RECORD VERSION

STATEMENT BY
LIEUTENANT GENERAL JAMES H. DICKINSON, USA
COMMANDING GENERAL,
U.S. ARMY SPACE AND MISSILE DEFENSE COMMAND/
ARMY FORCES STRATEGIC COMMAND
AND
COMMANDER,
JOINT FUNCTIONAL COMPONENT COMMAND FOR
INTEGRATED MISSILE DEFENSE

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Introduction

Chairman Fischer, Ranking Member Heinrich, and distinguished Members of the Subcommittee, thank you for your continued support of our Service members, Civilians, and Families and your continued support of the Army, the U.S. Strategic Command, the Department of Defense, and the missile defense community. Thank you also for the opportunity to testify before this Subcommittee. I am honored to highlight the important missile defense capabilities and ongoing enhancements that enable the defense of our Nation, forward stationed and deployed forces, allies, and partners.

As I have done for the past two years, today I bring both an Army and a joint perspective on effective missile defense capabilities. Within the Army and joint communities, my responsibilities encompass several mission areas.

As the commander of the U.S. Army Space and Missile Defense Command and Army Forces Strategic Command (USASMDC/ARSTRAT), I have Title 10 responsibilities to organize, train, and equip Army space and global ballistic missile defense forces. I serve as the Army's force modernization proponent for space, global ballistic missile defense, and high altitude forces and capabilities. Further, I am the Army Service Component Commander to U.S. Strategic Command (USSTRATCOM). In this role, I am responsible for planning, integrating, coordinating, and providing Army space and missile defense forces and capabilities in support of USSTRATCOM missions.

I also serve as the Army's Air and Missile Defense (AMD) Enterprise Integrator. In this role, 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 lifecycle management. I coordinate with the AMD community of interest to balance priorities, inform resourcing decisions, and pursue innovative approaches in order to enhance our strategic flexibility.

Finally, as the Commander of USSTRATCOM's Joint Functional Component Command for Integrated Missile Defense (JFCC IMD), I am responsible for coordinating global missile defense planning, conducting missile defense operations support, recommending allocation of missile defense assets, and advocating for missile defense capabilities on behalf of the Combatant Commanders.

My major tasks within these roles can be summarized as providing forces and capabilities for current operations; preparing forces and capabilities for the future fight; and, research and development of Army technologies that will provide future advancements in air and missile defense capabilities. To achieve this, the organizations I command align their activities to these priorities:

- Protect our homeland
- Provide combat-ready forces and capabilities
- Plan and conduct synchronized global operations
- Prepare or adopt leap-ahead concepts and technologies
- Preserve and account for the Nation's critical resources
- Promote and foster a positive command climate

In line with my previous appearances, my intent today is to highlight the dedicated people who serve in the diverse and geographically dispersed organizations under my command, to briefly outline the strategic environment, and to emphasize USASMDC/ARSTRAT's missile defense force provider responsibilities with respect to the Army and the Geographic Combatant Commanders (GCCs). I would also like to outline JFCC IMD's role as a warfighter advocate supporting USSTRATCOM's coordinating authority for global missile defense planning, and finally, I will summarize key Army AMD developments in the context of a comprehensive approach to addressing the evolving air and missile threat.

The Workforce—Our Foundation

USASMDC/ARSTRAT and JFCC IMD cannot carry out our wide-ranging national security missions without the dedication of our greatest asset—our people. One of my most important messages to you today is that your continued support is critical to our ability to develop and retain a highly qualified and mission-ready workforce. The Department of the Army needs predictable, stable funding to execute today's missions and to posture for the future. The October 1 impact and will ensure we continue to provide trained and ready Service members enacted Fiscal Year 2019 Department of Defense (DoD) budget and the Fiscal Year 2018 emergency budget reprogramming for homeland and regional missile defense is making a significant and Civilians to operate

and pursue advancements in space and missile defense capabilities for our Nation. The supplementary resources will continue our momentum to provide additional interceptors, modernize essential infrastructure, and enhance discrimination and characterization capabilities. After more than two years in command, I have seen countless examples of how our strength lies in the command's agile, adaptive space and missile defense workforce, a team of more than 3,000 highly trained and skilled Soldiers, Sailors, Airmen, Marines, and Civilians who stand vigilant 24/7/365, protecting the joint warfighter and defending the homeland.

Soldiers, Civilians, and Contractors Working Together Across 11 Time Zones in 23 Locations to Protect Our Nation, Allies, and Deployed Forces

The Increasingly Complex Threat Environment

Current global trends indicate ballistic and cruise missiles are becoming more capable, due in part to the proliferation of advanced technologies, resulting in systems with global reach, increasing speed, and greater accuracy. Additionally, many foreign ballistic and cruise missile systems are progressively incorporating advanced countermeasures including maneuverable reentry vehicles, multiple independent reentry vehicles, and electromagnetic jamming, all intended to defeat our missile defense capabilities. Moreover, numbers of ballistic and cruise missile platforms are increasing. Many of these systems are mobile, which increases the difficulty in detecting, tracking, and targeting these weapons.

Numerous countries are developing ground-, sea-, and air-launched land-attack cruise missiles using a variety of unconventional and inexpensive launch platforms. Today, nearly 30 countries possess ballistic missile capability and some are actively pursuing hypersonic weapons. There are over 35 different variants of ballistic missiles in service across the globe today and new intermediate-range and intercontinental ballistic missiles (IRBM and ICBM) are under development. Adversaries have demonstrated rapid advances in range and overall missile performance. To meet the demands resulting from the shift to great power competition, we continue to pursue increased capability through modernization and development as well as increased

capacity within the missile defense area. Russia and China have achieved parity with the U.S. in many cases, and overmatch in others.

Unmanned Aircraft Systems (UASs) have advanced technologically and proliferated exponentially over the past decade. As technology has progressed, both reconnaissance and attack capabilities have matured to the point where UASs represent a significant threat to Army combat operations from both state and non-state actors. The extensive range of UAS platforms in terms of size, velocity, range, altitude, flexibility, and capability make this a very challenging mission area for AMD systems. As such, we appreciate that Congress authorized the Department to take actions to mitigate the threat posed by UAS to facilities and assets related to the Department's missile defense mission.

