave us a visit.

Senator GILLIBRAND. Great.

General VANHERCK. Working much closer on the challenges that we face, ensuring that we are sharing data and information from anything that we see or do not see to ensure that we pass it to the organization so they can further investigate it. Absolutely.

Senator GILLIBRAND. The last time we had a hearing with AARO, we discussed investing in over-the-horizon radar and other type of new sensors that would help with collection. Have you been consulted on any of that discussion?

General VANHERCK. I have been heavily involved in the discussions on over-the-horizon radar with both Canada and the United States. The Department is funding over-the-horizon for the United States, and Canada has announced too. So absolutely, yes, I am directly involved.

Senator GILLIBRAND. Have you been in the discussions about the type of sensors that could be used or deployed to garner information specifically for the airspace that we don't really look at because it is not related to missiles?

General VANHERCK. I am not sure I understand that. So more broadly, I would just tell you that over-the-horizon, radar is not the end all, be all solution. That will give me domain awareness further away from the Homeland.

I am still confident in my ability to detect the balloons that we saw, the PRC high altitude balloon, and the subsequent objects that we saw and shutdown. But that is not the end all, be all. There has to be domain awareness between the over-the-horizon radars, that links the data from there to an endgame effector, and so there needs to be additional domain awareness.

We need to look more broadly at the rest of the infrastructure, the radars as well, and ensure the data from those systems is incorporated in an integrated air and missile defense system that can lead to effectors. I will go back to the comments of the Chairman. I am focused not on endgame kinetic kill.

I am focused primarily on the policy for what we must have in game kinetic kill, but more broadly, for developing capabilities such as the use of the electromagnetic spectrum, non-kinetic effectors to deny and deceive, and limited area or wide area defense capabilities, to include the use of autonomous unmanned platforms with domain awareness capabilities that could be maritime and air-borne.

Senator GILLIBRAND. Are you coordinating that—those recommendations and those plans with AARO?

General VANHERCK. Not directly with AARO right now, Senator. Into the Department, which I am assuming the Department is going to pull in AARO as part of that. So right now, we are re-looking the policy for Homeland defense. I have provided my commanders estimate, which is a plan for that.

I am also in the middle of developing what I call Homeland Defense Design 2035, which gets after exactly what I talked about, a new way of defending the Homeland. That is vastly different than the way we do it today with fighters, tankers, AWACS [airborne early warning and control system], those kinds of things.

Senator GILLIBRAND. I appreciate that, and I am looking forward to that myself. We have heard that our radar sites, depending on

who you asked, are based on 1980's technology, or 1990's era technology and 1960's era decision process.

How—I assume, based on your last answer, that you are improving the Northern Warning System and bringing other critical defensive infrastructure to be fully modernized.

General VANHERCK. So, the over-the-horizon radars will be addition to the North Warning Systems. The Department hasn't made a decision on modernization of the North Warning System or further replacement of the radars associated with the North Warning System, but that has to be a discussion. Like I said, OTHR is not the end all, be all solution.

Senator GILLIBRAND. Understood. So, are you going to give us recommendations for updating the Northern Warning System?

General VANHERCK. As part of the relook at Homeland defense and the policy study ongoing right now, that has to absolutely be part of the way forward.

Senator GILLIBRAND. I look forward to seeing that. Admiral Hill—there is still time, right? 30 seconds, okay. I didn't know if your tap was hurry up. I didn't know it was a hurry up tap. Okay.

Admiral Hill, while at the House Armed Services Committee hearing in March, General Milley told Congresswoman Stefanik that he believed a potential third missile defense site at Fort Drum would be strategically worthwhile.

Do you agree with that assessment? What advantage does this provide us when dealing with a potential nuclear threat from Iran?

Vice Admiral HILL. Yes, ma'am. During my last testimony, I did mention that I support the Chairman's comments. I think another site—you can never have too many sensors. You can never have too many effectors to deal with the kind of threats that we are dealing with.

I do think it is part of a mix of other options that we can look at. We are doing a study now that we owe back to the Hill by the end of June, and so we will complete that and deliver that.

Senator GILLIBRAND. Okay. Mr. Chairman, I am going to submit a question for the record concerning cyber to Secretary Plumb. Thank you.

Senator KING. Senator Cramer.

Senator CRAMER. Thank you, Mr. Chairman. Vice Admiral Hill, I am going to start with you just to relieve General VanHerck, who is thinking he is going to ask me about PARCS [Perimeter Acquisition Radar Attack Characterization System]. I know he has asked me about PARCS.

He always asks me about PARCS. So, I—maybe building on what he has just been talking about, maybe I will get back to him as well, related to Senator Gillibrand, what role does ground-based radar play?

And since I brought up ground-based, and what about PARCS? What do you see is the future for PARCS, and in this transition, at least to more space-based?

Vice Admiral HILL. Yes, sir. I believe the PARCS radar is owned and operated by the Space Force. We did and continue to assess the utility of it based on where our threat regions are and our focus for our sensor architecture.

Right now, PARCS is not a part of the overall missile defense architecture. I think the Space Force has ideas for it. I am just, I am not familiar with them yet, so I would probably have to go back and—

Senator CRAMER. So, does that mean I have to ask General VanHerck again, to remind us of the importance of PARCS, short-term, mid-term, maybe long-term? General.

General VANHERCK. There is \$108 million in the President's request in fiscal year 2024 for PARCS to go forward. It is crucial for missile warning today. As we go forward, and the proliferated low-Earth orbit capabilities come online, then I am sure the Department will reassess the need. I am confident if it is still required, the Department will continue to fund it.

Senator CRAMER. The policy that you were visiting with Senator Gillibrand about—when would we expect that and how would that affect, say, a budget a year from now, 2 years from now, as we are trying to, you know, beat—move at the pace of China.

General VANHERCK. Yes, I would defer to Department on that. I expect that policy within weeks to a few months, and it should inform the next budget cycle.

Senator CRAMER. Very good. Thank you. I will yield back, Mr. Chairman. Thank you all.

