



APRIL 2, 2014

# HEARING TO RECEIVE TESTIMONY ON BALLISTIC MISSILE DEFENSE POLICIES AND PROGRAMS IN REVIEW OF THE DEFENSE AUTHORIZATION REQUEST FOR FISCAL YEAR 2015 AND THE FUTURE YEARS DEFENSE PROGRAM

UNITED STATES SENATE, COMMITTEE ON ARMED SERVICES, SUBCOMMITTEE ON STRATEGIC  
FORCES

ONE HUNDRED THIRTEENTH CONGRESS, SECOND SESSION

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**OPENING STATEMENT OF SENATOR MARK UDALL,  
CHAIRMAN**

Senator UDALL. The subcommittee will come to order. The Strategic Forces Subcommittee meets today to consider the ballistic missile defense programs and policies supporting the President's budget request. We have five expert witnesses joining us today to help us review these important and complex issues.

Ms. Elaine Bunn is the Deputy Assistant Secretary of Defense for Nuclear and Missile Defense Policy. She's testified before the subcommittee on nuclear policy, and she's here today as the Defense Department's expert on missile defense policy issues. The Honorable Michael Gilmore is the Director of Operational Test and Evaluation within the Department of Defense. He provides the DOD and Congress with independent assessments of the adequacy and results of our missile defense testing and also plays a critical role in reviewing and approving the semi-annual integrated master test plan for missile defense.

Vice Admiral Jim Syring is the Director of the Missile Defense Agency, which researches, designs, develops, tests, and fields our ballistic missile defense system and supports its operation and improvement. He is responsible for roughly \$7.5 billion in this year's budget request.

Lieutenant General David Mann is the Commander of the U.S. Army Space and Missile Defense Command. He is also the Joint Functional Component Commander for Integrated Missile Defense under U.S. Strategic Command. He represents the crucial warfighter perspective on missile defense issues, which we always want to keep in mind since they are the customer and the user.

Ms. Cristina Chaplain is the Director of Acquisition and Sourcing Management at the Government Accountability Office and leads the GAO evaluation of our missile defense acquisition programs. Congress has benefited from her work on this topic, among many others.

We welcome you all back to the subcommittee and we thank each of you for your long and dedicated service to the Nation and to our security.

Ballistic missile defense has taken on a growing importance as missile threats have grown. We all want operationally effective, cost effective, and affordable missile defenses to protect our homeland, our forward deployed troops, our allies, and our partners. We also recognize such missile defense is both technically challenging and expensive.

Unfortunately, by imposing sequestration on the budget of the Defense Department and the rest of government Congress has made the effort more difficult. Those constraints mandated by Congress affect our missile defense programs just like all other government programs. If we let sequestration return with full force next year, it will make things worse. I would continue to urge my colleagues on both sides to work to avoid that.

With respect to our homeland missile defense capability, we have a system in place today that protects the entire Nation from limited missile attacks from North Korea and a potential Iranian threat. Yet we all know that we have had problems with the kill vehicles on that system and we need to fix those problems and demonstrate the fixes through realistic testing before we buy more interceptors. That's what we call fly before you buy.

Those kill vehicle problems occurred because we deployed the system before it was properly designed, engineered, and tested. In other words, in its haste to deploy the system quickly the Bush Administration did not practice fly before you buy. Consequently, I am pleased that the budget request includes funds to redesign the kill vehicles so that they will be more effective, robust, and reliable. This committee has supported such a redesign. In order to avoid repeating any of the previous mistakes, we also need a rigorous acquisition approach with stringent engineering design and testing to be confident it will work before we deploy it.

As the Pentagon has told us, we also need to improve our homeland defense capabilities by investing in additional sensor and discrimination capabilities. That is their highest and best priority because it will make our current system more effective and allow us to defeat more threat missiles with our existing and planned interceptors.

Regional missile defenses are a high priority for our regional combatant commanders because they need a capability to address existing missile threats to Europe, the Middle East, and Asia, especially those from Iran and North Korea. That's why the Joint Chiefs of Staff and Secretary of Defense Robert Gates unanimously recommended the European Phased Adaptive Approach, or EPAA, to the President. It would rapidly provide the capability they needed to protect NATO Europe against the growing Iranian missile threat.

Phase 1 of the EPAA was deployed in 2011 and we are on track to deploy phase 2 in Romania next year. Phase 3 is planned for deployment in Poland in 2018 at the same site we agreed with Poland back in 2008. We will be interested to hear more about the progress of EPAA and on our regional defense efforts, particularly with our allies and partners in the Middle East and Asia.

So with all of that said, we look forward to your testimony on these important topics. Before we turn to you for brief oral statements, let me turn to my friend and ranking member, Senator Sessions, for any comments that he wishes to make. Senator Sessions. Senator SESSIONS. Thank you, Mr. Chairman. I think you make some very important observations that I share in your remarks. Thank you for that.

In March of last year, Secretary Hagel announced steps to strengthen homeland missile defense, including the deployment of 14 more GBIs in Alaska, which was really bringing it back up to the Bush plan after they had been reduced, and deploying a second AN/TPY2 radar in Japan to provide improved early warning, particularly from North Korean launches. This was a recognition, I think, that we face a long-range missile threat to the homeland and that threat is increasing faster than we expected.

This year the budget request includes several important initiatives meant to improve the GMD system. They include: a redesigned exoatmospheric kill vehicle for the ground-based interceptor, which you made reference to; and a new long-range discrimination radar to be deployed in Alaska; and software improvements for threat discrimination. So those are good steps. I believe they'll save money in the long run. If we can get our discrimination ability and our ability to discriminate against false threats, we can use fewer launches and have more effect. So I commend Admiral Syring and Secretary Hagel for these steps.

Back in 2009, the Department of Defense decided to cease deployment of GBIs at 30 at Fort Greely and that has now been overcome. I recall a meeting in Senator Lieberman's office with Secretary Gates and other Senators where we discussed our concern about the decision to go to 30 from 44. While Secretary Gates assured us that the intention was to improve the GMD system at the time, funding shortfalls and the administration's emphasis on regional missile defense meant there was very little real improvement available to GMD.

So today I think we move forward. So the next 5 years, MDA intends to spend around \$700 million to design a new kill vehicle and I believe this is overdue.

Speaking of funding, let me show this chart. It looks awfully crowded, but it sort of tells us how in Washington things start eroding when we don't really understand what's happening to us. The President made a commitment at the time of the New START treaty that we would be involved in this, but this is how it looks. According to our staff estimates, the President's proposed 5-year spending plan that he's submitting today for missile defense is about \$6 billion less than the President's fiscal year 2012 spending plan. This is what he submitted as his spending at 8.8 in 2015 and 2016, billion dollars. So here we are for 2015 and we're at 7.8, and dropping down to 7.3 in fiscal year 2019.

So based on that, we're talking about over the FYDP about \$6 billion less than we were expecting to spend. Now, if this is because you've saved money on the Energy buildings at their laboratories, maybe we could survive that. Maybe it wouldn't be so devastating, because I have doubts about whether all that money, \$5 billion, \$10 billion buildings, was necessary. But we do not want—all I'm saying, Mr. Chairman, is having a credible missile defense system is so fundamentally important, and it's less than 5 percent of our total defense budget for the whole system, and we ought to be able to—actually, that's about 2 percent. \$7 billion out of \$500 billion is a lot less than that.

So I guess I would say that just points out where we are. That's what we're wrestling with, the kind of issue we're dealing with today. We want a good strong missile defense system. Can we complete it with those numbers and do you have a plan that will work? It would be great if you can do it at those numbers, but I'm a bit uneasy about it.

Thank you, Mr. Chairman—I would say one more thing. The sequester does not require us to cut any more in the future. The big cuts were this year and somewhat next year. But that Ryan-Murray bill filled in the hole this year and filled in some next year, leaving us at basically, the 050 account, at 521 this year, 521 in 2015, 561 in 2016—no, 523 in 2016, 536 in 2017, 549 in 2018, 562 in 2019, 576 in '20, and 590 in 2021.

We're going to have some pretty good increases, about a 2.5 percent increase, after the next 2 years, after the cuts we've already taken. You had to make big cuts this year, even with the little extra money that Ryan-Murray put into the account. But it avoided, I think, disastrous pain and some very unwise decisions you would have had to make. So I'm sympathetic with the problem, but we're going to all have to tighten our belt and defend America without wasting money, because the interest on the debt is going from \$233 billion this year to \$880 billion 10 years from today,

according to CBO, and that passes the whole defense budget in 4 or 5 years.

Thank you.

Senator UDALL. Thank you, Senator Sessions.

We will hear from the panel from our left to your right. We'll start with Ms. Bunn, and if you'll keep your oral statements brief, and I know you came prepared to do so, then we can open the committee up to questions from you. So, Ms. Bunn, you're recognized.

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THE SENATE ARMED SERVICES COMMITTEE

STATEMENT OF

M. ELAINE BUNN

DEPUTY ASSISTANT SECRETARY OF DEFENSE FOR NUCLEAR AND  
MISSILE DEFENSE POLICY

BEFORE THE SENATE ARMED SERVICES COMMITTEE

APRIL 2, 2014

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## **Introduction**

Chairman Udall, Ranking Member Sessions, and Members of the Subcommittee, thank you for the opportunity to testify in support of the Department's Fiscal Year (FY) 2015 budget request for missile defense. Ballistic missile defense (BMD) is a critical national security priority – both for the homeland and for our ability to project power abroad, prevent and deter conflicts, and defend our deployed forces and allies.

You asked for my assessment of how the programs and fiscal year 2015 budget request for the Missile Defense Agency (MDA) reflect missile defense policy and posture. The President's budget requests \$8.5 billion in FY 2015 with \$7.5 billion for the MDA to develop and deploy missile defense capabilities that protect the U.S. homeland and strengthen regional missile defenses.

As reflected in the 2014 Quadrennial Defense Review (QDR), which was submitted with the budget request, our top missile defense policy priorities have not changed. The first priority is the defense of the U.S. homeland against the threat of limited ballistic missile attack. We are committed to maintaining an advantageous position compared to the intercontinental ballistic missile (ICBM) threats from North Korea and Iran. This requires continued improvement to the ground-based midcourse defense (GMD) system, including enhanced performance of the Ground-Based Interceptor (GBI) and the deployment of new sensors.

DoD's budget request for FY 2015 also continues to implement regional approaches that are tailored to the unique deterrence and defense requirements of Europe, the Middle East, and Asia-Pacific regions. These regions vary considerably in their geography, history, and character of the threat faced, and in the military-to-military relationships on which we seek to build cooperative missile defenses. Our focus is on developing and fielding capabilities that are mobile and capable of being redeployed to different locations as necessary to address the threat. We are also encouraging our allies and partners to acquire missile defenses, and we are working to strengthen missile defense cooperation that can contribute to significantly increased performance than individual countries can achieve on their own.

I will begin with a discussion of ballistic missile threat and trends, and then focus on our progress on three key policy priorities: sustaining a strong homeland defense, strengthening regional missile defense, and fostering increased international cooperation and participation.

## **Ballistic Missile Threats and Trends**

Ballistic missiles are becoming more survivable, reliable, and accurate at greater ranges. Regional powers are basing more missiles on mobile platforms at sea and on land. Technical and operational measures to defeat missile defenses also are increasing. China, Iran, and North Korea, for example, exercise near simultaneous salvo firings of short- and medium- range

ballistic missiles from multiple locations to saturate regional missile defenses. Countries are designing missiles to launch from multiple transporters against a broad array of targets, enhancing their mobility and effectiveness on the battlefield. Shorter launch-preparation times and smaller footprints are making new systems more survivable.

### *Iran*

Iran already has the largest inventory of ballistic missiles in the Middle East, and today can strike targets throughout the region and into Eastern Europe. In addition to its growing missile inventories, Iran is seeking to enhance lethality and effectiveness of existing systems with improvements in accuracy and warhead designs. Iran is developing an anti-ship ballistic missile which could threaten maritime activity throughout the Persian Gulf and Strait of Hormuz. While Iran has not yet deployed an ICBM, its progress on space launch vehicles—along with its desire to deter the United States and its allies—provides Tehran with the means and motivation to develop longer-range missiles, including an ICBM.