> **"…U.S. homeland missile defense must both outpace rogue state offensive missile capabilities and hedge against possible future threat developments."**
> - 2019 Missile Defense Review

In the future, our missile defense systems will encounter more complex electronic and cyber attacks, as well as directed energy threats that could significantly degrade U.S. missile defense operations. We expect cyber and electronic attacks will be increasingly relied upon in potential adversaries' anti-access/area-denial (A2/AD) strategies. Our ability to successfully counter these continuously advancing threats will rely heavily on our increased use of space and space-enabled capabilities. Space sensors, in greater numbers and sensor modalities, would expand our capability and capacity to track, discriminate, and successfully engage ballistic, cruise, and hypersonic threats.

The strategic missile defense environment is becoming more challenging as adversary air and missile threats continue to proliferate in number and advance in complexity. Our evolution of capabilities requires a holistic approach that effectively integrates alternative approaches and technologies to defeat air and missile threats. A comprehensive approach, including attack operations and active and passive defenses, increases lethality and enables more efficient and effective missile defense capabilities. In addition, implementing technological advances in a time of fiscal constraints requires

more cost effective methods to integrate our current and future capabilities. We continue to prioritize integrated AMD resources to optimize our support of the warfighter and to partner with the Missile Defense Agency (MDA), Combatant Commands, and the Services in pursuit of fiscally responsible methods to address evolving threats.

Strategic Positioning to Counter the Threat

To counter the threat and meet the objectives of the 2018 National Defense and Army Strategies, USSTRATCOM and the U.S. Army continue to provide and enhance homeland and regional missile defenses. We continue to work with our allies and partners in Europe, the Indo-Pacific region, and the Middle East to increase integration and interoperability of missile defense systems and operations.

Integrated missile defense planning, force management, and operations emphasize global coordination with regional execution so that for any threat, we match the best interceptor with the best sensors. A layered and holistic approach that integrates offense and defense will move the U.S. toward a more robust and flexible crisis response capability.

The 2017 basing of a Terminal High Altitude Area Defense (THAAD) battery in the Republic of Korea bolstered our regional defense capabilities to improve protection of U.S. and allied forces, and critical infrastructure on the peninsula. Additionally during 2017, MDA completed the emplacement of 14 additional Ground-Based Interceptors (GBIs) at Fort Greely, Alaska, to provide more capacity to defend the Nation against an ICBM attack from North Korea, or a future ICBM capable Iran.

> **"I am confident in the ability of the Ground-based Midcourse Defense system to defend the United States from ICBMs fired from North Korea or Iran..."**
> - USNORTHCOM SASC Posture Statement, February 2019

The 2018 National Defense Strategy prioritizes a strong commitment to security and stability in the Indo-Pacific region, Europe, and the Middle East. In conjunction with our allies and partners, the Department of Defense maintains forward-committed Patriot; THAAD; and counter-rocket, artillery, and mortar (C-RAM) forces to enhance our AMD posture, sending a deterrence message to potential adversaries and assurance to our friends. Through forward positioned AMD commands and air defense

brigade headquarters, we continue to work with regional partners and allies to increase information and data sharing and we are developing a more robust global AMD force posture that leverages partner nations' growing capabilities and capacity. Eventually, this will reduce the strain on our forces while enabling more timely modernization of our AMD assets.

The Army AMD enterprise, consisting of agencies and organizations that develop, maintain, sustain, train, and employ AMD capabilities, developed Army Air and Missile Defense 2028. This document, is based on the National Security Strategy, the National Defense Strategy, the Missile Defense Review, the Army Operating Concept, the changing operational and threat environments, and the rapid pace of our technological advancement. This new path forward for Army AMD, released last month, focuses on the 2018-2028 timeframe, aligns with current Department and Army doctrine, and addresses our ability to balance current operational requirements while shaping the force and modernization efforts to counter future challenges. AMD serves as a critical enabler of the Army's ability to penetrate and dis-integrate enemy A2/AD systems and exploit the resulting freedom of maneuver to achieve strategic objectives. In summary, the Army Modernization Strategy enables us to deliver advanced AMD capabilities to our warfighters on a substantially decreased timeline. The Air and Missile Defense Cross-Functional Team (CFT) is key to rapidly developing requirements and ensuring these future capabilities transition quickly from concept, to prototyping, to fielding. Army AMD continues its focus on program development of Maneuver-Short Range Air Defense (M-SHORAD), Lower Tier Air and Missile Defense Sensor (LTAMDS), Indirect Fire Protection Capability (IFPC), Army Integrated Air and Missile Defense (IAMD), directed energy, and advanced energetics.

Providing and Enhancing Missile Defense Capabilities

USASMDC/ARSTRAT's first major task is carrying out its Title 10 responsibilities, which include being a force provider of missile defense capabilities. This command is manned by multi-component Soldiers, Civilians, and Contractors, who contribute to operations, planning, integration, control, and coordination of Army forces and capabilities in support of USSTRATCOM's missile defense mission. Other commands around the world, including all GCCs, also leverage the capabilities we provide.