Senator KING. Thank you, Senator. My impression, and perhaps you have the figures, Mr. Secretary, is that we are spending a lot more money on developing hypersonic missiles than we are in defending against hypersonic missiles. Is that true?

Dr. PLUMB. I don't have hard numbers on that, sir.

Senator KING. I will take that for the record, please.

Dr. PLUMB. Yes.

[The information referred to follows:]

Dr. PLUMB. The Department requested \$5.7 billion in its fiscal year 2024 budget request for offensive hypersonic missile development. This amount includes:

- \$713 million for Air Force programs
- \$1.4 billion for Army programs
- \$1.3 billion for Navy programs
- \$2.3 billion for Defense Wide activities

The Department requested \$278 million in its fiscal year 2024 budget request for the development of defensive capabilities to counter hypersonic missiles, specifically. This amount includes:

- \$209 million for the Missile Defense Agency's (MDA) hypersonic defense programs including the Glide Phase Interceptor
 - \$69 million for MDA's Hypersonic and Ballistic Tracking Space Sensor (HBTSS)
- Additionally, MDA's Sea-Based Terminal provides hypersonic defense capability. Program and funding details are available at a higher classification.

The Department also requested \$7.7 billion¹ in its FY2024 budget request for multi-mission capabilities that will support defense against more than one threat type (ballistic, cruise, and hypersonic).

- \$2.3 billion for Air Force Missile Warning/Missile Track (MW/MT) Architecture
- \$2.6 billion for Air Force Next-Gen Overhead Persistent Infrared Architecture
- \$428 million for Air Force Over-the-Horizon Radars
- \$1.2 billion for Army Patriot Missile Segment Enhancement (MSE)
- \$1.2 billion for Navy Standard Missile-6 (SM-6) procurement

¹This amount does not include several efforts (e.g., command and control (C2), engineering, and testing) that enable missile defense capabilities.

Senator KING. If I am correctly informed that that is the case, that we are spending more, it seems to me that we ought to be re-considering that in terms of the importance of defense.

Let me go back to my question to Admiral Hill. Can we stop a hypersonic missile today? You are on an aircraft carrier in the Western Pacific. Hypersonic missiles, fires coming at you 7,000 miles an hour. Do we have the capability to stop that missile?

Vice Admiral HILL. We have the capability to stop it in two places. One is in its ballistic flight and—

Senator KING. But it is a hypersonic missile. Does it necessarily go into ballistic flight?

Vice Admiral HILL. Not all of them do, but the ones that are currently in the theater we are talking about will normally start with a boost, and then go into a glide, and then into the terminal phase. In the terminal phase, it can be defeated.

Senator KING. Do we have—it can be defeated by a ship at sea?

Vice Admiral HILL. By a destroyer guarding the carrier. Yes, sir.

Senator KING. Why aren't we testing more? I couldn't find it in my notes, but I think China is testing something like 20 times as many missiles we are. Why are we so—they seem to be more tolerant of failure, and they learn more. Our tests have to be perfect. Talk to me about testing.

Vice Admiral HILL. Yes, sir. Testing is really the end of the system engineering loop, right. You are validating that you have met your requirements through the system development.

Clearly, they are moving faster than we are. I would say that many of the tests that we do in some of these more high-end threat areas that we don't report out publicly because of the classified nature of them.

There is, I would say, a reasonable amount of testing that is occurring against those sorts of advanced threats. We just don't publicize them.

Senator KING. Well, I think it was you in your testimony that said we are not reacting fast enough, that this climate is changing so rapidly that we are not—what should we be doing?

What can this Committee do in the way of additional resources, additional organizational changes so that we are not continually trying to catch up? Because we are—we have—this is a strategic change in the in the world that we are not adequately addressing. What do we need—I am talking about hypersonics. What do we need to do to be able to address that more effectively?

Vice Admiral HILL. Yes, sir. So, we have addressed the policy, so, the hypersonic defense that we do today is regional based, meaning we will take care of forward sea bases, and forward deployed Army maneuver forces. That is our focus today.

We want to do layered defense, which is why I will talk about glide phase. I will talk about kill it in the boost phase. We know how to kill aircraft. When we are down in that terminal phase, we have to have a robust capability to do that in the load out on the ships. So that is our focus today is on regional.

We do not have the policy to go after the strategic hypersonics, and that may be where you are going, Senator. I am not sure.

Senator KING. Well, it seems to me that this is a deterrence gap, where we need our adversaries to know that this weapon is not

going to be effective. The whole idea of deterrence is that there is a level of resilience, and that is what worries me. Is that by not having the defensive capability, you are inviting, in effect, a strike.

Vice Admiral HILL. We do have the defensive capabilities within the sea-based today. I want to work with the Army to build out the Patriot capability that we talked about earlier and to add to that capability.

We have a program in place called the Glide Phase Interceptor to thin the raid up in a different part of that flight regime, because we, from a layered defense perspective, we want to attack every part of that trajectory, and particularly where they are vulnerable, which is the glide phase.

Senator KING. Taking account of chaff and diversions and—

Vice Admiral HILL. absolutely—

Senator KING.—decoys and all of that kind of thing. General Karbler, can you see a hypersonic from space, single missile?

Lieutenant General KARBLES. Depending on the platform, delivery systems, sir, yes. If it is on the end of a boosting missile, we will see the initial—we will get an initial indication of it launching. But once it starts going into its flight phase, it becomes a very difficult target to track, to keep it from—to keep track custody of it really from birth to death, as I would—

Senator KING. Particularly if it is at a low altitude. Is that correct?

Lieutenant General KARBLES. Correct.

Senator KING. This is an entirely different question. Obviously, missile defense is very important to the Ukrainians. Why isn't Iron Dome being deployed to Ukraine? Secretary Plumb. We helped pay for it.

We have spent something like \$3 billion to Israel to develop it. \$500 million a year, my understanding is. Wouldn't this be a very important resource for the Ukrainians since their principal problem right now is air defense?

Dr. PLUMB. So, Senator, what we are using for supplying Ukraine with missile defenses from the United States stock is things we can draw down from our own stock. You know, we supplied Patriot batteries, for example. We supplied significant investments in missile defense, and we have encouraged allies to do the same.