Although we do not know if Iran will eventually decide to build nuclear weapons, Iran has developed technical expertise in a number of areas – including uranium enrichment, nuclear reactors, and ballistic missiles – from which it could draw if it decided to build missile-deliverable nuclear weapons.

### *Syria*

While Syria does not pose a ballistic missile threat to the U.S. homeland, the Assad regime does possess short-range ballistic missiles, and has shown a willingness to use them repeatedly against its own people. Syria has several hundred short-range ballistic missiles, all of which are mobile and can reach much of Israel and large portions of Iraq, Jordan, and Turkey from launch sites well within the country.

### *North Korea*

North Korea's weapons and missile programs pose a serious threat to the United States and to East Asia. North Korea has conducted three nuclear tests. It also is seeking to develop longer-range ballistic missiles capable of delivering nuclear weapons to the United States, and continues efforts to bring its KN08 road mobile ICBM, which it paraded most recently in July 2013, to operational capacity. While the reliability of an untested North Korean ICBM is likely to be very low, North Korea has used its Taepo-Dong-2 launch vehicle to put a satellite in orbit, thus successfully demonstrating technologies applicable to a long-range missile.

North Korea's efforts to produce and market ballistic missiles raise broader regional and global security concerns, by threatening the United States' allies and partners and increasing our concerns about ballistic missile technology proliferation.

## *China*

In the regional ballistic missile context, China is augmenting the over 1,200 conventional short-range ballistic missiles with a limited but growing number of conventionally armed, medium-range ballistic missiles that will improve China's ability to strike regional targets. China also continues to deploy growing numbers of anti-ship ballistic missiles.

## **Homeland Defense**

The U.S. homeland is currently protected against potential limited ICBM attacks from states like North Korea and Iran by the GMD system. This system consists of GBIs, land-based early-warning radars, sea-based radar systems, and a sophisticated command and control architecture.

The Department of Defense is implementing steps to strengthen the U.S. homeland missile defense posture as announced by Secretary Hagel in March of last year. The refurbishment of Missile Field 1 at Fort Greely, Alaska, is underway and the budget includes funding for the acquisition of GBIs to support GMD operations, testing, and spares, and emplacement of additional GBIs in Missile Field 2 as we progress toward 44 deployed interceptors by the end of 2017. Secretary Hagel also announced the deployment of a second AN/TPY-2 radar in Japan. This deployment will provide improved early warning and tracking of missiles launched from North Korea at the United States as well as its regional allies and partners. We remain on track to complete deployment of this capability by the end of the year.

The President's budget request also includes funding to initiate the redesign of the Exoatmospheric Kill Vehicle (EKV). The redesigned EKV, in essence a next-generation kill vehicle, will not only improve the reliability and performance of the GBI, but by being designed to allow for a more standardized production process, the kill vehicle should also be easier to build, upgrade, and maintain than the previous versions. This investment in the next generation kill vehicle for the GBI is especially important considering the test problems associated with the Capability Enhancement-II (CE-II) version of the kill vehicle. Although we are committed to ensuring the effectiveness of the current kill vehicle through testing; we are also pursuing a redesigned kill vehicle that will improve the reliability and effectiveness of the GMD system.

The submitted budget also includes funding for development of a Long Range Discrimination Radar (LRDR). This radar will provide persistent sensor coverage and improve discrimination capabilities against threats to the homeland from North Korea and will provide the Sea-Based X-band (SBX) radar more geographic deployment flexibility for contingency and test use.

We are also requesting funding to improve the discrimination capabilities of the existing GMD system. These investments will lead to a GMD system more capable of discriminating and destroying reentry vehicles with a high degree of confidence and will improve the efficiency and effectiveness of our homeland missile defenses.

As directed by Congress, the Missile Defense Agency is also currently evaluating four potential locations for an additional GBI site in the continental United States. An additional missile field in the Eastern portion of the United States would increase the overall survivability of the GMD system, provide more time to conduct missile defense engagements, and would allow for the deployment of additional interceptors.

That said, the cost of building an additional missile defense site in the United States is very high. Given that the ICBM threat from Iran has not yet emerged, and due to the recent test failures associated with the current GBI kill vehicles, the highest priorities for the protection of the homeland are in improving the reliability and effectiveness of the GBI and improving the GMD sensor architecture. The current GMD system provides coverage of the entire United States from North Korean and potential Iranian ICBMs. No decision has been made to deploy an additional missile field in the United States. If an ICBM threat were to emerge in numbers that necessitated the deployment of additional interceptors, the steps being taken now, to include conducting an environmental impact statement, will shorten the construction timelines associated with deployment of a new missile defense site.

### **Regional Missile Defense**

The Department's budget request for FY 2015 also continues to implement regional approaches that are tailored to the unique deterrence and defense requirements of Europe, the Middle East, and Asia-Pacific regions.

#### *Europe*

We are continuing to implement the European Phased Adaptive Approach (EPAA), and we are working in close collaboration with our NATO Allies to develop an advanced network of sensors and interceptors – on land and at sea – to protect NATO European territory and our forces and military facilities.

The United States has operated a forward-based radar in Turkey and maintained a sea-based missile defense presence in Europe since 2011. The Standard Missile (SM)-3 Block IB was deployed on Aegis BMD ships as an operational interceptor for the first time in 2013. The Block IB version of the interceptor uses an improved seeker and signal processor that allows for greater on-board discrimination and area coverage than the SM-3 IA. In October of 2013, a groundbreaking ceremony was held at the land-based SM-3, or Aegis Ashore, site in Romania. The site is planned to be operational by the end of 2015.

We have also taken steps to meet the requirement for sea-based BMD capabilities by establishing a home-port for four U.S. Aegis BMD destroyers at the naval facility at Rota, Spain. These multi-mission ships will support the missile defense mission, as well as other U.S. European Command and NATO maritime missions. The first of the four ships to be stationed at Rota, USS

DONALD COOK, has already deployed to Europe, and the USS ROSS will arrive this summer. The final two ships, the USS CARNEY and USS PORTER, will arrive in 2015.

The President's budget request also supports the Aegis Ashore site that will be deployed in Poland in the 2018 timeframe and the development of the SM-3 Block IIA interceptor that will be deployed on land and at sea. These capabilities will extend coverage to all NATO European countries.

As Secretary Hagel emphasized in his announcement in March of last year, our commitment to NATO missile defense "remains ironclad" as demonstrated by our strong support for the BMD capabilities either already deployed, or being developed for Phases 1 through 3 of the EPAA.

Our NATO Allies are also making significant contributions to the European missile defense mission. Romania, Spain, and Turkey are hosting U.S. missile defense assets and provide the external security for the facilities. Beyond hosting the second Aegis Ashore site in Europe, Poland has also announced its intention to spend up to \$10 billion to acquire increased air and missile defense capabilities. DoD is engaging directly with Poland to assist in the development of its missile defense requirements and is promoting U.S. systems to meet these requirements.

Several Allies have modern surface combatant ships that could be equipped with a BMD sensor or interceptor capability. The United States will continue to encourage its NATO Allies to do even more to cooperate and invest in missile defenses that will contribute to Alliance security.

The Netherlands has committed to spend up to 250 million Euro to upgrade the SMART-L radars on four of their frigates and it, along with Germany, has committed Patriot PAC-3 systems to NATO missile defense as demonstrated through the ongoing NATO deployment in defense of Turkey.

France is planning to provide its Spirale satellite detection system and a long-range radar for NATO territorial missile defense and has contributed the SAMP/T air and missile defense system, which became operational in 2013, to NATO BMD. Despite the U.S. decision to forgo production of the Medium Extended Air Defense System (MEADS), development will be completed in 2014. Germany and Italy are considering the system a possible future national contribution to NATO BMD.

The United States conducts exercises designed to hone our Alliance missile defense capabilities. U.S. European Command (USEUCOM) is engaged with NATO in the development of a biennial NATO-led BMD exercise event that serves to reinforce and expand upon other, routine BMD training evolutions that take place on a quarterly and semi-annual basis.

Many NATO Allies also participate in NIMBLE TITAN, a series of exercises designed to understand how the missile defenses of many participant can work together in a crisis or conflict.

The NIBLE TITAN 14 campaign, which began last year with regional tabletop exercises, has 21 participant nations, and NATO participates as an alliance. The final exercise of NIMBLE TITAN 14 is a capstone event that will take place in April involving all participants in a cross-regional wargame.

### *Asia-Pacific*

The cornerstone of our security and diplomacy in the region has been our strong bilateral alliances, including with South Korea, Japan, and Australia. All three of these nations play an important role in our regional efforts to achieve effective missile defense.

South Korea obviously has an immediate, proximate stake in preventing missile strikes from North Korea. We have worked very closely with South Korea to ensure that our Alliance maintains the capacity to do just that. The United States deploys Patriot PAC-3 batteries in South Korea to defend U.S. and South Korean forces. In addition, South Korea is taking steps to enhance its own air and missile defense systems, which include sea- and land-based sensors and Patriot PAC-2 batteries. DoD has been consulting closely with South Korea about how it can upgrade its missile defense capabilities and we are mutually committed to sustain and strengthen protection against the North Korean missile threat.

Japan has its own layered missile defense system, which includes Aegis BMD ships with Standard Missile-3 interceptors, PAC-3 batteries, early-warning radars, and sophisticated command-and-control systems. Japan is upgrading two ATAGO-class Aegis destroyers to BMD capability with certification scheduled for FY 2018 and FY 2019 and has recently expressed interest in purchasing two additional Aegis BMD ships, which would increase its inventory to a total of eight BMD-capable ships. As mentioned earlier, Japan also hosts a U.S. missile defense radar and has agreed to host a second radar.

Japan is also a critical international partner for BMD development. One of our most significant cooperative efforts is the co-development of an advanced version of the SM-3 interceptor, the SM-3 Block IIA.

The United States and Australia have forged a long-standing partnership on missile defense research and development – most notably with regard to sensors. In addition, Australia is involved in a trilateral discussion on missile defense in the Pacific involving the United States, Australia, and Japan.

Going forward, we will continue to emphasize the importance of developing a regional ballistic missile defense system that includes the sharing of sensor data among Allies.

### *Middle East*

The United States maintains a strong defense relationship with Israel, and our cooperation on missile defense has resulted in a comprehensive missile defense architecture. Israeli programs

such as Iron Dome, the David's Sling Weapon System, and the Arrow Weapon System, in conjunction with operational cooperation with the United States, create a multi-layered architecture designed to protect the Israeli people from varying types of missile threats. Missile defense figured prominently in the AUSTERE CHALLENGE exercise we conducted with Israel in the fall of 2012, the largest U.S.-Israeli military exercise in history. A similar exercise, JUNIPER COBRA, is scheduled to take place in May of this year.

The United States is also working with a number of Gulf Cooperation Council (GCC) countries on missile defense, including supporting the purchase of missile defense systems through the Foreign Military Sales program. The United Arab Emirates is procuring the Terminal High Altitude Area Defense (THAAD) system, with the first delivery expected next year. This is in addition to the UAE's earlier purchase of Patriot systems, which have been delivered. Saudi Arabia is in the process of upgrading its existing Patriot PAC-2 batteries to the PAC-3 configuration. Kuwait is also purchasing Patriot PAC-3 batteries.

U.S. Air Force Central Command maintains a series of regular exchanges between United States and GCC air defense officers at the Combined Air Operations Center located at Al Udeid Air Base in Qatar. These exchanges provide an opportunity for increased situational awareness of missile threats in the region as well as the potential for future BMD planning and operational cooperation.