Our operational function in today's fight is to provide trained and ready missile defense forces and capabilities to the GCCs and the warfighter. For example, USASMDC/ARSTRAT Soldiers serving in the homeland and in remote and austere forward-deployed locations operate the Ground-based Midcourse Defense (GMD) system and the Army Navy/Transportable Radar Surveillance and Control, Model 2, Forward-Based Mode (AN/TPY-2 FBM) radars. Highlights of the capabilities provided to current operations and readiness by our missile defense professionals include:

Support to Global Ballistic Missile Defense: Soldiers from the 100th Missile Defense Brigade, headquartered in Colorado Springs, Colorado, and the 49th Missile Defense Battalion, headquartered at Fort Greely, Alaska, are ready to defend our Nation from an ICBM attack. In support of U.S. Northern Command (USNORTHCOM), Army National Guard and active component Soldiers operate the GMD Fire Control Systems located at the Fire Direction Center in Alaska, the Missile Defense Element in Colorado, and a detachment that oversees operations at Vandenberg Air Force Base, California. These Soldiers, in conjunction with USNORTHCOM, also oversee maintenance of GMD interceptors and ground system components. At the Fort Greely Missile Defense Complex, the 49th Missile Defense Battalion military police secure the interceptors and command and control facilities from physical threats. Given their strategic mission in this remote location, the harsh environment and 20-hours per day of winter darkness, we must continuously review and enhance the Fort Greely Garrison services and support to these Soldiers, Civilians, Contractors, and their Families. With the continued support of Congress, we have already realized substantial quality of life improvements for these remotely stationed personnel and their Families.

> **"...the United States has a robust and credible layered missile defense system."**
> - USSTRATCOM SASC Posture Statement, February 2019

Support to GMD System Test and Development: Soldiers from the 100th Missile Defense Brigade and the 49th Missile Defense Battalion participate in GMD test activities and work with MDA developers on future improvements to the GMD system. MDA's testing regime, conducted through a series of ground-based and operational

flight tests, and rigorously verified, validated, and accredited models and simulations, emphasizes operational realism during test design and execution. This realism enables Soldiers of the 100th Missile Defense Brigade to sustain and improve their proficiency and validate operational employment of the system. A current example is the recent FTG-11 test. The event enabled brigade and battalion Soldiers to demonstrate their tactics, techniques, and procedures in support of an operational flight test. This test validates their readiness by performing their operational tasks while building warfighter confidence that the system will perform as designed.

> **"Our missile defense forces here, are vital to our national defense and the world should know that they're ready."**
> - VPOTUS Elmendorf Air Force Base, Alaska, 2018

Support to Regional Capabilities: The 100th Missile Defense Brigade also provides GCCs with trained and certified AN/TPY-2 FBM missile defense batteries. These batteries are currently located at five strategic locations around the globe where they contribute to the early warning, cueing, tracking, and discrimination of threats to our allies and partners. These forward-based radars also represent a tangible contribution to both homeland and regional defense. Soldiers manning these radars, deployed to remote and austere locations across the globe, demonstrate daily our Nation's commitment to defend deployed forces, allies, and partners from ballistic missile attacks.

Space Support to Ballistic Missile Early Warning: Space-enabled capabilities are essential for missile defense operations, providing and enabling communications; positioning, navigation, and timing; intelligence, surveillance, and reconnaissance; and early warning. We routinely coordinate and collaborate with USSTRATCOM's National Space Defense Center to ensure that space assets are poised to support missile defense.

In support of the joint force commander, USASMDC/ARSTRAT continues to provide ballistic missile early warning within the U.S. European Command (USEUCOM), U.S. Central Command (USCENTCOM), and U.S. Indo-Pacific Command (USINDOPACOM) theaters of operations. The 1st Space Brigade's Joint Tactical Ground Station (JTAGS) detachments, which support the Joint Force Space Component Command, are operated by USASMDC/ARSTRAT space cadre and qualified Soldiers who monitor launch activity and other infrared events. They provide essential information to members of the AMD and operational communities. Our JTAGS detachments are forward deployed around the globe, providing continuous, dedicated, assured missile warning to USSTRATCOM and GCCs in support of deployed and forward-based forces. In Europe, the relocation of the JTAGS detachment from Stuttgart, Germany, to Sigonella Naval Air Station, Italy, is scheduled for completion later this year. This will increase operational missile warning capability.

> **"The exploitation of space provides a missile defense posture that is more effective, resilient and adaptable to known and unanticipated threats."**
> - 2019 Missile Defense Review

USASMDC/ARSTRAT's second major task is to develop future missile defense forces and mature current capabilities. A major component of this function is providing relevant and updated training for our global missile defense systems. During the past fiscal year, USASMDC/ARSTRAT trained approximately 200 Soldiers to execute the missile defense mission of the homeland.

USASMDC/ARSTRAT, as a recognized Army Center for Analysis, conducts studies to determine how to best meet the Army's assigned missile defense responsibilities. Our analyses validates established procedures and supports emerging processes. The Army uses these result to document its missile defense needs and pursue joint and Army validation of its requirements. With insights from these studies, we develop and operationalize the doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy requirements to address evolving threats and potential vulnerabilities to the GMD and AN/TPY-2 FBM missile defense systems.

This disciplined approach ensures limited resources are applied to achieve maximum operational utility.

USASMDC/ARSTRAT's third major task is to provide critical technologies to address future needs that will enhance warfighter effectiveness. Our technology development function is primarily focused on the space and high altitude domains. Additionally, although MDA is the principal materiel developer for missile defense capabilities, USASMDC/ARSTRAT continues to support the Office of the Secretary of Defense (OSD) efforts to move conventional prompt strike technology demonstration activities to acquisition Programs of Record within the U.S. Army, U.S. Navy, and U.S. Air Force. USASMDC/ARSTRAT has been heavily involved in establishing the U.S. Army Hypersonic Project Office (AHPO) and is supporting the U.S. Air Force and U.S. Navy hypersonic programs with flight test and component procurement support. The AHPO is currently providing senior Army leadership with program plans, schedules, and funding requests to support a rapid near term capability. In addition, the AHPO is supporting MDA's concept development for defense against hypersonic threats. These technical capabilities are at the forefront of developing holistic, cost-effective approaches to address the broadening missile defense challenge.

Following are brief summaries of a few of our research and development efforts, as well as an overview of the capabilities of an essential Army testing range.