Senator KING. I understand a Patriot just took down a Russian missile yesterday, I believe.

Dr. PLUMB. It certainly has been in the news.

Senator KING. Open source, I guess.

Dr. PLUMB. Open source, there was a Patriot interceptor that killed a hypersonic missile in the last few days, yes, sir.

Senator KING. What about Iron Dome?

Dr. PLUMB. I am not aware of an Iron Dome system being offered to Ukraine, but that could be incorrect. I just don't know. Maybe someone else at the table, but I am not sure.

Senator KING. Any other thoughts?

Lieutenant General KARBLES. Sir, our two Iron Dome batters that we have right now, one completed its no equipment, training, no equipment, fielding. It is prepared for deployment. The second one is wrapping up its new equipment fielding right now. The

Army does have one battery available for deployment pending a request for it.

Senator KING. Thank you. Secretary Rosen.

Senator ROSEN. I was going to say that I got——

[Laughter.]

Senator KING. I promoted you.

Senator ROSEN.—I got a promotion or——

Senator KING. Senator Rosen, sorry.

Senator ROSEN. It is a flying day, so it is a long flight from the West Coast. So, there you go. Just got in. Thank you very much, Chairman King, Ranking Member Fischer. Appreciate it, and appreciate all of you and for your service, everything you are doing here today. So, I am going to talk a little bit about safeguarding domain awareness.

So General VanHerck, as you well know, our adversaries continue to field advanced capabilities across domains that have the potential to threaten the Homeland. So, in light of these threats, NORTHCOM and NORAD must ensure that the systems providing the Homeland with domain awareness are survivable, adaptable, and modern.

In addition, these systems must be hardened, as they will be subject to an array of cyber-attacks during any contingency, and so, I am encouraged by NORTHCOM's continued efforts to modernize legacy detection systems such as the over-the-horizon radar. Detection alone isn't sufficient.

Operators have to have the ability to effectively communicate the operational picture to other commands, as well as to our partners and allies, often under highly compressed timeframes.

We see those with hypersonics and others. General VanHerck, what steps are you taking to sufficiently harden our command and control nodes, particularly in the cyber domain, so that we are able to effectively share the operational picture during our potential conflict?

General VANHERCK. Senator, thanks for that. I am advocating to the Department that the foundational infrastructure, the IT [information technology] network and backbones that the data and information rides on, it allows us to share data and information internally, and with the allies and partners and my fellow combat commanders, is resilient and redundant in the way we go.

The Department this year has put several billion dollars into foundational infrastructure, which I think is crucial as we move forward to get after the cyber vulnerabilities that you talked to. Candidly, my most concerning domain awareness problem is exactly that.

It is the limited knowledge of cyber vulnerabilities for the critical infrastructure that we rely on to project power from our Homeland, to defend our Homeland, to do command and control within our Homeland. So, I continue to advocate for that to the Department.

Senator ROSEN. Thank you. I appreciate that, because I think the resiliency of redundancy and the agility of those systems are going to help us be successful.

In the technology space, of course, Admiral Hill, as you are aware, China's missile defense strategy heavily emphasizes developing anti-access, aerial denial capabilities, which use a combina-

tion of ballistic and cruise missiles launched from air, land, and sea to target the United States and, of course, our allied military assets in the Asia Pacific Theater, such as those in Guam or Okinawa.

Admiral Hill, with the rapid increase in China's technological advancement and missile accuracy, what kind of measures are we employing to increase the survivability of our own platforms to ensure that we can operate in and around these highly contested environments in the Pacific?

Vice Admiral HILL. Yes, ma'am. Thanks, Senator. I use the aircraft carriers, since Senator King brought that up a little bit earlier, that is where we focused our energies on increasing the ability to take on the hypersonic threat. The ships currently are outfitted with ballistic missile defense.

From a missile defense perspective, ships moving forward into the island chain have the ability to defend against ballistic missiles. They have their own capability to do self-defense against cruise missiles, and we have hypersonic defense. A ship has to worry about a lot, so, I am not going to speak for the Navy.

I can just speak to the missile defense missions that we provide in coordination with the Navy. With the Army, we have talked a lot about the maneuver force in terms of Patriots, THAAD, and station forward. Defense is important if you want to either buy time or to ensure that you can live to fight another day.

Senator ROSEN. That is right. Well, thank you, and I know that Chairman King talked about hypersonic weapons. So, Secretary Plum, Russia and China, no secret they are fielding hypersonic weapons. There are highly maneuverable vehicles that fly around more than five times the speed of sound.

The weapons have the potential to overwhelm our U.S. missile defense systems, undermine our strategic deterrence. So, I know we are not in a classified setting, so I would like to hear a little bit about your assessment of our hypersonic missile defense programs, our space-based sensors, what do we do to neutralize the threat?

I notice as I read some of the background, and you alluded to this earlier, that of course, we have the—we know much earlier on a ballistic missile where it is going, and we have to not be able to track the hypersonic once it may have left its launch.

So that timeframe of difference, and I know we are not in classified setting, but are we able to be agile enough to track it, to notify our allies and partners to make adequate decisions across the spectrum?

Dr. PLUMB. Thanks, Senator. Just a couple of pieces, if I may. So just to start, five times the speed of sound is—all the ballistic missiles travel pretty fast, right. So, it is not really just a speed piece. It is the maneuverability of a hypersonic weapon that bothers everyone at the table, because you can't predict the end point by knowing the initial launch conditions.

There is a lot of ballistic missiles in the world that still maneuver at the end, but they still give you a better arabesque, and you just kind of know about where they are going to end up if you do your math right, but you can't do that with a cruise missile because it can keep maneuvering.

One of the things we are really heavily investing in is a space-based architecture that can at least have awareness of where these things are through their flight. Admiral Hill is working on something called HBTSS—which I call hobbits, I don't know if anyone else does. But the idea there is to actually be able to do custody of it and be able to track a piece all the way through.