As the GCC states begin to field more capable systems, the United States and its Gulf partners must work toward greater integration of those capabilities across the region. The desired end state is a regional missile defense architecture in which GCC member states participate and contribute to the extent practical, leading to a networked, layered defense of key strategic centers that strengthens deterrence and increases our collective ability to defeat a ballistic missile attack.

### *Russia*

This Administration, in keeping with previous Administrations, has sought cooperation with Russia on missile defense. Genuine missile defense cooperation would be in the security interests of all parties by strengthening the defensive capabilities of the United States, NATO, and Russia. It would also help to remove missile defense as a source of tension in the bilateral relationship, and send a powerful signal to potential adversaries that ballistic missile threats will be ineffective as a tool of coercion.

The United States has pursued missile defense cooperation with Russia with the clear understanding that we will not accept constraints on our missile defense systems, we will implement the EPAA, and Russia will not have command and control over the ballistic missile defense of NATO territory.

The United States has been open and transparent with Russia about our plans for European missile defenses, and explained in detail why U.S. missile defense systems in Europe will not negate the Russian strategic nuclear deterrent. We have made a number of proposals that would have laid the groundwork for meaningful cooperation, including a proposal to establish missile defense cooperation centers in Europe, and more recently, a proposal that would provide for reciprocal transparency about our respective missile defense plans and programs. These proposals would allow for the better understanding of the purpose of our missile defenses and for predictability about our missile defense plans for the future.

Russia has not reacted positively to the U.S. proposals and has instead continued to seek legally-binding restrictions and limitations on our missile defense deployments to Europe. In the course of our bilateral dialogue, we have continuously rejected any limitations on our missile defenses. Our missile defense deployments to Europe address the regional ballistic missile threat posed by Iran and Syria, and cannot be subject to limits imposed by a third party.

Russia's intervention into the crisis in Ukraine, in violation of international law, led to the suspension of our military to military dialogue and we have not continued to engage Russia on the topic of missile defense. As Russia's violation of international law continues, we will review any future bilateral engagements on missile defense to ensure that they are in the security interests of the United States and our allies.

## **Conclusion**

The ballistic missile threat – to the United States, to our Allies and partners, and to our forces overseas – is evolving, and we continue to grow and adapt our homeland and regional missile defense posture and international cooperation to address it.

We have had some very significant progress over the last several years, but this Administration has emphasized from the beginning that we cannot afford to stand still. The President's budget request for FY 2015 reflects DoD's goals of retaining the flexibility to adjust, and to enhance our defenses as the threat and technologies evolve. Missile defense is crucial to maintaining our most vital security commitments – the defense of the United States and the protection of our allies and partners and our forces around the world.

I want to thank you for having me here today, and I look forward to your questions.

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U.S. SENATE**

**STATEMENT**

**BY**

**J. MICHAEL GILMORE**

**DIRECTOR, OPERATIONAL TEST AND EVALUATION**

**OFFICE OF THE SECRETARY OF DEFENSE**

**BEFORE THE**

**SENATE ARMED SERVICES COMMITTEE**

**STRATEGIC FORCES SUBCOMMITTEE**

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U.S. SENATE  
SASC – APRIL 2, 2014**

**J. Michael Gilmore**  
**Director, Operational Test and Evaluation (DOT&E)**  
**Office of the Secretary of Defense**

Chairman Udall, Senator Sessions, distinguished Members of the Committee, thank you for the opportunity to discuss missile defense testing and my assessment of the Ballistic Missile Defense System, or BMDS.

Over the last year, Aegis Ballistic Missile Defense (BMD) and Patriot each demonstrated progress toward short-range ballistic missile threat class capability, even though Aegis BMD suffered a Standard Missile-3 (SM-3) Block IA intercept failure and an SM-3 Block IB missile failure during FY13 flight tests. The Theater High-Altitude Air Defense (THAAD) (twice) and Aegis BMD (once) demonstrated progress toward medium-range ballistic missile threat class capability when they successfully destroyed medium-range air-launched targets during two separate tests. The Command and Control, Battle Management, and Communications (C2BMC) demonstrated the capability to control two operationally-deployed AN/TPY-2 radars in Forward-Based Mode, using operational communications architectures, personnel, and tactics, techniques, and procedures.

The Ground-Based Midcourse Defense (GMD) element experienced a third consecutive failure in its flight test program. Supported by my office and by U.S. Northern Command, the Missile Defense Agency (MDA) conducted a GMD intercept test using a Capability Enhancement-I (CE-I) Exoatmospheric Kill

Vehicle (EKV) flying a more challenging and operationally realistic profile than the three previous CE-I intercept tests. The EKV failed to separate from the third stage, and could not complete the planned intercept.

Significant to a system-level characterization of the BMDS, the BMDS Operational Test Agency Team and the MDA conducted the first operational flight test of the BMDS that included Aegis BMD, THAAD, C2BMC, and an AN/TPY-2 radar operating in its Forward-Based Mode. This test, Flight Test Operational-01 (FTO-01), was planned to include a layered ballistic missile defense with the C2BMC providing information on system-level performance. The AN/TPY-2 (Forward-Based Mode) radar acquired and tracked all targets and passed track data to both Aegis BMD and THAAD via C2BMC. Although a layered defense between Aegis BMD and THAAD was demonstrated, the integration demonstrated was limited because, consistent with the test's design and the current capabilities of the BMDS and C2BMC, engagements were managed using the organic capabilities of the Aegis and THAAD systems. The test results are being used to modify and refine the tactics, techniques and procedures to be used by deployed Aegis and THAAD units, as well as to incorporate and field upgrades to those systems' suites of software.

The 2013 test program, although less robust than previous years, was adequate to support the development of the BMDS. The MDA conducted tests as scheduled in the Integrated Master Test Plan (IMTP), versions 12.2 and 13.1, approved by the MDA and DOT&E directors. However, except for Patriot Missile

Segment Enhancement testing, all key flight tests scheduled in IMTP 12.2, moved to later calendar quarters in IMTP 13.1, many to FY14 from FY13. This includes Aegis Ashore and Aegis BMD testing. Most of these changes were due to budget issues, brought on by sequestration, other Department budget reductions, and target availability. Due primarily to problems with target readiness, the first operational test of the BMDS, FTO-01, was moved one quarter later in IMTP 13.1, and completed in that same quarter.

Last year, the MDA conducted eight flight tests and five ground tests of the BMDS and/or its elements that were the primary contributors to DOT&E's characterization of the BMDS. While the cumulative results of the testing conducted to date do not provide sufficient data to quantify BMDS system-level performance for all of the many possible instantiations of the BMDS, they are adequate to reveal specific strengths and weaknesses in system-level capability that contribute to the overall development of the BMDS.

The GMD flight test program, affected by three consecutive test failures, is under review. The MDA conducted six GMD intercept flight tests in the eight-year period from Jan 2006 to January 2014. The Ground-Based Interceptors (GBIs) in these tests were equipped with either a Capability Enhancement-I (CE-I) Exoatmospheric Kill Vehicle (EKV) or an upgraded EKV version called the CE-II. In the first three intercept flight tests, the GBI hit its intended target; in the second three tests, the GBI did not intercept a target successfully. Following the FTG-06 failure of the GBI to hit its intended target, the MDA conducted FTG-06a

as a redo of FTG-06. However, FTG-06a also resulted in a failure of the GBI to hit its intended target. While waiting for final results from the Failure Review Boards, the MDA planned FTG-07 to demonstrate CE-I EKV performance in a more challenging operational scenario than previous CE-I tests, and to increase confidence in the fielded GBIs that are equipped with CE-I EKVs. However, this also resulted in a failure of the GBI to hit its intended target.

The MDA responded to the Failure Review Board results for FTG-06 and FTG-06a by changing EKV fabrication processes, improving quality control processes during GBI fabrication, and redesigning a CE-II EKV component. In FY/CY13, the MDA successfully tested a CE-II EKV incorporating the redesigned component in GMD Control Test Vehicle-01 (GM CTV-01), an interceptor-only flight test. The FTG-07 Failure Review Board determined that the root cause of the failure rested in two significant design susceptibilities with the EKV battery and electronic control power supply common to both the CE-I and CE-II EKVs. Consistent with the results of the most recent Failure Review Board, these GBI flight test results led me to recommend in my most recent Annual Report that MDA consider re-designing the EKV using rigorous systems engineering design principles to make the EKV more robust against failure. The MDA Director independently made the same recommendation to the Department's leadership, and the missile defense program submitted as part of the President's Budget allocates funds for re-designing the GBI EKV.

Since Flight Test Standard Missile-15 (FTM)-15 in April 2011, Aegis BMD has experienced one missile anomaly and three missile failures. During FTM-15, the SM-3 Block IA Third Stage Rocket Motor, or TSRM, experienced a failure in a critical component, leading to unexpected behavior just prior to achieving a successful intercept. The faulty component, common to both the Block IA and IB missiles, was subsequently redesigned and flown successfully in FTM-18. During FTM-16 Event 2 in September 2011, a catastrophic failure of the TSRM resulted in a failure to intercept. The MDA determined the cause to be an issue with one of the firing parameters and they made the necessary software modifications to mitigate the issue and verify the fix during numerous ground firings and a later successful FTM-19 flight test. Another TSRM failure occurred during the first of two Initial Operational Test and Evaluation flight tests (FTM-21) when the second of two salvo-fired IB missiles experienced a TSRM failure following a successful intercept by the first missile. The MDA is investigating this latest failure using the Failure Review Board process. The TSRM issues just described affect both the IA and IB missiles since the TSRM is a common component to both missile variants. Finally, a Block IA missile failed to intercept during Flight Test Integrated-01. A Failure Review Board determined that the cause of this failure is unrelated to the TSRM issues.

The MDA will conduct their first engagement of an Intercontinental Ballistic Missile, with the target flying a range of greater than 5,500 kilometers, in FY16, rather than FY15 as planned in IMTP 13.1. The first GMD salvo test of

two interceptors fired at a single target will occur in FY18. And finally, the MDA will conduct a multiple simultaneous engagement of two interceptors on two targets in FY20 during an integrated system-level operational test. When I briefed you last year, the multiple simultaneous engagement was planned for FY18. These changes will align the frequency of GMD testing back to 12-month centers. Also significant, beginning with the FY16 test, all but one of the subsequent GMD tests will be against Intercontinental Ballistic Missile class targets.

For Aegis BMD and THAAD, sufficient data now exist to perform quantitative estimates of the probability of engagement success for the tested battlespace (which is less than the full intended battlespace) of the two weapon systems. The probability of engagement success estimates for these two weapon systems are included in the classified portion of my 2013 Assessment of the BMDS.

For other BMDS elements, my assessments often contain subjective content due to the limited amount of test data that are available and the resulting limited progress toward verification, validation, and accreditation (VV&A) of the required BMDS models and simulations. Many of the models and simulations used in the ground tests are still not accredited for performance assessment, thereby limiting quantitative assessments based on their results. Some portions of the battlespace where data are lacking cannot be assessed. Examples include high closing velocities associated with longer range targets for Aegis BMD, salvo intercept time spacing for GMD since it has not yet attempted a salvo launch, and launch-

on-remote track for THAAD. My office and the MDA are working to assure the IMTP supports BMDS modeling and simulation by providing the test data required for rigorous VV&A. The MDA was able to collect important data on Critical Engagement Conditions and Empirical Measurement Events supporting VV&A. However, model and simulation VV&A to support comprehensive quantitative performance assessments will, in many instances, require several more years to complete.

My comments to this committee during my testimony of the last five years, regarding the IMTP development process, remain accurate. The Director of MDA, Vice Admiral Syring, has continued to pursue a rigorous IMTP development process that has produced a well-justified set of tests. During the reporting period, the MDA continued to emphasize operational realism when planning for and conducting both ground and flight testing. My office continues to be involved throughout the semi-annual review and revision process leading to each update of the IMTP. This process has worked well during the preparation of the previous plans that I approved jointly with the MDA directors. The process has enabled each version of the IMTP to be revised in a timely manner consistent with policy changes, flight test results (including unsuccessful intercepts), and changes in budgetary resources. The IMTP is a rigorous plan for obtaining the test information needed to assess BMDS performance quantitatively.