High Energy Laser Technology Development and Demonstration: The Army's high energy laser (HEL) science and technology effort aims to develop ruggedized laser system components and subsystems, integrate them onto an Army vehicle, conduct demonstrations to characterize performance, and transition the technology to a Program Executive Office. A solid-state laser weapon system has the potential to be a low-cost and effective complement to kinetic capabilities in countering rockets, artillery, and mortars (RAM); UAS; and other threats. The effort builds upon earlier pathfinder demonstrations of a 10-kilowatt (kW) laser system by continuing to develop, integrate, and mature the technology at higher laser power outputs. The 50-kW class Robust Electric Laser Initiative fiber laser has been integrated into the High Energy Laser Mobile Test Truck (HELMTT) for a 50-kW laser demonstration against RAM and UAS threats. The HELMTT deployed to the High Energy Laser System Test Facility

(HELSTF) at White Sands Missile Range, New Mexico, last fall for initial system checkout. During that limited demonstration, the HELMTT system showed that a high energy laser system, mounted on an Army tactical vehicle, could engage and destroy RAM targets. It will return to the HELSTF later this spring to conduct data collection to ensure we are on the right track with our HEL development efforts. This demonstration will be a key knowledge point for the next major phase of high energy laser technology development, the High Energy Laser Tactical Vehicle Demonstrator (HEL TVD). The HEL TVD supports the Army's Indirect Fire Protection Capability Increment 2-Intercept (IFPC Inc 2-I) program. It is on schedule to conduct a C-RAM 100-kW demonstration in late 2022 to validate system performance against IFPC Inc 2-I requirements.

> **"…we are no more than a few years of having…directed energy weapons of military utility…"**
> - Dr. Michael Griffin, Center for Strategic and International Studies Interview, December 2018

During the past year, USASMDC/ARSTRAT also started work on the Multi-Mission High Energy Laser (MMHEL) as an Army Technology Maturation Initiative (TMI). The TMI will integrate a 50-kW laser system on a Stryker combat vehicle and culminate in an operational demonstration that informs M-SHORAD requirements. Supporting this effort is the Mobile Experimental High Energy Laser (MEHEL), a 10-kW laser on a Stryker. Over the past several years, MEHEL has participated in four Maneuver Fires Integration Experiments at Fort Sill, Oklahoma, and a Joint Warfighting Assessment in Germany. During the 2018 Joint Warfighting Assessment, Soldiers from the 2nd Cavalry Regiment successfully operated the MEHEL during limited live-fire exercises. MEHEL is helping warfighters develop tactics, techniques, and procedures, as well as concepts of operations for future high energy laser weapons.

Low-Cost Target Development: The Army has completed the initial effort to develop a suite of threat representative, short-range ballistic missile targets for lower-tier missile defense testing at a substantially reduced cost. Over the past few years, we completed three detailed target designs and successfully demonstrated all three of the configurations, which leverage excess solid rocket motors. The initial launch of Zombie targets was the Pathfinder Zombie Demonstration flight in December 2016, followed by

Sabre Zombie targets in June and November 2017 for Patriot intercept tests. These missions were critical operational tests of the Patriot PAC-3 Missile Segment Enhancement (MSE) interceptor. Development of a two-stage Zombie ballistic missile target known as Black Dagger was completed last year, culminating with a successful risk reduction launch in June 2018. The Black Dagger target is meant to represent a broader range of short-range ballistic missile threats by achieving longer range, higher altitude, and increased velocity. The Zombie suite of targets has multiple missions planned in support of MDA, Patriot, and Army IAMD over the next several years. The goal remains to provide more cost effective ballistic missile targets. Accomplishing this goal, will result in an overall reduced cost to the DoD's test execution mission.

Missile Defense Testing Range: USASMDC/ARSTRAT operates the Ronald Reagan Ballistic Missile Defense Test Site (RTS) at the U.S. Army Garrison—Kwajalein Atoll in the Republic of the Marshall Islands. RTS provides critical testing support to both offensive and defensive missile testing requirements for programs such as GMD and U.S. Air Force strategic ballistic missile systems. RTS retains preeminent ballistic missile testing capabilities used in validating the Nation's ability to sustain a strong, credible ballistic missile deterrent as a key element of national security and the security of U.S. allies and partners.

RTS continues to support the developmental and operational testing of both homeland and regional missile defense systems. Two Standard Missile-3 tests were successfully supported with MDA in 2018 (FTM-29 in January 2018 and FTO-03 E1 in December 2018). Planning and preparation for support to the Army Patriot system, the MDA Ground-Based Interceptor, and THAAD systems continued throughout 2018 for future test events.

RTS also supports offensive ballistic missile testing for the Air Force Global Strike Command. During 2018, RTS supported four Minuteman III test (Glory Trips) launches to successfully validate and verify the effectiveness, readiness, and accuracy of the weapon system. Hypersonic system testing has become a significant element of test planning at RTS during 2018. Because of the geographic remoteness and available complex sensor suite, RTS has seen a significant upswing in hypersonic

systems test planning. There are currently five active hypersonic test programs in various stages of planning at RTS.

In concert with its testing mission, RTS conducts continuous deep space surveillance and space object identification operations to increase national capabilities and reduce expenditures for both mission sets. The U.S. Air Force continues testing of its most advanced surveillance system—Space Fence. In a few years, this improved surveillance capability will enable proactive space situational awareness while complementing existing systems at the RTS.

Army Contributions to the Nation's Missile Defense Capabilities

Army Air and Missile Defense 2028 meets the directives of the National Defense Strategy and the Army vision and enables Multi-Domain Operations (MDO). To achieve the AMD force of 2028, we must continue to modernize and develop AMD capabilities, build sufficient AMD capacity for MDO, and ensure AMD forces are trained and ready. MDO requires that our capabilities and associated command and control systems have robust interoperability, to include with joint and allied forces, and be highly resilient. Accomplishing these essential tasks will allow us to provide deterrence via forward stationing and enable a more robust, comprehensive defense by coordinating and integrating with our partners and allies. AMD is one of six Army modernization priorities in which recent Army investments have significantly increased. The Army AMD CFT is the Army's modernization lead for these capabilities and works closely with the other Services, the Joint Staff, and MDA toward joint IAMD capabilities. The Program Executive Office for Missiles and Space is the Army's materiel developer for these capabilities and works closely with the AMD CFT. A summary of the Army's AMD strategic direction and major programs follows:

AMD is a Critical Enabler of the Army's Ability to Conduct Multi-Domain Operations

Air and Missile Defense Readiness: Readiness is the Army's top priority. The operational demand to meet the requirements of joint warfighters continues to stress the Army AMD force, impacting current and future readiness, as well as modernization initiatives. With a significant portion of the AMD force decisively committed, the Army continues to take action to mitigate this stress on the force and restore strategic

flexibility. Within the last five years, the Army implemented a Sustainable Readiness Model, established an AMD test detachment, and fielded the Dismounted Patriot Information Coordination Central (DPICC). Last year, the Army completed fielding of five DPICCs to USINDOPACOM, USEUCOM, and USCENTCOM providing these Combatant Commanders greater flexibility and a smaller deployable footprint to meet mission requirements.