We are working on this, and that is a big problem because you can't just rely on one vector or one radar phase to tell you a thing is coming, and so it is a hard problem. We are working on that. So that is one piece. You got to have that domain awareness and ability to track these things, and we are working hard on that.

Also, you have to have something to be able to actually shoot at it, otherwise all you can do is watch it, and so, it turns out Patriot even has some ability against the hypersonic.

But the Glide Phase Intercept Program is one thing that is being worked on, for example. Admiral Hill has already spoken at some length about sea-based terminal mode of the SM-6, which is good for ship defense and point defense. So, we are working on all these pieces together.

Senator ROSEN. Thank you. I see my time is up.

Senator KING. Senator Kelly.

Senator KELLY. Thank you, Mr. Chairman. Thank you, Senator Rosen, for the lead into my question, which is about—

Senator ROSEN. I predicted it.

Senator KELLY. Thank you. About SM-6—so, Admiral Hill, Secretary Plumb, the SM-6 ship launched anti-air and anti-surface interceptor, this missile is produced at Raytheon in Tucson, Arizona.

Admiral Hill, last year during this hearing, you noted that the SM-6 is the only weapon in the country's arsenal capable of engaging highly maneuverable hypersonic missiles, threats, incoming threats.

So, in the context of potential adversaries, can you please speak a little bit more about how important it is for the U.S. to have an arsenal capable of engaging highly maneuverable, hypersonic threats?

Vice Admiral HILL. Yes, sir, and it is a full kill chain answer, right. Secretary Plumb already talked about our ability to detect and track them. If you can't do that, you can't fire anything at it.

It is a very complex—once it comes into the glide phase, it has got the ability to maneuver globally. So that is why we need to see them from space and have a total track custody, all the way to the end game.

When they dip into the atmosphere and start that maneuver, you have to have a shooting battery, whether it is a ship or some sort of land-based unit, that can do that, fine-tune, tracking in the endgame to launch and control that missile.

But it is important to have an arsenal, and when you say arsenal, I translate that as an inventory. You need a large inventory of them because, again, the threat can be defined as big, big numbers, very high speed and maneuver.

Senator KELLY. Before we get to the procurement and the inventory numbers, can you comment a little bit about when we get to that endgame, when we—and maybe you can't because this is not a classified setting, but when we look at like cross range for an

SM-6, can it match the cross range capability of any hypersonic missile that China is currently developing?

Vice Admiral HILL. I think in this environment I can say yes that we are matched very well with the threat and where it is today. We are going to have to continue to improve our missile capability. At some point we will over overmatch the G capability of that missile frame.

Senator KELLY. Secretary Plumb, Admiral Hill mentioned that we would need a lot of them. I understand DOD is requesting a multiyear procurement in the next budget request to include 825 SM-6 missiles. Can you explain why it's such a critical request as we face this capable adversary, and why doing large lot procurements is the best way to do this?

Dr. PLUMB. Well, first of all, Senator, again, I am not the acquisition professional at this table, but I will just say that once you have a proven capability, being able to buy in large lots gives you insight into how the missile performs. It is much better than just building a few at a time. It is a much better way to do your statistics on your manufacturing and how it works.

Senator KELLY. You know, if we have a high value target and we have got an incoming hypersonic missile, I imagine the ops plan there is not to just launch one of these things at it. Hence the 825 number to protect—

Dr. PLUMB. That is true—

Senator KELLY.—protect the fleet and the high value targets.

Dr. PLUMB. Sir, in air defense, it is really an operational question because it will vary. But most commanding officers of a ship, most commanding officers of a battery will determine what their salvo size is based on the threat and numbers that they are dealing with. Yes, sir.

Senator KELLY. Thank you. Another subject. So, the request, I think, is for \$1.6 billion for Aegis in fiscal year 2024, which gets us 27 SM-3 Block 1Bs and 12 SM3 Block 2As and develops upgrades to the system.

The Aegis site is expected to be among the first to receive the SM-3 Block 2A. I think this is going to be at the Aegis Ashore site in Poland, is my understanding. Can you provide a status of Aegis ashore in Poland, and what it will be able to do when fully operational?

Vice Admiral HILL. Yes, sir. So, Aegis Ashore in Romania, operational today. Poland is going through the board of inspection survey today.

We are leveraging the Navy processes there that drive us to Chief of Naval Operations' acceptance by the end of this fiscal year. It will then go through European Command and NATO's [North Atlantic Treaty Organization] acceptance throughout next year.

So, we are right now operating the site, but we will come through those different certifications over the course of the next few months, and it will be fully operational.

What it provides is it completes European phase—phase three, which means that we can defend against ballistic missiles from rogue countries to protect Europe and the United States.

Senator KELLY. In my remaining 15 seconds, real quick, when I was over in the Middle East in January, Israel and some of our

Middle East partners made a request in looking for support for an integrated missile defense architecture in the Middle East between Israel, other countries, and the United States. What are your thoughts on an integrated regional missile defense for the Middle East?

Vice Admiral HILL. Is that a question for me?

Senator KELLY. Yes.

Vice Admiral HILL. It is probably more of an operational question, but from an acquisition and development perspective, we work very closely with Israel. Senator King mentioned that \$500 million of our budget every year goes to building out the defense capabilities for Israel, focused mostly on upper tier Arrow, David's Sling, and Iron Dome.

We integrate as far as we can integrate, whether it is across the sensor architecture to provide tracks, or if it is a deeper set of integration, as a General Karbler does within the Army on Iron Dome. But I think there is nothing wrong with being integrated across friends and allies.

Senator KELLY. Thank you.

Senator KING. I want to thank all of you for joining us today. I have a couple of concluding thoughts. One, it strikes me as bothersome that all three of you are leaving at the same time. It also strikes me as bothersome that I think that Chairman of the Joint Chiefs, Chief of the Navy, I believe the Air Force are also all leaving this summer at the same time.

There ought to be a staggered system so that there is continuity in this critically important function. That is not your problem, but it is one that, Mr. Secretary, I think we ought to think about. To have the entire upper echelon of this particular, critical function walking out the door essentially within months strikes me as not a good organizational structure.