The rigorous testing incorporated in the IMTP will inevitably lead to flight test failures. These failures, although often perceived as setbacks, provide

information that is absolutely critical to assuring that our ballistic missile defenses will work under realistic and stressing conditions. The IMTP does not, however, include explicit provisions for backup or repeat tests that would be needed in the event of flight test mission failures. Therefore, the effects of unsuccessful tests, such as the FTG-07 and FTM-21 missile 2 failures, need to be mitigated through future updates of the IMTP. Thus far, the semi-annual revision process has allowed flexibility in making the necessary adjustments when needed.

**Unclassified Statement of**

**Vice Admiral J. D. Syring**

**Director, Missile Defense Agency**

*Before the*

**Senate Armed Services Committee**

**Subcommittee on Strategic Forces**

**Wednesday, April 2, 2014**

*Embargoed Until Released by the  
Senate Armed Services Committee  
United States Senate*

**Vice Admiral J.D. Syring, USN  
Director, Missile Defense Agency  
Before the  
Senate Armed Services Committee  
Strategic Forces Subcommittee  
April 2, 2014**

Good afternoon, Chairman Udall, Ranking Member Sessions, distinguished Members of the subcommittee. I appreciate this opportunity to testify before you today. Our current budget request of \$7.459 billion for Fiscal Year (FY) 2015 will continue the development of defenses for our Nation, deployed forces, allies, and international partners against increasingly capable ballistic missiles. The FY 2015 missile defense program will support the warfighter and needs of the Combatant Commanders (COCOMs) with the development and deployment of interceptors, sensors, and the command, control, battle management and communications (C2BMC) system that makes up the integrated Ballistic Missile Defense System (BMDS). Our PB 2015 request supports needed improvements in homeland defense and continues strong support of regional defense initiatives. Our FY 2015 program plans include continued investments in advanced technologies and future capabilities to keep pace with the increasingly complex threat.

**Ballistic Missile Threat**

The threat continues to grow as our potential adversaries are acquiring a greater number of ballistic missiles, increasing their range and making them more complex, survivable, reliable, and accurate. The missile defense mission is becoming more challenging as potential adversaries incorporate BMD countermeasures. Space-launch activities in Iran and North Korea involve multistage systems that serve to further the development of ballistic missile technology for longer-range systems, including

intercontinental ballistic missile (ICBM)-applicable technologies and systems. As the Director for National Intelligence testified last year, “Iran has demonstrated an ability to launch small satellites, and we grow increasingly concerned that these technical steps . . . provide Tehran with the means and motivation to develop larger space-launch vehicles and longer-range missiles, including an ICBM.” Iran could develop and test an ICBM capable of reaching the United States by 2015. In addition to the Taepo Dong 2 space launch vehicle/ICBM, North Korea is developing and has paraded the KN08 road-mobile ICBM and an intermediate-range ballistic missile (IRBM) capable of reaching Guam and the Aleutian Islands. Iran also has steadily increased its ballistic missile force, deploying next generation short- and medium-range ballistic missiles (SRBMs and MRBMs) with increasing accuracy and new submunition payloads. Iran has publicly demonstrated the ability to launch simultaneous salvos of multiple rockets and missiles. Demonstrating that it is capable of modifying currently deployed ballistic missile systems, Iran has flight-tested a Fateh-110 ballistic missile called the Khalij Fars by adding a seeker to improve the missile’s accuracy against sea-based targets. This ballistic missile has a range of 300 km, which means it is capable of threatening maritime activity throughout the Persian Gulf and Strait of Hormuz.

### **Support for the Warfighter**

Our overriding goal is to provide support to the warfighter. With this budget we will maintain our commitment to build out homeland defenses to 44 Ground Based Interceptors (GBIs), pending a successful return to intercept this summer, and focus on Ground-based Midcourse Defense (GMD) system reliability and GBI performance. We will also maintain our commitment to deploy Phases 2 and 3 of the European Phased

Adaptive Approach (EPAA). We are continuing efforts to improve the performance of the Aegis Weapons System and deliver Standard Missile (SM-3) Block IB guided missiles. We will also deploy a second forward-based X-band AN/TPY-2 radar in Japan, improving homeland and regional defense capabilities and increasing our global operational AN/TPY-2 radar posture, and build and improve the C2BMC infrastructure at fielded sites. We plan to procure interceptors for Terminal High Altitude Area Defense (THAAD) and, pursuant to our agreement with the Army, fund additional AN/TPY-2 spares and an additional THAAD Battery.

Last year we conducted or participated in over 17 multi-event exercises and wargames, which are critically important to the warfighter and the intensive engineering efforts across the Agency. MDA also worked collaboratively with Combatant Commanders, Office of the Secretary of Defense (OSD) and the Services to complete a strategy and roadmap providing a series of near-, mid- and far-term architecture options for the BMDS that are the basis for program planning for the rest of this decade. In response to the continued fielding by U.S. adversaries of air, missile, and rocket capabilities, in May 2013 MDA assumed the responsibility of Technical Authority for Integrated Air and Missile Defense (IAMD), and as such will lead the Department's joint IAMD engineering and integration efforts, including interface definition and control as well as technical requirements allocation.

Finally, we continue to work closely with the Director, Operational Test & Evaluation (DOT&E) and with independent testers and the Services. From October 2012 to the present, we have executed 9 high profile flight tests, 13 if you include our involvement with and contributions to Israeli flight tests. The highlight was Flight Test

Operational – 01 (FTO-01), the historic and unparalleled operational test of our regional layered ballistic missile defenses this past September, which involved THAAD and Aegis BMD, ground- and sea-based forward deployed sensors, and C2BMC. The two targets were launched on operationally realistic trajectories towards a defended area near the Reagan Test Site in the Pacific Ocean. This was a highly successful operational test involving MDA, the Operational Test Agency, Joint Functional Component Command for Integrated Missile Defense, and U.S. Pacific Command, as well as U.S. Army Soldiers from the Alpha Battery, 2<sup>nd</sup> Air Defense Artillery THAAD, U.S. Navy Sailors aboard the USS Decatur and British sailors aboard the HMS Daring, and Airmen from the 613<sup>th</sup> Air and Operations Center. Similar to the Flight Test Integrated – 01 test conducted in October 2012, FTO-01 provided the warfighters confidence in the execution of their integrated air and missile defense plans and the opportunity to refine operational doctrine and tactics, techniques and procedures.

In FY 2015 we have 15 flight tests in the Integrated Master Test Plan. As the BMDS matures, we are continuing to increase the complexity in our flight test program by: conducting more system-level operational tests; increasing the number of BMDS assets in those tests; increasing the numbers, types and ranges of the threat representative targets we use; conducting more simultaneous launches; and replicating potential wartime scenarios to realistically exercise warfighting chain of command to evaluate command and control concepts of operation and tactics, techniques and procedures. We also have system-level ground tests that combine the warfighter chain of command with the developmental system and test under varying conditions to improve confidence in the system being deployed to Combatant Commands. We are entering a

period of unprecedented complexity and increased testing tempo based on that complexity. Our flight tests will also involve an increasingly stressful set of threat representative targets as well as longer range interceptors for our regional capabilities. Over the coming years, U.S. government stakeholders – to include Soldiers, Sailors, Marines, and Airmen – and allies will have a larger role and impact in our test program than ever before.

### **Homeland Defense**

MDA's highest near-term priority remains the successful GMD intercept flight test of the newest GBI Exo-atmospheric Kill Vehicle (EKV) – the Capability Enhancement (CE)-II EKV. Based on our analysis of the data from the successful January 2013 non-intercept controlled flight test of the CE-II GBI (CTV-01), we plan to conduct FTG-06b, an intercept flight test, this summer. CTV-01 demonstrated the successful dampening of the vibration environments that affected the navigation system and resulted in the failure of the FTG-06a mission conducted in December 2010. FTG-06b will demonstrate the ability of the CE-II EKV to discriminate and intercept a lethal object from a representative ICBM target scene. An increase in the number of GBIs in the fleet assumes a successful return to intercept of the CE-II EKV.

Last July, with FTG-07, we conducted an intercept flight test of the upgraded CE-I, or first generation, EKV. We made numerous improvements to the CE-I fleet through upgrades since the last successful CE-I flight test in 2008. In FTG-07 the EKV did not intercept the target because the kill vehicle on the GBI did not separate from the booster's third stage. The failure investigation is progressing toward a root cause. Once

the investigation is concluded, we will take steps to make any fixes to the fleet that need to be made for both the CE-I and CE-II EKV's.

Today, 30 operational GBIs protect the United States against a limited ICBM attack from current regional threats, such as North Korea and Iran. Last year we began refurbishment of Missile Field 1 at Fort Greely, Alaska (FGA) to develop silo capacity to support delivery of an additional 14 GBIs, continued emplacing GBIs in Missile Field 2 (MF 2), and continued conducting GBI component testing and refurbishing currently deployed GBIs to test and improve their reliability. We are requesting approximately \$1.3 billion in FY 2015 for homeland defenses. We remain committed to a "fly before you buy" acquisition approach. Pending a successful outcome of the GMD intercept flight test this summer, we will resume taking delivery of GBIs and emplace them in MF 2 and MF 1 as we progress towards 44 by the end of FY 2017. Beginning in FY 2016, we will acquire replacement GBIs to support GMD operations, testing, and spares, pending the outcome of flight testing.

Construction of the GBI In-Flight Interceptor Communication System (IFICS) Data Terminal (IDT) at Fort Drum, New York is proceeding on schedule. Once it is operational in late-2015, the east coast IDT will enable communication with GBIs launched from Fort Greely, Alaska and Vandenberg Air Force Base in California over longer distances and improve defenses for the eastern United States by increasing system performance in specific engagement scenarios.

We currently operate a forward-based X-band radar, the AN/TPY-2 radar, in Shariki, Japan, which is in the northern part of that country. In September 2012 the Secretary of Defense directed the deployment of a second AN/TPY-2 X-band radar in

Japan to provide improved tracking coverage for launches out of North Korea. Working with our Japanese partners, we expect to complete the deployment of the second AN/TPY-2 radar in Kyogamisaki in southern Japan by the end of this calendar year. We will also deploy a new C2BMC capability which will enhance the overall performance of the radars when operating in a mutually supporting dual radar mode.

We will take additional steps to keep pace with the threats to the U.S. homeland. We have requested \$99.5 million in FY 2015 to redesign and improve the GBI EKV. The redesigned EKV will be built with a modular, open architecture and designed with common interfaces and standards, making upgrades easier and broadening our vendor and supplier base. The new EKV's will improve reliability and be more producible, testable, reliable, and cost-effective and eventually will replace the kill vehicle on our current GBI fleet. We are currently assessing concepts, acquisition options, and timelines to test and field the redesigned EKV. Our goal is to begin flight testing the redesigned EKV in FY 2018. We also request \$79.5 million, which includes \$29 million in MILCON funding for planning and design, to begin development of a Long Range Discrimination Radar (LRDR), with deployment planned in 2020. The new long-range, mid-course tracking radar will provide persistent coverage and improve discrimination capabilities against threats to the homeland from the Pacific theater. This new radar also will give more geographic flexibility to deploy the Sea-Based X-band (SBX) radar for contingency and test use.

MDA requests \$122 million in FY 2015 to support the Discrimination Improvements for Homeland Defense (DIHD) efforts. The goal of this effort is to develop and field an integrated set of capabilities to improve BMDS reliability, lethality,

and discrimination. The end result will be a deployed future BMDS architecture more capable of discriminating and destroying a reentry vehicle. Our plans in this area will support a near-term DIHD capability (2016) and a DIHD capability fielding in 2020.