Mission Command: Closely linked to AMD readiness is the ability to provide low density/high demand AMD mission command elements. The mission command elements are pivotal to laying the foundation and creating an environment that supports the integration of Army AMD forces into joint command and control (C2) architectures. Over the past year, the Army has activated an additional active component Air Defense Artillery brigade headquarters in USINDOPACOM and is rotating a National Guard Air Defense Artillery brigade headquarters to USEUCOM, and is elevating the command of the 10th Army Air and Missile Defense Command in USEUCOM to a general officer.

Terminal High Altitude Area Defense (THAAD) System: THAAD, a key component of the Ballistic Missile Defense System (BMDS) architecture, is designed for area defense of deployed and allied forces, population centers, and critical infrastructure against short-, medium-, and intermediate-range ballistic missiles. THAAD is a mobile and globally transportable, low density/high demand asset. THAAD has a unique endo- and exo-atmospheric intercept capability using proven hit-to-kill technology. There are currently seven operational THAAD batteries. THAAD batteries are deployed to Guam and the Republic of Korea in response to the North Korean nuclear and missile threat. The U.S. Forces Korea (USFK) Joint Emergent Operational Needs Statement (JEONS) requirement brings a remote launch capability in Fiscal Year 2019 and a THAAD Missile Segment Enhancement Integration capability in Fiscal Year 2021. As directed in the 2019 Missile Defense Review, the Army, in conjunction with OSD and MDA, is currently reviewing and validating the THAAD requirements in order to support current operation plans.

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, friends, and allies. The Patriot force is 40 percent forward

stationed/forward deployed as GCCs' increasing AMD requirements drive the operational tempo and stress on the Patriot force. The PAC-3 and PAC-3 MSE interceptors employ hit-to-kill capability against ballistic missiles. PAC-3 MSE fills the engagement gap between the THAAD and the PAC-3 missiles while also defeating advanced threats earlier, at greater range, with increased lethality. The PAC-3 MSE is in full-rate production and is the latest generation hit-to-kill PAC-3 interceptor in the Patriot force to meet global capability requirements. Over the next year, ongoing efforts will increase annual PAC-3 MSE production capability by approximately 30 percent to address increased U.S. requirements and demand from our international partners.

Patriot must continually modernize through software and hardware upgrades to avoid obsolescence and to take advantage of the extended battlespace performance afforded by the PAC-3 MSE interceptor. This modernization effort provides combat identification enhancements, addresses upper tier debris mitigation, improves performance of the PAC-3 MSE interceptor, and enables Army and joint interoperability improvements. The Post Deployment Build (PDB)-8 Conditional Materiel Release hardware and software was approved in November 2018. An agile build, PDB-8.0.6, was created in support of the USFK JEONS to expand Patriot and THAAD interoperability. The JEONS requirement brings the launch-on-remote capability, which expands Patriot's battlespace by enabling it to utilize the AN/TPY-2 radar battlespace by the Patriot system. This capability will be pure fleeted across Patriot in PDB-8.1 in Fiscal Year 2022. For adversary overmatch, the Army is continuously improving Patriot capability against the near-term evolving threat while we move toward the Army IAMD Battle Control System (IBCS) architecture including a new Lower Tier Air and Missile Defense Sensor (LTAMDS) and the IFPC Inc 2-1.

Lower Tier Air and Missile Defense Sensor (LTAMDS): LTAMDS will provide sensing capabilities in the lower tier portion of the ballistic missile defense battlespace and allow the full kinematic capabilities of the PAC-3 MSE missile. Additionally, LTAMDS will serve as a sensor node on the IBCS network, address capability gaps, modernize technology, reduce operations and sustainment cost, mitigate obsolescence, increase battlespace, and enhance reliability and maintainability.

To ensure a fair-and-open competition, an LTAMDS Sense-Off demonstration will be conducted in 2019. The upcoming Sense-Off competition provides industry the opportunity to demonstrate potential LTAMDS solutions. The Army will leverage Sense-Off results, along with concurrent modeling and simulation efforts, to evaluate current industry capabilities and determine future growth potential. Following the Sense-Off and proposal evaluations, the Army will award a contract later this year to a single vendor for the delivery of six prototypes. The rapid prototyping effort goal is the delivery of four sensors to one battalion in 2022.

Indirect Fire Protection Capability Increment 2 – Intercept (IFPC Inc 2): As the end of the operational lifecycle approaches for short-range AMD capabilities such as Avenger, the Army is developing new capabilities to defeat air, cruise missile (CM), and RAM threats. The primary IFPC-Inc 2 mission is to provide a robust protection capability against these threats to supported forces within fixed and semi-fixed locations. To address a gap in defenses against potential Russian and Chinese CM threats, the Army recently reported to Congress its intent to rapidly field an interim capability utilizing the Israeli Iron Dome system no later than Fiscal Year 2020. Concurrently, the Army plans to execute a decision on enduring IFPC capability by the end of Fiscal Year 2019. Two batteries of the enduring IFPC-Inc 2 capability will be deployed no later than the conclusion of Fiscal Year 2023.