Second, the three of you are in an extraordinary position to be able to give us some strong exit interview data. In other words, as you are leaving, what would you change? What would you suggest to the Committee in terms of authorities, organizational structures, priorities? Where do you think we could improve this entire missile defense enterprise?

As I say, all three of you are in an exceptional position to do that, and I am not in the position of assigning homework here, but it would be very important to the Committee if you could give—just give us two or three pages. Here is what I would change, as I am going out the door, to improve the functioning of this critically important part of our deterrent and our national defense posture.

I want to thank you all again for your service, congratulate you, and look forward to your suggestions. And the only—other thing I would say is, do it soon. We are about to do the National Defense Authorization Act in about 5 weeks, and we would love to have your input as the Subcommittee makes its report to the full Committee.

Thank you again and thank you for your service to the country. Senator Fischer, did you want to add any conclusion?

Senator FISCHER. Well, I would say, well said, Mr. Chairman. Thank you all.

Senator KING. Thank you. The hearing is adjourned.

[Whereupon, at 5:48 p.m., the Subcommittee adjourned.]

[Questions for the record with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR ANGUS KING

HYPERSONIC MISSILES

1. Senator KING. Admiral Hill, today I asked you if we had the capability to stop a hypersonic missile ‘today’ coming at an aircraft carrier in the Western Pacific. You answered that the Navy could stop it in two places: ballistic flight and terminal phase. Furthermore, you relayed that a Navy guided-missile destroyer (DDG) can stop a hypersonic missile from approaching an aircraft carrier. However, the Chief of Naval Operations (CNO) testified earlier this year that there is more work to be done in hypersonic defense. The CNO further testified that he is not satisfied with where we are regarding naval defense against a hypersonic attack in the Indo-Pacific. What are the hypersonic threats (capacity and capability) in the maritime and land domains (against our ship formations, land formations overseas, and in the homeland) today through 2030? Please provide a detailed answer, classified up to TS-SCI if needed, that includes a year-by-year analysis from now until 2030.

Vice Admiral HILL. [Deleted.]

2. Senator KING. Admiral Hill, what kinetic capability and capacity do we have to defeat these threats in the boost, glide, and terminal phases? Please provide a detailed answer, classified up to TS-SCI if needed, that includes a year-by-year analysis from now until 2030.

Vice Admiral HILL. [Deleted.]

3. Senator KING. Admiral Hill, what capability gaps should be addressed, in priority, from technical feasibility for defeating a hypersonic arsenal? Please provide a detailed answer, classified up to TS-SCI if needed, that includes a year-by-year analysis from now until 2030.

Vice Admiral HILL. [Deleted.]

HIGH-ENERGY LASER

4. Senator KING. Secretary Plumb and Admiral Hill, Although only one Navy surface combatant, the USS Preble (DDG 88), is equipped with a high-energy laser (HELIOS), no additional Surface Navy Laser Weapon Systems were funded in the fiscal year 2024 President’s Budget Request. What is the Department of Defense’s (DOD’s) roadmap and funding profile for equipping Army, Navy, and Air Force platforms with integrated directed energy weapons?

Secretary PLUMB. The DOD’s roadmap for Directed Energy Weapons (DEWs) consists of high-power laser and microwave technology and system development with near, mid, and far-term objectives to field capabilities against increasingly stressing threats. The Military Departments and Agencies are investing accordingly to incrementally mature technology while leveraging DOD-wide directed energy efforts to accelerate development of DEWs. Collaboration between the Military Services and Agencies has been beneficial for technological advancements and opportunities to expand the industrial base. The DE funding included in the fiscal year 2024 President’s Budget Request is approximately \$920 million, inclusive of science and technology (S&T)/research, development, test, and evaluation (RDT&E) activities across all Military Departments and Agencies as well as the integrated DE weapon developments by the Military Departments.

The Army is on track to deliver combat-capable integrated DE systems within the Future Years Defense Program that will address a range of threats:

- The DE Maneuver-Short Range Air Defense (DE M-SHORAD) 50kW-class laser weapon will defeat Group 1–3 Unmanned Aerial Systems (UAS), Rotary Wing and Rocket, Artillery and Mortar threats. The Army will deliver 4 prototype systems in fiscal year 2023 and has funds allocated to transition DE M-SHORAD to a program of record in the FYDP.
- Army is teaming with the Joint community on the Indirect Fire Protection Capability-High Power Microwave (IFPC-HPM) program to deliver four prototype systems in fiscal year 2024. These prototype systems will defeat Group 1–2 UAS threats and swarms.
- The IFPC-High Energy Laser (IFPC-HEL) 300kW-class laser weapon will defeat Cruise Missiles in addition to Group 1–3 Unmanned Aerial Systems (UAS),

Fixed Wing, Rotary Wing and Rocket, Artillery and Mortar threats. The Army will deliver two prototype systems in fiscal year 2025.

- The Army is also developing the Army Multipurpose-High Energy Laser (AMP-HEL) 20kW-class laser weapon to be integrated on an infantry squad vehicle and plans to deliver four prototype systems in fiscal year 2024. These prototype systems will defeat Group 1–2 UAS threats.

The Army's budget request for integrated DE weapons in fiscal year 2024 is \$210 million and approximately \$1 billion through the FYDP.

The Navy has already delivered several combat-capable DE systems that are being operated and sustained as Fleet assets while other systems are being developed.

- The AN/SEQ–4 Optical Dazzler Interdictor, Navy (ODIN) Counter-ISR (C-ISR) laser system is on eight Guided Missile Destroyers (DDG) platforms. The Department plans to request funding across the FYDP to support capability upgrades, maintenance, and sustainment.
- The 60 kW HELIOS weapon system has been installed on USS *Preble* and is undergoing system checkouts and crew training prior to deployment in 2024. HELIOS addresses UAS threats and also provides C-ISR capabilities.
- The Navy is also developing the HELCAP S&T laser weapon testbed for Counter Anti-Ship Cruise Missile demonstrations in fiscal year 2024–2025.