We are requesting \$64 million in FY 2015 for continued Sea-Based X-band (SBX) radar operations. In collaboration with the Services, Joint Staff, STRATCOM and the COCOMs, we maintained the SBX radar in Limited Test Support Status, where the radar continues to support the BMDS test program and remains available for contingency deployment under the operational command of PACOM. In 2013 SBX supported real world operations, with 49 days at-sea, and the FTG-07 GMD test with a total of 110 days at-sea and demonstrated an autonomous acquisition capability.

We are also examining locations for a possible additional CONUS interceptor site. The current GBI sites at Fort Greely, AK and Vandenberg AFB, CA provide capability necessary to protect the homeland. While there has been no decision by the Department to move forward with an additional CONUS interceptor site, such a site would add battle space and interceptor capacity should it be deemed necessary to proceed with deployment. Our CONUS Interceptor Site study determined the following sites are viable candidates and they are to be included in the Environmental Impact Statement: Fort Drum, New York; Naval Air Station Portsmouth SERE Training Area, Rangley, Maine; Ravenna Training and Logistics Site, Ohio; and Fort Custer Combined Training Center, Michigan. The Environmental Impact Statement, which will take approximately 24 months to complete, will assess environmental impacts at each of the sites, to include potential impacts to land use, water resources, air quality,

transportation, socioeconomics and other factors established by the National Environmental Policy Act.

For FY 2015 we are requesting approximately \$38.6 million for our network of strategic radars. We will continue missile defense upgrades of the Early Warning Radars in Clear, Alaska and Cape Cod, Massachusetts. We expect to complete the Clear radar upgrade in 2017 and the Cape Cod upgrade in 2018. Last year MDA worked with the Air Force to begin upgrading the Early Warning Radar (EWR) at Clear, Alaska to give it a missile defense capability, providing improved ballistic missile defense sensor coverage over the continental United States and reducing sustainment and operating costs. We also transferred sustainment responsibility for the Beale (California), Fylingdales (United Kingdom), and Thule (Greenland) Upgraded Early Warning Radars back to the United States Air Force.

### **Regional Defenses**

Deployment of regional defenses to protect our deployed forces, allies and international partners remains one of our top priorities. Our FY 2015 budget request funds the continued development and deployment of defenses against SRBMs, MRBMs, and IRBMs in support of Combatant Commanders' near-term and future priorities. MDA will continue to focus on threats from the Asia-Pacific and Middle East regions as we continue to support the European Phased Adaptive Approach to protect our deployed forces and our allies.

#### *Terminal High Altitude Area Defense*

In FY 2013 MDA delivered 37 THAAD Interceptors and expended two in flight tests, for a total of 84 delivered to Army war stock. We also delivered hardware for

fielding of the third THAAD battery: 2 Tactical Station Groups, 6 Launchers, and a set of Peculiar Support Equipment. Training of the soldiers who will operate the third THAAD battery has begun and we expect it to be completed in FY 2015. This year we expect to deliver the fourth THAAD battery. In collaboration with the Services, Joint Staff, STRATCOM and the COCOMs, we achieved first operational deployment of the THAAD capability for the defense of Guam. In recent tests we demonstrated THAAD's ability to intercept an MRBM as part of an integrated operational test with Aegis BMD (FTO-01), the second intercept of this class of target since FTI-01. THAAD has put together a remarkable record of success, successfully intercepting 11 out of 11 targets with the operationally configured interceptor.

For FY 2015, MDA is requesting \$464 million for THAAD procurement, which includes the purchase of 31 THAAD interceptors. We also are requesting \$300 million in RDT&E funding in FY 2015 and \$76 million for THAAD operations and maintenance. We will continue to enhance THAAD's ability to operate through post-intercept debris, enable launch of THAAD's interceptors using sensor data provided by other BMDS sensors, and maintain capability against current and evolving threats. THAAD will conduct two flight tests in FY 2015. In FTT-18 THAAD will demonstrate an intercept of a separating IRBM target using the THAAD radar, launcher, fire control and communication, interceptor closed loop operations, and engagement functions. In FTO-02 THAAD will engage a SRBM with associated objects and demonstrate advanced radar algorithms.

### *Aegis Ballistic Missile Defense*

Last year MDA completed six BMD Weapons System installations on Aegis ships: two Aegis BMD 3.6; three Aegis BMD 4.0; and one Aegis BMD 5.0 (USS JOHN PAUL JONES) in conjunction with the Navy's Aegis Baseline 9 installation. The USS JOHN PAUL JONES will replace the USS LAKE ERIE as the BMD deployable test ship to support MDA and Navy testing of Integrated Air and Missile Defense capabilities. We now have a total of 30 BMD capable Aegis ships in the Fleet. In 2013 we delivered 10 SM-3 Block IAs and 16 SM-3 Block IBs. By the end of 2015, over 65 SM-3 Block IBs will be delivered.

We are requesting \$929 million in RDT&E funding in FY 2015 to continue development, testing, and installation of Aegis BMD capabilities to defeat longer range and more sophisticated ballistic missiles launched in larger raid sizes. We request \$435 million in FY 2015 for Aegis BMD procurement, which includes \$348 million for 30 SM-3 Block IB guided missiles and \$12 million for operations and maintenance of SM-3 Block IAs. In response to the Combatant Commanders' demand for more BMD ships with the latest tested capability, Navy and MDA have incorporated Aegis BMD into the Navy's Aegis DDG Modernization Program and new construction DDGs. We will continue upgrading the capability of existing BMD ships and integrating new and modernized ships to the BMD fleet, with a planned operational availability of 43 Aegis BMD ships in FY 2019. The homeport transfer of four Aegis BMD ships to Rota, Spain began this past February with the USS DONALD COOK. Another Aegis BMD ship, USS ROSS is scheduled to transfer later this year, and the remaining two Aegis BMD ships will transfer in 2015.

With the Japan Ministry of Defense, we completed multiple SM-3 Block IIA component Cooperative Development Project Critical Design Reviews, including: Staging Assembly, Steering Control Section, Guidance System, Third Stage Rocket Motor, Sensors, Kinetic Warhead Guidance Electronics Unit Assembly, Divert and Attitude Control System, and Kinetic Warhead, culminating with an overall missile system Critical Design Review, in October 2013. Also in October, the SM-3 Block IIA completed Propulsion Test Vehicle-01 in which the missile and new composite canister both demonstrated successful and safe ignition and egress from the vertical launching system.

Last year was a significant year for Aegis BMD testing, with five for five successful intercept tests and successful transmission of Long Range Surveillance and Track data through C2BMC to the GMD system in FTG-07. FTM-20 (February 2013) demonstrated the ability of the Aegis BMD 4.0 Weapon System to Launch on Remote using data from the Space Tracking and Surveillance System (STSS) demonstrator satellites. FTM-20 employed an SM-3 Block IA against a unitary medium-range target. High quality infrared fire control data from STSS was provided through C2BMC. C2BMC generated very high quality fire control quality data and passed the track data over operational communications links to the firing Aegis ship to conduct a launch on remote engagement. This complex test proved the value of an integrated C2 and sensor network and the use of space-based sensors to expand the BMD battle space. FTM-19 (May 2013) supported the development and assessment of the Aegis BMD 4.0 Weapon System and the SM-3 Block IB prior to an FY 2014 full-rate production

decision. A second Aegis BMD ship successfully acquired the target and conducted a simulated engagement using space-based sensor data.

In a span of 23 days, Aegis BMD was a principal player in three major operational flight tests: FTO-01, FTM-21 and FTM-22, which all achieved successful intercepts. FTM-21 (September 2013) and FTM-22 (October 2013) fired SM-3 Block IBs to validate operational effectiveness and suitability of the Aegis BMD 4.0 Weapon System and the SM-3 Block IB. FTM-22 was our fifth consecutive successful intercept mission using the 4.0 Weapons System and SM-3 Block IB and an important milestone for Phase 2 of the EPAA. FTM-21 and FTM-22 also completed Director Operational Test and Evaluation Initial Operational Test and Evaluation flight testing requirements for the 4.0 Weapons System and the SM-3 Block IB.

To complete Initial Operational Test and Evaluation requirements for the 4.0 weapons system, we also conducted a tracking exercise, FTX-18, over the Atlantic Ocean in January 2014, which confirmed the capability of the 4.0 weapons system to track and engage a raid of three ballistic missile targets with simulated SM-3 Block IBs. In this event, multiple Aegis BMD baselines participated, yielding comparative raid performance data, including the Aegis Ashore Romania deckhouse at Lockheed Martin in Moorestown, New Jersey. The Aegis Ashore system will be deployed to Romania later this year.

We also continue development of a Sea Based Terminal capability to provide protection of maritime forces against advanced anti-ship ballistic missiles and increased layered defense for forces ashore. Using an incremental development approach, we are incorporating BMD capability into the Navy's Baseline 9 architecture, to include terminal

defense with the SM-6 guided missile and the BMD 5.0 weapon system. In 2013, we completed the initial design phase and initiated software development for missile and weapon system modifications. We plan to test and certify the first increment of Sea Based Terminal capability in 2015. We also finalized the requirements for the second increment of Sea Based Terminal capability, scheduled to certify in 2018.

The FY 2015 Aegis BMD flight test program will include almost all of the Standard Missile variants, with firings of SM-3 Block IBs from ships as well as the PMRF Aegis Ashore Missile Defense Test Center, execution of raid scenarios with engagements in both Anti-Air Warfare and BMD warfare areas, Launch on Remote for long-range engagements, developmental Controlled Test Vehicle firings of the SM-3 Block IIA missile, and tracking exercises for the Sea Based Terminal weapon system configuration.

#### *European Phased Adaptive Approach*

We will continue to support the EPAA to provide coverage of European NATO territory from Iranian ballistic missile threats by investing resources for EPAA development, testing and deployment. Phase 1, which provides coverage of NATO territory in Europe with the deployment of Aegis BMD 3.6 ships with SM-3 IAs and a SPY-1 radar in the Mediterranean, the AN/TPY-2 radar (Forward Based Mode) to U.S. European Command (EUCOM) in Turkey, and the C2BMC Spiral 6.4 system at Ramstein AFB in Germany, has been operational since the end of 2011.

Our goal in EPAA Phase 2 is to provide robust capability against SRBMs and MRBMs. The architecture includes the deployment of the Aegis BMD 4.0 and 5.0 weapon systems with SM-3 Block IBs at an Aegis Ashore site in Romania and at sea, .

A formal ground-breaking ceremony for the Aegis Ashore site took place in Deveselu, Romania in October 2013. The start of construction of the Aegis Ashore site in Deveselu, Romania this year involves the delivery of the deckhouse from Moorestown, N.J. to Romania. The site will be integrated into the EUCOM command and control network, tested and operational by December 2015. MDA requests \$123 million in FY 2015 to continue development of the Aegis Ashore sites in Romania and Poland. We also request \$226 million in FY 2015 for the continued procurement of equipment for Aegis Ashore in Poland.

Four months after disassembly and transport of the Aegis Ashore equipment to the Pacific Missile Range Facility (PMRF) began, an Aegis Light Off ceremony was held on 6 December, 2013 to commemorate the first time the Aegis Combat System was powered on, with Sailors manning the consoles and the system brought on-line at the PMRF deck house facility. We are now preparing for Aegis Ashore flight tests at PMRF this year and in 2015.

Deployment of Phase 3 will enhance and expand protection for European NATO countries and U.S. forces through the region from MRBMs and IRBMs from the Middle East. In support of EPAA Phase 3, the SM-3 Block IIA, which we are co-developing with the Japanese government, and an upgraded version of the Aegis Weapons System are on schedule to be available for deployment in 2018 at Aegis Ashore sites in Romania and Poland, and at sea. MDA requests \$264 million in RDT&E funding in FY 2015 to continue the bilateral, cooperative effort. The upgraded Aegis Weapons System and C2BMC system with engage on remote AN/TPY-2 radar (forward based mode) capability combined with the faster, longer reaching SM-3 IIA will expand Aegis

BMD battle space to counter more sophisticated threats and will extend coverage to NATO allies in Europe threatened by longer range ballistic missiles.