Counter-Unmanned Aircraft Systems (C-UAS): Technological advances and the proliferation of commercial and tactical UAS in both reconnaissance and attack capabilities have matured to the point where they represent a significant threat to Army operations from both state and non-state actors. The extensive range of platforms in terms of size, velocity, range, altitude, flexibility, and capability make this a very challenging mission area for AMD systems. C-UAS efforts are critical to defeat the rapid proliferation of small, commercially available UAS technology on the battlefield. In response to a warfighter Joint Urgent Operational Needs Statement (JUONS), the Army has deployed over 500 C-UAS systems (man-portable, expeditionary, and mobile) and continues to adapt to changes in theater UAS threats. The modification of counterfire target acquisition radars, equipped with multi-mission air surveillance target acquisition capabilities, improves the warfighter's ability to detect and defeat these low, slow, and

small UAS threats. Efforts continue to close the risk gap to protect our maneuver forces with short range defense capabilities.

Army Long-Range Persistent Surveillance (ALPS): In support of a JUONS, the ALPS passive sensor is currently being fielded to USINDOPACOM, USEUCOM, and USCENTCOM. The Army demonstrated the ability to integrate ALPS into the Army IBCS in 2018. Once fully integrated into Army IBCS, the ALPS passive sensor will provide continuous, 360-degree, long-range surveillance against fixed and rotary wing aircraft, UAS, and CM threats.

Maneuver-Short Range Air Defense (M-SHORAD): M-SHORAD will provide a dedicated maneuverable and survivable AMD capability for maneuvering forces against fixed-wing, rotary-wing, and UAS threats. The Army delivered two Avenger battalion equipment sets to USEUCOM in support of the European Deterrence Initiative. The equipment was accompanied by personnel and infrastructure allowing the establishment of an active component Avenger battalion. Additionally, the Army is rotating an Army National Guard Avenger battery to Europe to provide protection of maneuver forces. While the current Avenger and Stinger systems provide limited capabilities today, we must develop and field more advanced systems to outpace the threat. In Fiscal Year 2018, the Army began the development and fabrication of initial M-SHORAD systems that integrate existing Army capabilities into a Stryker combat vehicle. Rapid prototype development and integration activities continue and fielding of four M-SHORAD battalions is scheduled for Fiscal Years 2021 through 2023. In addition, the Army continues to mature high energy lasers and electronic warfare to increase M-SHORAD capabilities in support of the maneuver force. M-SHORAD will begin to integrate a laser with an initial capability in Fiscal Year 2024. By Fiscal Year 2028, M-SHORAD battalions will field a mix of directed energy and missile-based systems.

Army Integrated Air and Missile Defense (IAMD): Army IAMD integrates current and future AMD sensors and weapons into a common integrated fire control capability. The Army's common integrated and networked AMD C2 capability, IBCS, will allow the warfighter to fully integrate joint and multinational AMD capabilities across all echelons. IBCS allows rapid convergence of sensors, shooters, and C2 components on an integrated fire control network. Once fully fielded, IBCS will provide a game-changing

capability, allowing AMD forces to be tailored and scaled appropriately to meet the given threat. The flexible number and mix of capabilities can be task organized into a formation with an inherent, integrated C2 system. The IBCS open architecture will enable rapid integration of legacy and developmental sensors and shooters, providing capabilities to defeat emerging threats in multi-domain operations. The program continues to execute on plan in accordance with the 2018 Congressional report.

The program will field common missile command nodes for Army AMD forces to defend against manned aircraft and UAS, air-to-ground missiles, tactical ballistic missiles, CM, and RAM attacks. The IBCS will operate with air surveillance and fire control capabilities across the Army, and with joint and multinational AMD capabilities across all echelons. It will enhance the lethality of the AMD force, dismantling the current system-centric control paradigm, which will dramatically increase capability and also facilitate open industry competition in support of the AMD community. Additional efforts are currently underway to explore the feasibility and potential benefits of integrating Army's IBCS and MDA's BMD System Command, Control, Battle Management, and Communications (C2BMC), to include THAAD fire control center, to fully support Army IAMD interoperability with the BMDS.

Joint Functional Component Command for Integrated Missile Defense (JFCC IMD)—Integrating and Synchronizing Missile Defense

JFCC IMD is USSTRATCOM's missile defense integrating element, formed to execute its Unified Command Plan (UCP) assigned missile defense mission and enable the headquarters to focus on integration and advocacy. Headquartered at Schriever Air Force Base in Colorado Springs, Colorado, JFCC IMD is manned by a cohesive team of Army, Navy, Air Force, Marine Corps, Civilian, and Contractor personnel.

As the Secretary of Defense and various Combatant Commanders have previously testified, warfighters remain confident in our ability to protect the Nation against missile attacks. However, as the global missile threat continues to evolve, we must invest in holistic approaches to defeat adversary missiles before launch or during all phases of flight (boost, midcourse, and terminal phases). Additionally, we must continue to invest in capabilities that limit or mitigate the effects of an attack which penetrates our defenses. JFCC IMD's principal mission is to coordinate with, and

operationally support, the joint warfighters at the GCCs, and advocate for their requirements with the materiel developers at MDA and the Services. On behalf of the GCCs and USSTRATCOM, JFCC IMD champions warfighter priorities and capability needs, including continued development of a robust sensor network, integrated discrimination capabilities, redundant and resilient C2 networks with enhanced cybersecurity defenses, and improved interceptors for both homeland and regional missile defenses.

Through JFCC IMD, we work across DoD and alongside key allies and partners to improve integration of existing capabilities, maximizing efficiency and effectiveness in global missile defense missions. The essential force multiplier is integration—a critically important mission enabler that JFCC IMD directly supports. As a functional component command of USSTRATCOM, JFCC IMD executes support to designated UCP responsibilities along four lines of effort:

- Synchronizing global missile defense planning, global force management, and missile defense security cooperation activities.
- Conducting global missile defense operations support, to include asset management, alternate execution authority, federated intelligence support, and network monitoring and protection.
- Executing above element, joint, and combined global missile defense training and education, exercises, and experimentation.
- Advocating for and recommending acceptance of global missile defense capabilities, conducting analysis and assessments of current and future capabilities, and supporting ground & flight tests.