The Navy budget request for these integrated DE weapon systems and demonstrations in fiscal year 2024 is \$51 million and \$239 million through the FYDP.

The Air Force is developing two High-Power Microwave (HPM) integrated weapon system demonstrators called Directed Energy Frontline Electromagnetic Neutralization and Defeat (DEFEND) that will evaluate capabilities supporting Integrated Air and Missile Defense. The Navy is working closely with the Air Force on DEFEND to assess the options for shipboard applications. The Air Force budget request for DEFEND in fiscal year 2024 is \$80 million and \$115 million through the FYDP.

Vice Admiral HILL. We refer your question to Office of the Under Secretary of Defense for Research and Engineering (OUSD(R&E)). OUSD(R&E) acts as the central coordinator for all directed energy development across the Department of Defense (DOD). They are best suited to provide a full and holistic picture of the Department's roadmap and the progress being made on directed energy.

5. Senator KING. Secretary Plumb, how could the High Energy Laser prototypes developed under the Office of the Secretary of Defense (OSD) High Energy Laser Scaling Initiative (HELSEI) program coupled with the HELIOS scalable architecture be leveraged to enable simultaneous development and deployment of even more capable integrated Surface Navy Laser Weapon System (SNLWS) prototypes at 120kW-, 300kW-and 500kW-class power levels?

Secretary PLUMB. The OSD HELSEI program successfully demonstrated 300 kW class laser sources from multiple vendors in fiscal year 2023. The second phase of HELSEI initiated in fiscal year 2023 with the goal of demonstrating scalability of those laser architectures to between 500 kW and 1 MW by 2026.

As part of the Navy's SNLWS program, the 60 kW HELIOS weapon system has been installed on USS *Preble* and is undergoing system checkouts and crew training. The Navy is planning a Counter Anti-Ship Cruise Missile maritime test with HELIOS in late calendar 2023 prior to deployment of the USS *Preble* in fiscal year 2024. In parallel to HELIOS, the Navy is preparing to integrate one of the already demonstrated OSD 300kW HELSEI sources into their HELCAP S&T laser weapon testbed for c-ASCM demonstrations in fiscal year 2024–2025.

The Navy is also exploring options for integration of a HELSEI source with scalable power architecture, with considerations for:

- Operationalizing a 300kW-class maritime prototype laser weapon system on-board a DDG 51 surface combatant.
- Designing, manufacturing, integrating, and testing new/upgraded/modified systems needed to convert a 300kW HELSEI laser into a laser weapon system for a Navy ship.
- Minimizing installation complexity and integration time by superstructure removal/replacement (pre-built) and shipboard-consistent configuration for integration at a West Coast land-based site.

6. Senator KING. Admiral Hill, does the Missile Defense Agency have an overall roadmap for directed energy weapon research and development and eventual fielding to counter threats in the land and air domains?

Vice Admiral HILL. Yes, the Missile Defense Agency (MDA) has a roadmap for directed energy weapon research and development which flows into the OUSD(R&E) directed energy enterprise. The MDA participates in all appropriate directed energy and enabling technology Communities of Interest, which builds the directed energy roadmaps across the Department. These foundational plans support a DOD wide rollout of directed energy solutions across the breadth of applicable mission areas, to augment existing layered missile defenses.

QUESTIONS SUBMITTED BY SENATOR KIRSTEN GILLIBRAND

CYBERSECURITY

7. Senator GILLIBRAND. Secretary Plumb and Admiral Hill, I understand that the Missile Defense Agency entered a \$266 million dollar contract last year to improve cybersecurity within our weapons systems. Can you address how the Department of Defense is working to expand its internal cyber workforce? How can Congress help improve your capabilities?

Secretary PLUMB. On March 1, 2023, Deputy Secretary of Defense Kathleen Hicks signed the 2023–2027 Department of Defense (DOD) Cyber Workforce (CWF) Strategy, which sets the foundation for how DOD will foster a cyber workforce capable of executing the Department's complex and varied cyber missions. The strategy will enable DOD to retain highly skilled cyber operators. It will close workforce development gaps, drive workforce management and development initiatives, and help transform the Department into a data-centric enterprise including optimized workforce analytics.

DOD is aligning strategic efforts to four human capital pillars: 1) identification; 2) recruitment; 3) development; and 4) retention. Our efforts within each of these pillars will ensure the DOD workforce is agile, flexible, and responsive to the evolving cyber domain.

Vice Admiral HILL. The \$266 million contract is not an additional investment in cybersecurity but a continuation of both cyber and non-cyber support requirements replacing two of our legacy Advisory and Assistance Support contracts.

The Department of Defense (DOD) released the Cyber Workforce Strategy 2023–2027 on March 1, 2023. The Missile Defense Agency (MDA) will align the management of its cyber workforce to the DOD strategy. The DOD strategy takes a proactive approach in setting unifying direction and guidance for the DOD to foster a cyber workforce that will be ready to execute cyber missions. To support the accomplishment of the strategic goals in the strategy, the DOD is planning to produce a cyber workforce implementation plan. The plan will ensure that the strategy's talent identification, recruitment, development, retention, and management objectives of the strategy are achieved.

Key MDA Efforts: The MDA developed and created a Cyberspace Workforce Management Program in August 2020. The program supports mission readiness, provides for management review and leadership oversight, and satisfies MDA, DOD, and Federal Information Security Management Act compliance. The program provided the agency with direction to implement and maintain; the MDA Cyberspace Workforce Management Program, and a tracking mechanism and repository to support the Cyberspace Workforce Management Program. Additionally, the program directed standardized tracking of cybersecurity credentials and supporting documentation for MDA personnel. The MDA will update the Cyberspace Workforce Management Program to ensure alignment with the objectives and goals from the February 2023, publication of the DOD Cyberspace Workforce Qualification and Management Program. In 2021 MDA developed and implemented the Cyberspace Workforce Qualification Tracking (CWQT) tool to formally track the MDA cyber workforce skills and certifications. The automated CWQT facilitates the generation of reports to support Federal Information Security Modernization Act reporting requirements and enhances the ability to respond to cyberspace workforce requests.