Working closely with Navy, we will deliver the upgraded 5.1 Aegis BMD Weapons System as a part of the Navy's Baseline 9 architecture on ships for deployment worldwide in 2018 to support Combatant Commanders requirements to counter an expanded threat set. This past year we continued development of the Aegis BMD 5.1 fire control system.

*Command, Control, Battle Management, and Communications and Sensors*

In 2013 we continued to support warfighter operations of the EUCOM BMDS capability for regional defense. In partnership with the Combatant Commands, we maintain the capability to engage multiple simultaneous threat attacks in the region. As the foundation of BMDS, the MDA C2BMC team supported the warfighter in real world operations across multiple Areas of Responsibility, which included deployments to the Middle East, Turkey, and Kwajalein. Last year we fielded software upgrades to U.S. Northern Command (NORTHCOM), U.S. Strategic Command (STRATCOM), U.S. Pacific Command (PACOM) and Central Command (CENTCOM) and installed Spiral 6.4 MR-2 at PACOM, NORTHCOM, and STRATCOM. This year we completed software upgrades to CENTCOM and EUCOM. We also delivered the Distributed Training System to CENTCOM for Air and Missile Defense Exercise 13-2.

For the first time, in 2013, we conducted a flight test with successful debris mitigation (FTO-01) and also generated fire control quality track data from space sensors for a live fire Launch-on-Remote Aegis BMD 4.0 Weapons system and SM-3 Block IA engagement (FTM-20). In addition to continuing the enhancement of global

BMD survivable communications and support for operations and sustainment of C2BMC at fielded sites, in FY 2015 we will integrate Space Based Infrared System Increment 2 capabilities into C2BMC to support cueing of BMD sensors worldwide. We will also improve sensor data integration and battle management in C2BMC to support Aegis BMD cueing and launch-on and engage-on remote capability.

In support of homeland and regional defense, we continued to sustain AN/TPY-2 operations and supported the deployment of additional AN/TPY-2 radars and the C2BMC infrastructure. For the second AN/TPY-2 radar deployment to Japan, we identified candidate sites, conducted site surveys, selected sites, obtained agreements with the host nation, and initiated site design efforts. We deployed the AN/TPY-2 (Terminal Mode) as part of a THAAD battery in the PACOM Area of Responsibility. Last year we relocated the AN/TPY-2 radar in CENTCOM to a permanent location. Additionally, we accepted the AN/TPY-2 radar Number 8 and provided it to the 3<sup>rd</sup> THAAD Battery; awarded a production contract for AN/TPY-2 Number 12; awarded a production contract for an additional Prime Power Unit; and awarded a contract for AN/TPY-2 spares.

We request \$393 million in FY 2015 to develop and deploy BMDS sensors (includes Long Range Discrimination Radar), and \$183 million to operate and sustain the nine AN/TPY-2 radars and support the UEWRs and Cobra Dane radar. We request \$444 million in FY 2015 to operate and sustain C2BMC at fielded sites and continue C2BMC program spiral development of software and engineering to incorporate enhanced C2BMC capability into the battle management architecture and promote further interoperability among the BMDS elements, incorporate boost phase tracking,

and improve system-level correlation and tracking. We will also continue communications support for the AN/TPY-2 radars and C2BMC upgrades. We request \$31 million for continued operation of the Space Tracking and Surveillance System and Near-Field InfraRed (NFIRE) satellite system in FY 2015. We continue to operate the two STSS-D satellites to conduct cooperative tests with other BMDS elements and demonstrate the capability of the satellites to cue and track against targets of opportunity to provide high precision, real-time tracking of missiles and midcourse objects that enable closing the fire control loops with BMDS interceptors. We also continue to operate the NFIRE satellite, which has the capability to collect near-field phenomenology data for use in developing plume to hard-body handover algorithms for boost phase interceptor programs.

### **Developing New Capabilities**

We are developing fiscally sustainable advanced technology that can be integrated into the BMDS to adapt to threat changes. Our investments are focused on technology that brings upgradeable capability to the warfighter. Our advanced technology investments are determined by systems engineering, which permits us to evaluate and determine which emerging technical solutions will best address gaps in the BMDS and enhance its overall capability and performance. The goal of our technology investment strategy is to deploy a future BMDS architecture more capable of discriminating and killing reentry vehicles with a high degree of confidence, allowing the warfighter to dramatically improve shot doctrine. One of our greatest challenges is the ability to bring multiple sensor phenomenology (i.e., reflective and thermal properties of the missile) into the missile defense architecture. Relying purely on terrestrial radar for

precision tracking and discrimination of the threat is a potential weakness our enemy could exploit in the future. Adding persistent electro-optical sensors to our architecture is a high payoff solution for this gap.

MDA requests \$45 million in FY 2015 for Discrimination Sensor Technology. We will integrate advanced sensors on existing unmanned aerial vehicles and demonstrate their ability to create a precision track that shooters can use to target their interceptors quickly and accurately. We will test the first precision track sensors at PMRF this fall. In parallel, we will begin integration and ground test of an advanced sensor upgrade to these precision track sensors with follow-on flight testing in FY 2016. MDA's Discrimination Sensor Technology development and test plan is a cost-effective, stepping stone to MDA's long-term goal of persistent discrimination coverage from a space platform.

Additionally, Air Force Space Command (AFSPC) and MDA are collaborating on future space sensor architecture studies and sensor performance assessments across a broad set of joint mission areas and on Analyses of Alternatives (AoA) studies with threat definition, technical evaluations, and cost analysis support. MDA is supporting AFSPC in its review of concepts that will inform an AoA for the future of protected military satellite communications and overhead persistent infrared systems. As an example, MDA is exploring the potential of BMDS-focused space sensors that also provide data contributing to Air Force missions such as Space Situational Awareness.

MDA requests \$14 million in Weapons Technology in FY 2015 to combine the knowledge gained from our Discrimination Sensor Technology effort with our high-power directed energy program to build the foundation for the next-generation laser

system capable of addressing advanced threats and raids at a much lower cost than existing missile interceptors. We are pursuing a unique set of laser technology to execute missile defense missions from high-altitude, low-mach airborne platforms operating in the clear, low turbulence stratosphere. We have been developing two promising solid-state lasers: one at Lawrence Livermore National Laboratory and the other at the Massachusetts Institute of Technology's Lincoln Laboratory collaboratively with the Defense Advanced Research Projects Agency (DARPA). Both lasers achieved record power levels within the last year. MDA will continue high energy efficient laser technology development with the goal of scaling to power levels required for a broad spectrum of speed of light missile defense missions. This year, we are working with several aircraft prime contractors defining concepts for integrating a multi-kW class laser into a mid-altitude, unmanned aerial vehicle. A laser test platform addresses a broad spectrum of mission applications and we will continue our collaboration with our service partners, the Air Force Research Laboratory, and DARPA for joint development and test opportunities.

MDA requests \$26 million in FY 2015 for the Common Kill Vehicle (CKV) Technology effort. MDA's strategy is to achieve as much commonality among future GMD kill vehicles and other future kill vehicles for Aegis BMD and THAAD. In FY 2014 this CKV technology effort will help establish the requirements foundation for the redesigned GMD EKV, which we are now planning as the first phase (Phase I) of our overall kill vehicle development strategy. Our FY 2014 joint government and industry concept definition effort will also assess the ability of industry to meet those requirements. In follow-on CKV efforts, or Phase II, we will make investments that

reduce the costs of production and weapon system operations through new kill vehicle architectures and scalable technology that improves the effectiveness and performance of our interceptor fleet against an evolving threat. Our investments in large format focal plane arrays, smaller inertial measurement units and high performance propulsion components as well as new kill vehicle architectures are key enablers. This technology development allows us to engage a more numerous and increasingly more complex threat, eventually establishing the technology foundation for killing multiple lethal objects from a single SM-3 or GBI.

MDA requests \$16 million in FY 2015 for the Advanced Research area which conducts leading-edge research and development with small businesses, universities, and international partners to create and advance future missile defense capability. This effort includes managing the Small Business Innovation Research and Technology Applications programs to help MDA-funded small businesses to transition their technology to missile defense applications. MDA is also seeking to leverage the creativity of our nation's universities by sponsoring academic research focused on developing breakthrough capabilities for missile defense.

MDA requests \$9 million in FY 2015 for the Advanced Concepts & Performance Assessment effort, which delivers independent assessments of government, university, and industry technology concepts that, along with systems engineering requirements, support acquisition strategy decisions and define our technology focus areas. This effort has greatly improved our assessment of advanced BMD technologies to address evolving threats for the warfighter. We work directly with universities, Federally Funded Research and Development Centers, University Affiliated Research Centers and

innovative small businesses to develop cutting edge data collection, modeling techniques, hardware-in-the-loop, and high performance computing platforms to speed the assessment of innovative technology concepts.

## **International Cooperation**

MDA is engaged with over twenty countries and international organizations, such as NATO. Our major international efforts reflect the Department's goals in the Asia-Pacific, Middle East, and Europe: building partner BMD capacity, supporting the strategic shift to Asia-Pacific, and executing EPAA deployments.

### *Building Partner BMD Capability*

Since I last testified before the committee, we had several successes in our cooperative development programs with our Israeli partners. Through our cooperative efforts, Israel is developing a layered and robust BMD capability. In November 2013 the Israel Missile Defense Organization (IMDO) and MDA achieved a second successful intercept using the David's Sling Weapon System. This past January we successfully conducted the second fly-out of the Arrow-3 upper tier interceptor. These programmatic milestones provide confidence in future Israeli capabilities to defeat the evolving ballistic missile threat in the Middle East. Another recent and significant accomplishment for the Department is the precedent-setting international agreement with Israel regarding coproduction of the Iron Dome missile defense system that was signed on March 5, 2014. The agreement supports increasing U.S. industry co-production of Iron Dome components.

Our largest co-development effort is with Japan on the SM-3 Block IIA interceptor. Japan has committed significant funding for their part of this co-

development project. Japanese and U.S. components will be fully integrated and flight tested in the coming years. The Japanese dedication to this program ensures we will remain on track to deliver SM-3 Block IIA in support of the EPAA Phase 3 in the 2018 timeframe.

After spending a year establishing processes, procedures, and an information technology infrastructure, the Defense Security Cooperation Agency designated MDA a Foreign Military Sales (FMS) Implementing Agency in February 2012 for the THAAD missile defense system and the AN/TPY-2 radar. MDA is currently executing one FMS case with the United Arab Emirates for two THAAD batteries and accompanying launchers, radars, and interceptors. We are actively engaged with several nations, particularly those in the Gulf region, to provide program information and pricing and cost data that may inform future decisions to procure THAAD as an upper tier missile defense capability.

#### *Supporting the Strategic Shift to the Asia-Pacific*

As I have already stated, along with the cooperative efforts on the SM-3 Block IIA, the United States and Japan are working together to support the deployment of the second U.S. forward-based AN/TPY-2 radar. Our Japanese partners should be commended for their efforts in supporting this deployment to the Japan Air Self-Defense Force (JASDF) base in Kyogamisaki in southern Japan. This radar will enhance both regional BMD capability and improve defense of the U.S. homeland.

MDA also supported the deployment of a THAAD missile defense system to Guam for the defense of U.S. deployed forces in the region. This is our first long-term deployment of a THAAD battery.

### *Executing EPAA Deployments*

Last October MDA and other Department leaders participated in a groundbreaking ceremony for the Aegis Ashore site in Romania. Site preparation work has started, and we are on schedule with military construction activities demonstrating real steps to deliver EPAA Phase 2 in the 2015 timeframe.

In addition to programmatic planning and deployment activities, MDA is also supporting EUCOM efforts to ensure the necessary Implementing Arrangements are in place to support EPAA fielding timelines. In the near-term, this means coordinating on and, where possible, streamlining the construction, site activation, and equipment acceptance processes in Romania. We are also laying the groundwork for these efforts in Poland. Again, all activities are on track to support the stated EPAA timelines.