To accomplish these efforts, we maintain close collaborative relationships with the GCCs, MDA, the Services, OSD, the Joint Staff, and our allies and partners. We continually seek to enhance our deployed forces' capabilities while gaining operational experience and confidence in our collective ability to defend the Nation, deployed forces, partners, and allies. Some of our key efforts to enhance missile defense planning and capabilities for both the homeland and regional architectures follow:

Expansion and Integration of the Missile Defense Architecture: In response to the evolving strategic environment, we continue to bolster homeland and regional

missile defense capabilities. In development of the global missile defense mission, we are supporting the advancement of the new capabilities such as Aegis Ashore in Poland; the Standard Missile-3 Block IIA under co-development with Japan; Long Range Discrimination Radar at Clear Air Force Station, Alaska; 20 additional GBIs in a new missile field at Fort Greely, Alaska; Homeland Defense Radar–Hawaii; Pacific Radar; Spacebased Kill Assessment; and various other new capabilities such as neutral particle beam, high energy laser, and other directed energy technologies. Given the many challenges associated with implementation of these architectures, JFCC IMD, in support of USSTRATCOM's coordinating role for global missile defense, collaborates with the GCCs to assess and address cross-regional gaps in the areas of planning, policy, capabilities, and operations.

Multi-Regional Missile Defense Asset Management: JFCC IMD, in coordination with USSTRATCOM and the GCCs, manages the availability of missile defense assets to balance operational readiness posture, coordinates the scheduling of missile defense system maintenance activities, and supports MDA and Service test requirements. The asset management process allows us to continually assess our readiness to defend against missile attacks and to recommend adjustments to optimize the overall missile defense architecture.

Cybersecurity of the Ballistic Missile Defense System: JFCC IMD, in coordination with USSTRATCOM and MDA, conducts the Cybersecurity Service Provider mission for the BMDS to ensure cyber defenses and operations are planned and executed across the globe. JFCC IMD works with key stakeholders to enhance the cyber defense posture of our missile defense operational architecture against malicious activity. We are collaborating with our mission partners to incorporate realistic cybersecurity testing in support of the Warfighter Capability Acceptance process. JFCC IMD also works closely with the Joint Staff, Combatant Commanders, and MDA to educate, train, and exercise cybersecurity protocols to ensure the highest levels of readiness.

Global Planning and Assessment: As regional and global missile threats continue to increase in number and complexity, JFCC IMD works with the missile defense community to refine processes that synchronize transregional global missile

defense planning and operations. Codified in periodic revisions to the Global Missile Defense Concept of Operations, these processes ensure unity of effort and mitigate potential seams and gaps across geographic areas of responsibility. Consistent with the Department's transition to planning based on adversary problem sets, JFCC IMD has continued to refine our process for adversary-centric missile defense plans assessments, and completed further objective analysis of missile defense risks across multiple GCC plans. This assessment methodology identifies systemic risk, informs recommendations for shortfall mitigation, and increases effectiveness in future missile defense planning efforts. This analysis informs our biennial Global Integrated Air and Missile Defense Assessment which shapes recommendations for global force management and future capability advocacy. Looking forward, we will focus our efforts with the warfighter community to continue establishing approaches and processes necessary to enable increased integration and a more holistic approach to missile defense.

Global Force Management: USSTRATCOM, as the designated Joint Functional Manager for missile defense, relies upon JFCC IMD to evaluate and recommend to the Joint Staff sourcing of missile defense requirements based on assessed risk. Due to the low density/high demand nature of missile defense assets, all sourcing decisions have a direct and significant impact on other Combatant Commanders' campaign and contingency plans. We continue to refine our approach to prioritize steady-state global missile defense requirements. This Global Prioritized Defended Asset List categorizes the GCCs' critical assets based on global risk. It informs our recommendations in the Global Force Management process, enabling senior leaders to make informed decisions on allocation of low density missile defense forces.

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. In support of those efforts, our Global Missile Defense Concept of Operations includes an International Engagement Framework which provides a common approach to identify potential partners, a model to identify a level of maturation, and an assessment mechanism. This approach has formed the analytical basis for the Department's Reports to Congress on

Allied Integration for the past two years. Another venue aimed at promoting increased cooperation is the Nimble Titan campaign, a biennial series of multinational missile defense experiments. Nimble Titan brings together policy and military subject matter experts from allies and partner nations to explore collaborative missile defense, synchronize policy and military initiatives, and identify potential future concepts. Today, ministries of foreign affairs and defense representatives from 24 nations, the North Atlanta Treaty Organization (NATO), three additional multinational organizations, as well as DoD, OSD, Joint Staff, Combatant Commands, and MDA convene quarterly to exchange views and insights, collectively exploring policy and operational concepts.

> **"By working together with allies and partners we amass the greatest possible strength for the long-term advancement of our interest…"**
> - 2019 National Defense Strategy

The Nimble Titan 18 campaign highlighted the importance of common threat perception, differences in triggers for offensive action, challenges of intelligence and information sharing in a multinational coalition, and experimentation with global, regional, and national defense designs with layered defense. The campaign explored regional verses national defense designs to combat overmatch of threats, where nations with missile defense assets provided coverage for regional partners without assets. Additionally, increased intelligence sharing led to a multinational coalition to prevent missile proliferation and decreased risk of escalation.

The ongoing Nimble Titan 20 campaign incorporates recent guidance from worldwide senior leaders and lessons learned from past campaigns to experiment with the future use of space sensors for missile defense, the use of deterrence, and defense against and use of non-kinetic effects to include cyber, as part of IAMD. Nimble Titan continues to be a gateway for the U.S. to establish crucial relationships with allies and partners. It also informs the missile defense policies of the participating nations and international organizations. Events like Nimble Titan foster greater confidence in combined missile defenses and provide a means to advance U.S. efforts in collaboration, integration, interoperability, and burden sharing with our allies and partners.