In August 2021, the MDA Director published the MDA's Cyberspace Defense Strategy. The strategy describes the Director's intent and guidance for the cyberspace defense of the missile defense system and the MDA. It outlines desired outcomes, strategic initiatives, and major tasks to ensure that the missile defense system and the MDA is protected from the activities of our cyber adversaries. One of the strategic initiatives is to increase the cyber technical competency of the missile defense system workforce. The strategy includes three major tasks to accomplish the initiative:

1. Cyberspace Workforce Management: Execute the MDA Cyberspace Workforce Management Program.

2. Cyberspace Workforce Training: Develop a tailored cyber curriculum and hands-on training.
3. Cyberspace Workforce Hiring: All MDA organizations will strategically hire, reskill, retain, and contract for additional cybersecurity engineering expertise.

Regarding how Congress can help improve capability, Please support the current and future President's Budget, to improve the MDA cyber workforce program capabilities.

QUESTIONS SUBMITTED BY SENATOR ELIZABETH WARREN

AEGIS ASHORE SYSTEM

8. Senator WARREN. Admiral Hill, in a Department of Defense (DOD) press briefing on March 14, 2023 regarding the President's fiscal year 2024 missile defense budget request, when asked about the completion of the Poland Aegis Ashore system, you said "... it will be operational to conduct ballistic missile defense of the homeland and of the European continent." How does Aegis Ashore and the European Phased Adaptive Approach defend the U.S. Homeland?

Vice Admiral HILL. The European Phased Adaptive Approach (EPAA)—including the AEGIS Ashore sites in Romania and Poland and a Ballistic Missile Defense (BMD) radar in Turkey—is a U.S. voluntary national contribution to the North Atlantic Treaty Organization (NATO) BMD mission, aimed at providing full coverage and protection for all NATO European populations, territory, and forces against ballistic missiles from outside the Euro-Atlantic area. NATO BMD is designed to counter the increasing threat posed by the proliferation of ballistic missiles in the vicinity of the south-eastern border of the Alliance.

U.S. missile defense capabilities deployed as part of EPAA and NATO BMD, including the AEGIS-Ashore sites in Poland and Romania, are not intended, nor have the capability to defend against missile threats to the U.S. Homeland.

SM-3 BLOCK IIA INTERCEPTOR

9. Senator WARREN. Admiral Hill, in that same briefing, you said that while the SM-3 Block IIA Interceptor was tested against an International Continental Ballistic Missile (ICBM)-range threat, it was out of the system's design space. What hardware or sensors changes would need to be made to give these interceptors a role in homeland defense, as envisioned by the previous administration? What is the estimated cost of these changes?

Vice Admiral HILL. (CUI) The Missile Defense Agency (MDA) approach to provide a layered homeland defense capability was to leverage existing regional capabilities with demonstrated or assessed residual capability. Aegis Ballistic Missile Defense and the Standard Missile-3 (SM-3) Block (Blk) IIA were identified as contributing systems. Aegis Weapon System (AWS) BL 9.C2 (BMD 5.1) ships are capable of employing the SM-3 Blk IIA which demonstrated residual capability against a simple ICBM threat in Flight Test Aegis Weapon System-44 conducted November 2020. While residual capability exists today to use the SM-3 Blk IIA for U.S. homeland defense, the Department has chosen not to pursue this option as a persistent element of the U.S. homeland ballistic missile defense architecture. Additional updates to the AWS and SM-3 Blk IIA would be required to expand the threat set and increase performance against moderate and complex ICBMs.

GROUND-BASED MIDCOURSE DEFENSE (GMD) SYSTEM FOR FLIGHT TEST GROUND-BASED INTERCEPTOR-12

10. Senator WARREN. Admiral Hill, please outline the technical goals of the upcoming GMD test FTG-12 beyond demonstrating the interceptor in the two-stage booster mode.

Vice Admiral HILL. [Deleted.]

11. Senator WARREN. Admiral Hill, which countermeasures do you expect the test to demonstrate the system's capability against?

Vice Admiral HILL. [Deleted.]

QUESTIONS SUBMITTED BY SENATOR TOM COTTON

NEXT GENERATION INTERCEPTOR

12. Senator COTTON. Admiral Hill, can you provide an update on the Missile Defense Agency's (MDA's) efforts to develop a cost plan to acquire no fewer than 64 Next Generation Interceptors (NGIs), as required by last year's National Defense Authorization Act?

Vice Admiral HILL. [Deleted.]

13. Senator COTTON. General VanHerck, how would buying 64 NGIs to in order to deploy a uniform fleet of interceptors improve your ability to stay ahead of the North Korean threat?

General VANHERCK. The current Department of Defense plan to procure 20 Next Generation Interceptors (NGIs) in addition to the current fleet of Ground-Based Interceptors (GBIs) enables USNORTHCOM to stay ahead of the projected North Korean threat. NGIs are being designed to have a significant increase of reliability and lethality over the current GBIs. Based on the expected increased performance of the NGI, I am expecting to be able to reduce the ratio of interceptors per inbound threat, therefore 64 NGIs would allow engagements of more inbound threats than a mixed fleet of 64 would allow.

GLIDE PHASE INTERCEPTOR

14. Senator COTTON. Admiral Hill, you recently testified before the House Armed Services Committees that not fielding the Glide Phase Interceptor until "out in the mid '30's is ... almost irrelevant." I agree with that. Would additional funding or authorities from Congress help to accelerate this program?

Vice Admiral HILL. Additional funding would allow the MDA to deliver the Glide Phase Interceptor capability as early as fiscal year 2032, without incurring concurrency risk. In fiscal year 2024, an additional \$298 million over MDA's Presidents Budget 2024 request would support this acceleration

GUAM DEFENSE SYSTEM

15. Senator COTTON. Admiral Hill, the budget plans for an "enhanced capability" on Guam by 2029 and future additional capabilities in the 2030's, but Admiral Davidson's window for a Chinese invasion of Taiwan closes in 2027. Will there be an initial operating capability for Guam defense capable of intercepting Chinese missiles, and if so, when do you anticipate that will be?