We are also working through NATO to ensure U.S. C2BMC and NATO command and control networks are fully interoperable. The United States and NATO test existing and future ballistic missile defense capabilities through a series of ongoing test campaigns in order to evaluate current capabilities and reduce risk for future development.

MDA will continue to engage NATO and regional Allies in support of U.S. national security strategy through international cooperation in missile defense. For instance, the United States is working with NATO on a study to identify cooperative opportunities for European nations to develop and procure missile defense capabilities to complement the U.S. EPAA contribution to NATO BMD.

MDA remains engaged and committed to expanding work with our international partners, to include conducting joint analyses to support partner missile defense

acquisition requirements, cooperative research and development projects, co-development, deployments, FMS, and co-production. It is an honor to work with dedicated international partners on activities that benefit both U.S. and international contributions to missile defense architectures.

## **Cybersecurity**

MDA has been working diligently to enhance the cybersecurity posture of missile defense networks and improve the protection of ballistic missile defense information. MDA has developed new policies, partnered extensively with industry and other Department of Defense organizations, and has continuously increased investments in cybersecurity to ensure our networks and information remain secure against cyber attacks.

I have coordinated policy Memoranda with the DoD Chief Information Officer's office and the Under Secretary of Defense for Acquisition, Technology, and Logistics and signed MDA Policy Memoranda on "Securing Ballistic Missile Defense Information on Government and Non-Government Networks and Systems." These require MDA program executives, program managers, contracting officials, and contractors to follow existing guidelines and implement new cybersecurity measures. We published MDA Manual titled: "Procedures for Protection of Critical Program Information and Mission-Critical Functions and Components within the Missile Defense Agency." We conducted a cybersecurity industry day titled: "The Emerging Role of Cybersecurity in Missile Defense Agency Acquisitions." This served to inform MDA industry partners of new cybersecurity requirements and threats and elicited feedback from industry representatives on how they can meet the new cybersecurity requirements. MDA also

expanded a partnership with DOT&E to test and experiment with cybersecurity on MDA systems. This partnership leverages DOT&E resources and teams MDA with special cyber expertise and extensive knowledge of current threats.

The MDA Computer Emergency Response Team (CERT) performs continuous monitoring of MDA government information systems to protect and defend the confidentiality, integrity and availability of MDA networks and data. MDA is enhancing the established integrated security architecture, aligned to the Defense Enterprise Security Architecture that constantly improves methods to protect, monitor, analyze, detect, and respond to unauthorized activity within MDA information systems. Cyber boundary protection measures include state-of-the-art firewalls, intrusion detection and prevention systems, and email spam/virus prevention capabilities. The Missile Defense Agency will continue to work closely with Federal agencies, industry partners, and others to identify and implement measures to further increase the security of missile defense information while continuously seeking to improve technologies and capabilities that protect MDA critical program information.

I am proud to report we completed our first experiment with DOT&E in February. In the first experiment, MDA successfully demonstrated cybersecurity improvements that are in development. As a result of extensive interactions with a live cyber Operational Force during the first experiment, MDA will pursue new ways to strengthen cybersecurity that will be demonstrated in future experiments.

## **Conclusion**

Mr. Chairman, we have stayed focused on our core mission. We will continue our work with the warfighter to develop, test, and field a networked, global BMD system

that is flexible, survivable, and affordable and invest in promising and potentially game-changing technology programs to ensure the BMDS will be capable of defeating the complex threats we expect to face in the future. In order to ensure we are using the taxpayer's dollars wisely and deploying effective missile defense capabilities, we will continue to test elements of the system to demonstrate that they work before we commit to their fielding. It is vital that we provide the warfighters the cost-effective and reliable weapon systems they need to do their job. I remain dedicated to committing the manpower and resources to correcting the issues in our GMD program, executing a successful intercept flight test this summer, and keeping the focus on reliability in our operational homeland defenses. We continue to make good progress in our work with our international partners, and I want to increase my focus on those important efforts.

I look forward to answering the committee's questions. Thank you.

**RECORD VERSION**

**STATEMENT BY**

**LIEUTENANT GENERAL DAVID L. MANN, USA**

**COMMANDING GENERAL,  
U.S. ARMY SPACE AND MISSILE DEFENSE COMMAND/  
ARMY FORCES STRATEGIC COMMAND  
AND  
JOINT FUNCTIONAL COMPONENT COMMAND FOR  
INTEGRATED MISSILE DEFENSE**

**BEFORE THE**

**COMMITTEE ON ARMED SERVICES  
STRATEGIC FORCES SUBCOMMITTEE  
UNITED STATES SENATE**

**SECOND SESSION, 113<sup>TH</sup> CONGRESS**

**APRIL 2, 2014**

**NOT FOR PUBLICATION  
UNTIL RELEASED BY THE  
SENATE ARMED SERVICES COMMITTEE**

**Lieutenant General David L. Mann, USA**  
**Commanding General**  
**U.S. Army Space and Missile Defense Command/  
Army Forces Strategic Command**  
**and**  
**Joint Functional Component Command for  
Integrated Missile Defense**

Chairman Udall, Ranking Member Sessions, and distinguished Members of the Subcommittee, thank you for your continued support of our Service Members, Civilians, and Families. I appear before you today bringing both a Joint and Army perspective for effective missile defense capabilities. We appreciate this Subcommittee's continued support of the Army, the U.S. Strategic Command, the Department of Defense, and the missile defense community. It is an honor and privilege to testify before this Subcommittee along with these distinguished witnesses who bring missile defense capabilities to our Nation, forward deployed forces, partners, and allies.

I have three main responsibilities. First, as the Commander of the U.S. Army Space and Missile Defense Command (USASMDC), I have Title 10 responsibilities to train, maintain, and equip space and global ballistic missile defense forces for the Army. Second, as the Commander, Army Forces Strategic Command (ARSTRAT), I am the Army Service Component Commander (ASCC) to the U.S. Strategic Command (USSTRATCOM). I am responsible for planning, integrating, and coordinating Army forces and capabilities in support of USSTRATCOM missions. Third, as the Commander of USSTRATCOM's Joint Functional Component Command for Integrated Missile Defense (JFCC IMD), I am responsible for synchronizing missile defense planning, conducting ballistic missile defense operations support, and advocating for missile defense capabilities for the Warfighter.

In accordance with these responsibilities, my intent today is threefold: to highlight USASMDC/ARSTRAT's missile defense force provider responsibilities with respect to the Army and the Geographic Combatant Commanders (GCCs); to outline JFCC IMD's role as an operational integrator of Joint missile defense for USSTRATCOM; and to summarize key Army ballistic missile defense activities and developments.

## The Strategic Environment

Ballistic missile threats from regional actors such as North Korea and Iran are increasing, both quantitatively and qualitatively, and are likely to continue to grow over the next decade. In a resource constrained environment, we must be prepared to quickly adapt and confront various threats. Holistic strategies that effectively integrate offensive and defensive capabilities are essential. It is of utmost importance that we prioritize missile defense resources to optimize these capabilities for the Warfighter.

To meet the objectives of the current Defense Strategic Guidance, USSTRATCOM and the Army continue to provide and enhance homeland and regional missile defense. We have worked with partners in U.S. Pacific Command (USPACOM), U.S. Northern Command (USNORTHCOM), and USSTRATCOM to review and improve our capabilities in the USPACOM area of responsibility in accordance with the Department's strategy to rebalance toward the Asia Pacific region. The deployment of a Terminal High Altitude Area Defense (THAAD) battery to Guam has enhanced our

***Ballistic and cruise missiles “have the potential to pose catastrophic threats that could directly affect our Nation’s security and prosperity.”***

***-- U.S. Defense Strategy  
January 2012***

ability to protect U.S. territories in the region and signal our commitment to our regional partners. The March 2013 Secretary of Defense (SECDEF) announcement of the deployment of 14 additional Ground-Based Inceptors at Fort Greely, Alaska and

a second missile defense sensor in Japan will provide improved capability and capacity to defend the Nation against a limited ballistic missile attack. Toward this end, we continue to work with regional partners and allies to increase our information and data sharing.

The Defense Strategic Guidance also establishes a priority to maintain a strong commitment to security and stability in Europe and the Middle East. We are continuing to build capability and capacity in these regions consistent with the objectives of the Phased Adaptive Approach to regional missile defense. To further protect our allies and

partners in these regions, the Army has deployed additional Patriot air and missile defense forces to Turkey and Jordan.

In summary, the growing complexity of the strategic environment based on technological advances of the threat and fiscal realities require cost efficient and effective methods of integrating current and future capabilities. We will continue to partner with the Missile Defense Agency (MDA) and Combatant Commands to ensure we pursue a fiscally responsible path to keep pace with evolving threats by identifying and prioritizing capability additions that provide the greatest operational value.

### **The Workforce—Recognizing and Protecting Our Greatest Asset**

These challenges I've highlighted cannot be mitigated without the dedication of our greatest asset—our people. During the DoD Space hearing before this Subcommittee a few weeks ago, I felt it appropriate to highlight our workforce and the Army's commitment to deter instances of sexual harassment and assault. At USASMDC/ARSTRAT and JFCC IMD, our people are our most enduring strength. The Service Members, Civilians, and Contractors at USASMDC/ARSTRAT and JFCC IMD support the Army and Joint Warfighter each and every day, both those stationed in the homeland and those deployed across the globe. Within USASMDC/ARSTRAT and JFCC IMD, we remain committed to providing trained and ready Service Members and Civilians to operate and pursue enhanced system capabilities for the Nation's ballistic missile defense system (BMDS).

In step with the Army, our USASMDC/ARSTRAT and JFCC IMD leadership team embraces the imperatives of Sexual Harassment / Assault Response and Prevention (SHARP). As stated by the Chief of Staff of the Army, sexual harassment and sexual assault violate everything the U.S. Army stands for, including our Army Values and Warrior Ethos. At USASMDC/ARSTRAT, I will continually assess the effectiveness of our SHARP efforts to ensure we are meeting the needs of our Soldiers, Civilians, and family members. Our workforce deserves nothing less.

## Accomplishment of Missile Defense Tasks

USASMDC/ARSTRAT, a force provider for missile defense capabilities, is a split-based command with dispersed locations around the globe that are manned by multi-component Soldiers, Civilians, and Contractors. Organizations around the world, including USTRATCOM, USNORTHCOM, and the GCCs leverage our capabilities. Our Title 10 responsibilities include operations, planning, integration, control, and coordination of Army forces and capabilities in support of USSTRATCOM's missile defense mission. USASMDC/ARSTRAT also serves as the Army's global operational integrator for missile defense, the Army's proponent for global missile defense force modernization, and the Army's technical center lead to conduct air and missile defense related research and development in support of Army Title 10 responsibilities.

Our operational function is to provide trained and ready missile defense forces and capabilities to the GCCs and the Warfighter which address today's requirements.

***“Homeland defense and support to civil authorities require strong, steady-state force readiness, to include a robust missile defense capability.”***

***-- Priorities for 21<sup>st</sup> Century Defense  
January 2012***

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 Forward-Based Mode (AN/TPY-2

FBM) radars. A summary of the ongoing missile defense capabilities provided by our missile defense professionals is highlighted below.

*Support to Global Ballistic Missile Defense (BMD):* Soldiers from the 100<sup>th</sup> Missile Defense Brigade, headquartered in Colorado Springs, Colorado, and the 49<sup>th</sup> Missile Defense (MD) Battalion, headquartered at Fort Greely, Alaska, remain ready, 24/7/365, to defend our Nation and its territories from a limited intercontinental ballistic missile attack. Under the operational control of 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 the GMD Command Launch Element at Vandenberg Air Force Base, California. These Soldiers,

in conjunction with JFCC IMD and USNORTHCOM, also oversee the maintenance of GMD interceptors and ground system components. At the Fort Greely site, 49<sup>th</sup> MD Battalion military police secure the interceptors and communications capabilities at the Missile Defense Complex from physical threats. The GMD system remains our Nation's only defense against a limited ICBM attack.