JFCC IMD, in coordination with Combatant Commands and selected allies and partner militaries, is developing a multilateral information-sharing and modeling and simulation construct to enable collaborative planning and provide a better assessment of allied and partner nations' missile defense systems and capabilities. It also participates in regular multilateral tabletop exercises and events to help partner nations identify and close capability gaps. Additionally, we have successfully integrated allies directly into the JFCC IMD staff through the Foreign Liaison Officer (FLO) program. Our first FLO, a German Air Force officer, has been an integral player in Nimble Titan, NATO BMD training, and allied and partner modeling and simulation efforts. We are seeking to add additional FLOs to increase our understanding of allied missile defense policies, capabilities, and planning in order to optimize missile defense planning and force allocation.

Joint Missile Defense Training and Education: In coordination with USSTRATCOM, the Joint Staff, Combatant Commands, and the Services, we continue to develop comprehensive and innovative training programs to close gaps between Service, joint, and regional missile defense training and education. JFCC IMD's Joint Ballistic Missile Defense Training and Education Center, was designated last year by OSD as a Center of Excellence. It now offers 16 mission-oriented resident and mobile training team courses, and online courses to include orientation, asset management, C2BMC situational awareness, and general officer/flag officer seminar training. Over the past year, JFCC IMD instructors executed 240 courses, training over 3,500 students worldwide. Additionally, in keeping with Joint Vision 2020, JFCC IMD provided training courses to our allies and partners through military-to-military and Foreign Military Sales training venues. In 2018, this included training to the Japan Self Defense Force Joint Staff, the Republic of Korea Armed Forces, and the Peninsula Shield attendees at the Fires Center of Excellence Top Gun course.

Warfighter Capability Acceptance and Integrated Master Test Plan: As missile defense architectures mature, warfighters require a credible, comprehensive assessment of new capabilities to inform operational acceptance into the global BMDS. The warfighter relies on a robust and operationally relevant test campaign to confidently field and integrate new capabilities into their existing IAMD architectures.

In April 2018, Warfighter Capability Acceptance was completed for the entire fleet of operational GBIs, thus enhancing homeland defense capabilities for USNORTHCOM and USINDOPACOM. Warfighter Capability Acceptance is scheduled to be completed in 2019 for improvements made to Robust IRBM Defense for USEUCOM and USCENTCOM.

Last year's test campaign included several significant tests. In April 2018, the Department demonstrated interoperability between the THAAD and Patriot weapons systems. Additionally in September 2018, international cooperation was demonstrated when Japanese Maritime Self Defense Force and MDA completed an Aegis BMD intercept flight test, in cooperation with the U.S. Navy, off the coast of Hawaii. Finally, in December 2018, the Department conducted an Aegis Weapon System Engage-On-Remote intercept of an IRBM-class target with an SM-3 Block IIA interceptor demonstrating the effectiveness of the European Phased Adaptive Approach Phase III architecture.

This year, JFCC IMD supported the FTG-11 test which demonstrated several firsts, including the first salvo (two GBIs) engagement; operational flight test of the GMD system; first use of the space segment of the Space-based Kill Assessment in a GMD flight test; and first Aegis SM-3 Block IIA simulated engagement of an ICBM class target. The Navy and MDA will demonstrate fleet defense using a salvo of two SM-6 missiles. Additionally this year, new capabilities that will be demonstrated in flight test are THAAD remote launcher capability and Patriot launch on remote engagement using THAAD.

Missile Defense Review (MDR): The recently released MDR reinforces our commitment to defending the United States, our deployed forces and allies from adversary missile launches. The review lays out a strategy to prioritize a comprehensive approach to countering the increasingly capable and diverse missile threat. It acknowledges the limitations of relying solely on defending against missiles inflight and seeks to improve our integration of offensive and defensive actions. Combining offensive capabilities with a credible missile defense capability sends a strong message of deterrence to our adversaries. We are pursuing new concepts and capabilities to ensure effectiveness against current and future threats. But, as we

address future threats, we must account for the AMD assets required to defend the homeland while simultaneously improving our regional capabilities. The MDR assigned a number of follow-on reviews to ensure the missile defense enterprise appropriately addresses requirements development, trans-regional integration, and pre-launch attack operations. The JFCC IMD team is fully engaged in these efforts and I am confident they will effectively inform meaningful reforms.

> "The MDR looks at, and beyond, the contemporary threat environment to consider emerging missile challenges and their implications for U.S. missile defense roles and requirements."
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> - 2019 Missile Defense Review

In summary, JFCC IMD continues to expand our Nation's global missile defense architecture and explores future capabilities to maintain operational advantage against current and future threats. Competitive edge is maintained through integrated planning and operational support, deliberate investments in our capability developments by MDA and the Services, investments in our warfighters through education and training, expansion of collaboration with our allies and partners, and the speed of innovation and fielding to get capability in the hands of our warfighters.

Conclusion

Chairman Fischer and Ranking Member Heinrich, as a member of the joint missile defense community, the Army continues to pursue enhancements to the Nation's IAMD systems, from the tactical to the strategic levels of warfare. As outlined here, USASMDC/ARSTRAT 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 new technologies required to maintain a technological advantage against our adversaries. Our trained and ready Soldiers, operating GMD elements in Colorado, Alaska, New York, California, and from remote, globally deployed locations, remain on point to defend the homeland against an ICBM attack. As a force provider to the GCCs, our Soldiers provide essential regional sensor capabilities, ballistic missile early warning, and satellite communications. Our regional forces continue to leverage

allied collaboration and planning efforts in developing integrated and interoperable defenses against the various threat sets. USSTRATCOM, through the JFCC IMD, continues to integrate BMDS capabilities to counter global missile threats and to protect our Nation, deployed forces, allies, and partners.

While operational, doctrinal, and materiel developments are essential, our most important assets are the thousands of Soldiers, Sailors, Airmen, Marines, Civilians, and Contractors who deploy and operate 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.

I appreciate having the opportunity to address missile defense matters and look forward to addressing your questions.