Vice Admiral HILL. [Deleted.]

16. Senator COTTON. Admiral Hill, how many Chinese missiles would it take to overwhelm the Guam Defense System once it achieves enhanced capability in 2029?

Vice Admiral HILL. [Deleted.]

GROUND-BASED INTERCEPTORS

17. Senator COTTON. Admiral Hill, for how long will the Service Life Extension Program for the Ground-Based Interceptors (GBIs) allow the GBIs to remain in the fleet?

Vice Admiral HILL. The service life requirement for Ground Based Interceptors is 20 years. Of the 47 Ground Based Interceptors currently deployed, there are 20 interceptors equipped with Capability Enhancement (CE)-I Exo-atmospheric Kill Vehicle (EKV), the first generation configuration initially fielded in 2004. As the Ground Based Interceptor fleet continues to age, the assessed reliability will degrade over time due to the effects of aging, but it is a gradual decline and "end of life" is not a specific date. The CE-I interceptors are currently undergoing a SLEP to increase their reliability and performance. The SLEP will improve the reliability of each upgraded Ground Based Interceptor by up to 20 percent through low-risk, cost-effective upgrades and replacement of limited-life parts. See classified attachment 2, "GMD Interceptor Fleet Reliability with CE-1 Comparison." In addition to service life, the Agency manages the Ground Based Interceptor fleet to ensure the most capable and reliable fleet is available for Homeland Defense.

18. Senator COTTON. Admiral Hill, in what year do you expect that GBIs will need to begin being retired?

Vice Admiral HILL. In addition to the above response regarding the CE-I EKV equipped Ground Based Interceptors, the service life requirement for the newer Ground Based Interceptors is also 20 years. Of the 47 Ground Based Interceptors

currently deployed, there are 27 of these newer interceptors equipped with either the CE-II or CE-II Block 1 EKV mated to either a Configuration 1 or Configuration 2 Booster Vehicle, with emplacements initiated in 2008. As the CE-II Ground Based Interceptor fleet continues to age, the assessed reliability will degrade over time due to the effects of aging, but it is a gradual decline and “end of life” is not a specific date. The MDA will continue to assess overall and configuration specific reliability predictions in conjunction with the ongoing development, acquisition, and fielding of the Next Generation Interceptors.

The eventual mix of Next Generation Interceptors and Ground Based Interceptors should be informed by a variety of threat, operational, and programmatic considerations, including: threat evolution; Next Generation Interceptor performance; performance and reliability of the Ground Based Interceptor fleet including the first CE-II Ground Based Interceptor approaching 20 years of service in 2028; and the maturation of U.S. Northern Command’s missile defense Concept of Operations required to negate the threat. The Department will continue to evaluate these considerations as the Next Generation Interceptor technology matures and the development program progresses with the objective of synchronizing any inventory decisions, as appropriate, with key program milestones to generate economic efficiencies, and, in conjunction with other missile defeat activities, stay ahead of the threat.

TERMINAL HIGH ALTITUDE AREA DEFENSE (THAAD) LAUNCH-ON-REMOTE

19. Senator COTTON. Admiral Hill, can you explain how the THAAD Launch-On-Remote capability recently deployed in United States Indo-Pacific Command (INDOPACOM) will improve our missile defense capabilities in that region?

Vice Admiral HILL. The Missile Defense Agency (MDA) fielded three capabilities recently to INDOPACOM as part of Joint Emergent Operational Need (JEON) PC-0021 solution:

i. THAAD Remote Launch (fielded in TH 3.2, June 2020): THAAD Remote Launcher capability using the THAAD Remote Launch Kit provides flexible communication paths to increase launcher emplacement distance and defended area.

ii. Patriot Launch on Remote (THAAD) (fielded in TH 3.2, June 2020): Enables Patriot to launch Patriot Advanced Capability-3 Missile Segment Enhancement (MSE) interceptors utilizing THAAD AN/TPY-2 radar track data to detect and track threat ballistic missiles at longer ranges while utilizing MSE’s full kinematic capability.

iii. Integration of Patriot/MSE with THAAD (fielded in TH 4.0 Oct 2022): Incorporates MSE launchers and missiles into the THAAD Weapon System to provide additional engagement opportunities and enhanced performance against threat ballistic missiles.

20. Senator COTTON. Admiral Hill, can you ‘ the Missile Defenses Agency’s plans to continue fielding this capability globally?

Vice Admiral HILL. The JEON PC-0021 capabilities are planned to begin fielding globally at end of calendar year 2023. The MDA is procuring hardware now and coordinating with the Army for availability to complete installation, check-out, and training. Fielding will be based on coordination with the Army and unit availability. The Army will prioritize the upgrades based on each unit’s needs.

QUESTIONS SUBMITTED BY SENATOR MIKE ROUNDS

SPECTRUM

21. Senator ROUNDS. Admiral Hill, There is an effort by some in Congress to require sharing of all or some of the 3.1–3.45 GHz band of the electromagnetic spectrum between the Department of Defense and commercial interests in the private sector. As I understand it, the 3.1–3.45 GHz band is primarily used by Department of Defense ground-, air-and sea-based radars and sensors to detect airborne and missile threats. For example, the Navy’s Aegis Combat System’s AN/SPY radar uses that band and is one of the few systems able to track the new threat posed by low flying, highly maneuverable hypersonic missiles. Can you confirm that many of the missile defense systems your agency develops, which are critical to our national security, reside on this portion of the spectrum? If so, can you share examples of either specific systems that currently operate there or some of the missions and capabilities which rely on this portion of the spectrum?

Vice Admiral HILL. [Deleted.]

22. Senator ROUNDS. Admiral Hill, providing this committee with your best military advice, can you characterize the risk to mission and the potential impact on extant missile defense systems the Missile Defense Agency (MDA) has developed if action were taken to enable the auction of portions of this band prior to the analysis of the results of the statutorily required Department of Defense-National Telecommunications and Information Administration study, which is required to be completed by September 2023?

Vice Admiral HILL. [Deleted.]