*Support to Regional Capabilities:* The 100<sup>th</sup> Missile Defense Brigade also supports GCCs with AN/TPY-2 FBM radar detachments and provides subject matter expertise on operator training and certification. These operational capabilities are present today at strategic locations around the globe.

*GMD System Test and Development:* In addition, soldiers from the 100<sup>th</sup> MD Brigade actively participate in GMD test activities and continue to work with Missile Defense Agency (MDA) developers on future improvements to the GMD system.

*Ballistic Missile Early Warning:* In support of the Joint Force Commander's theater force protection, USASMDC/ARSTRAT continues to provide ballistic missile early warning within various theaters of operations. The 1<sup>st</sup> Space Brigade's Joint Tactical Ground Station (JTAGS) Detachments, under the operational control of USSTRATCOM's Joint Functional Component Command for Space, but operated by USASMDC/ARSTRAT space-professional Soldiers, monitor enemy missile launch activity and other infrared events. They provide essential information to members of the air, missile defense, and operational communities. Our JTAGS Detachments are globally forward, providing 24/7/365, dedicated, assured missile warning to USSTRATCOM and GCCs in support of deployed forces.

Our second major task is to build and mature future missile defense forces—our capability development function. These are the missile defense capabilities we will provide tomorrow. A major component of our capability development function is to train Army Soldiers on missile defense systems. During the past year, USASMDC/ARSTRAT trained over 350 Soldiers and recertified as an Army Learning Institution of Excellence for missile defense training.

***Providing Greater Missile  
Defense Capabilities to  
Future Warfighters***

The Army uses established and emerging processes to document its missile defense needs and pursue Army and Joint validation of its requirements. As a recognized Army Center for Analysis, USASMDC/ARSTRAT conducts studies to determine how best to meet the Army's assigned missile defense responsibilities. With this information, we develop the Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities (DOTMLPF) domains to mitigate threats and vulnerabilities for MDA-developed GMD and AN/TPY-2 FBM missile defense systems. This disciplined approach helps to ensure limited resources are applied where Warfighter operational utility can be most effectively served.

In our third major missile defense task, USASMDC/ARSTRAT provides critical technologies to address future needs that will enhance Warfighter effectiveness—our materiel development function. In USASMDC/ARSTRAT, our technology development function is primarily focused on space and high altitude. While MDA is the principal materiel developer for ballistic missile defense, USASMDC/ARSTRAT has a number of ongoing missile defense related materiel development efforts, to include ongoing research and development of an OSD sponsored conventional offensive strike capability to address ballistic missile threats. A brief summary of two of these research and development efforts, as well as an overview of an essential Army testing range, follows.

*High Energy Laser Mobile Demonstrator:* As we have repeatedly witnessed during conflicts in both Iraq and Afghanistan, insurgents pose serious dangers to U.S. forward operating bases by employing quick-attack, low-trajectory, rockets, artillery, and mortar (RAM) strikes. The technology objective of the High Energy Laser Mobile Demonstrator (HEL MD) is to demonstrate a solid-state laser weapon system that will serve as a complementary kinetic energy capability in countering RAM projectiles. This directed energy weapon system will also have a significant capability against unmanned aerial vehicles (UAVs). An initial demonstration was recently completed against short range mortars, UAVs, and UAV-mounted intelligence, surveillance, and reconnaissance sensors. This demonstration served as a risk reduction for future subsystem development and integration while advancing this technology effort to a 50 kilowatt demonstration in 2017. The 50 kilowatt HEL MD will consist of a ruggedized and

supportable high energy laser with subsystems installed on a tactical military vehicle to enhance the safety of deployed forces. The synergy of both directed and kinetic energy systems has the potential to enhance significantly our homeland defense capabilities, particularly against cruise missile and indirect fire threats.

Low-Cost Target Development: The Army continues to pursue a technology effort to develop a suite of low cost targets for the Patriot testing program. The intent is to design threat-representative targets at a substantially reduced cost for short-range ballistic missile testing. Over the past year, using existing excess solid rocket motors, the Army realized significant savings within its operational testing account. The Army will continue to leverage technology advancements in order to realize less expensive targets that are representative of actual threats.

Missile Defense Testing: USASMDC/ARSTRAT operates the Ronald Reagan Ballistic Missile Test Site (RTS). RTS, located on the U.S. Army Garrison - Kwajalein Atoll in the Republic of the Marshall Islands, is critical to both offensive and defensive missile testing requirements, such as the GMD system and the U.S. Air Force strategic ballistic missile systems. In addition to their testing mission, personnel at the Reagan Test Site conduct continuous operational space surveillance and object identification missions.

### **Joint Functional Component Command for Integrated Missile Defense— Synchronizing Missile Defense Operational Level Planning and Support**

The Joint Functional Component Command for Integrated Missile Defense, or JFCC IMD, is USSTRATCOM's missile defense integrating element and has been operational for nine years. Like the other Joint Functional Component Commands, JFCC IMD was formed to operationalize USSTRATCOM missions and allow the headquarters to focus on integration and advocacy. Headquartered at Schriever Air Force Base in Colorado Springs, Colorado, the JFCC IMD is manned by professional Army, Navy, Air Force, Marine Corps, Civilian, and Contractor personnel.

As the SECDEF and various Combatant Commanders have previously testified, the Warfighter remains confident in our ability to protect the Nation against a limited ballistic missile attack, even in the face of the changing fiscal environment. We are

actively engaged with MDA and the Combatant Commanders to optimize and execute the Administration's plan to increase the number of ground-based interceptors (GBIs) at Fort Greely from 26 to 40 and to deploy a second AN/TPY-2 FBM radar to Japan.

We have collaborated with USNORTHCOM, USSTRATCOM, and MDA to identify homeland interceptor sites that best meet operational requirements. The four sites recommended for Environmental Impact Statement analyses have been provided to this subcommittee. The operational contributions of a third interceptor site can vary based on the overall level of improvement to the strategic BMDS. Although MDA continues the planning work necessary to implement this measure, I recommend the priority of investment should be to programs that improve discrimination and tracking capabilities and overall GBI system reliability.

On behalf of USSTRATCOM, JFCC IMD is working across the military enterprise to increase the integration of existing capabilities in order to maximize efficiency and effectiveness to protect the homeland, our deployed forces, partners, and allies. The key force multiplier is "integration", which is a critically important mission area for JFCC IMD and directly supports USSTRATCOM's assigned Unified Command Plan (UCP) responsibilities for missile defense.

***Defense of the Homeland  
Priority Requires Execution  
of a Holistic Global Missile  
Defense Plan***

As an operational and functional component command of USSTRATCOM, JFCC IMD has derived five key mission tasks from the USSTRATCOM UCP responsibilities:

- Synchronize operational level planning, integrate security cooperation activities, and recommend allocation of forces via the global force management process.
- Conduct operations support and asset management for missile defense forces and provide alternative execution support.
- Integrate Joint BMD training, exercises, and test activities.
- Advocate for future capabilities, conduct analysis and assessments, and recommend the operational acceptance of missile defense capabilities into the architecture.

- Provide information system security and network support to assure a reliable BMDS communications network.

To accomplish each of these five mission tasks, we maintain close collaborative relationships with the GCCs, MDA, the Services, the Office of the Secretary of Defense (OSD), the Joint Staff, and our allies. Through collaborative processes, we continually add to our deployed capability while gaining operational experience and confidence in our collective ability to defend our Nation, deployed forces, partners, and allies.

Following, I will highlight some of our collaborative efforts to enhance missile defense planning and capabilities for both the homeland and regional architectures.

*Expansion and Integration of the Missile Defense Architecture:* In response to the changing strategic environment, the SECDEF directed us to bolster homeland and regional missile defense capabilities. In addition to the previously deployed AN/TPY-2 FBM radars and deployment of the THAAD battery to Guam, we are finalizing the plan to deploy an additional FBM radar in the PACOM area of responsibility, and we are

expanding our missile defense collaboration with allies. We are maturing the European Phased Adaptive Approach (PAA) with the forward deployment and stationing of Aegis BMD ships in Rota, Spain, developing the Aegis Ashore site in Romania, and continuing the

***“The United States will continue to defend the homeland against the threat of limited ballistic missile attack”.***

*--Ballistic Missile Defense Review  
February 2010*

production of the SM-3 IB interceptors. Given many of the challenges associated with implementation of these architectures, JFCC IMD, supporting USSTRATCOM as the global synchronizer for missile defense, is collaborating with the GCCs to assess and address the cross regional gaps in the areas of planning, policy, capabilities, and operations.

*Global Assessment:* As regional phased adaptive approaches mature, and with homeland defense at the forefront, JFCC IMD collaborates closely with the GCCs to assess the level of risk associated with the execution of their operational plans given their allocation of BMD capabilities. The overall assessment serves to shape

recommendations for global force management and advocacy efforts for future capability investments. We have completed the 2013 Global IAMD Assessment and are currently conducting the 2014 assessment. For the 2013 assessment, we expanded the previous BMD-only assessment to look at integrating both air and missile defense assets to more accurately reflect the way we fight and the associated operational risks.

With regard to regional threats, JFCC IMD assessments indicate that addressing missile defense threats will remain a challenge. Our research, supported by the 2013 Global Assessment, reinforces the fact that GCC demands for missile defense capabilities exceed the available BMD inventory. We must continue to address this mismatch using mobile and re-locatable missile defenses and a comprehensive force management process. We also possess a full spectrum of offensive and defensive capabilities to deter and defend against the ballistic missile threat.

*Global Force Management:* The increasing demand of BMD assets is managed by the Joint Staff and the Services. USSTRATCOM, as the designated Joint Functional Manager for missile defense, relies upon JFCC IMD to evaluate and recommend sourcing of BMD requirements based on assessed risk. Due to the high demand, low-density nature of missile defense assets, all sourcing decisions have a direct and significant impact to other combatant commanders' campaign and contingency plans. The Global Force Management process enables senior leaders to make more informed BMD sourcing decisions based on global risk.

*Multi-Regional BMD Asset Management:* JFCC IMD, in coordination with USSTRATCOM and the GCCs, manages the availability of missile defense assets to balance operational readiness postures, scheduled and unscheduled maintenance activities, and MDA and Services' test requirements. This important process allows us to continually assess our readiness to defend against a ballistic missile attack and to recommend adjustments to optimize the overall BMD architecture.

*Training, Exercises, and War Games:* JFCC IMD continues to focus on the integration of allies into regional missile defense architectures. We leverage training,

***“The United States will seek to lead expanded international efforts for missile defense.”***

***--Ballistic Missile Defense Review Report  
February 2010***

exercises, and war games to increase dialogue and partnership. We are underway with Nimble Titan 14, our biannual multinational BMD war game. While budget constraints have caused us to reduce the scale for regional exercise from interactive war games to table-top exercises, we are still able to accomplish many of the stated objectives. For the first time, Nimble Titan 14 will include the participation of the Kingdom of Saudi Arabia, the United Arab Emirates, Turkey, Estonia, Norway, Sweden, and Finland. In addition to NATO, we anticipate over 20 participating nations and a large number of international observers. Our campaign goals for this iteration of Nimble Titan will advance national policy objectives by helping mature NATO's new missile defense mission area; explore options for increased regional multilateral BMD cooperation; and openly work coalition BMD issues with Middle East nations. We continue to focus on cross-regional coordination, offense/defense force integration, sensor integration, and multinational BMD planning solutions.

The Nimble Titan war game is an invaluable medium to advance U.S. missile defense policy. The war game allows us to mature cooperative relationships with our allies and partners as well as advance our Nation's and combatant command's regional security objectives. This event is critical to developing a common understanding of policy hurdles associated with combined BMD architectures. Conclusions derived from training, exercises, and war games will continue to shape our recommendations on asset allocation, resources, and operational planning through the existing DoD and missile defense community management structures.

*Joint BMD Training:* In August 2012, the DoD designated USSTRATCOM as the lead for integrating and synchronizing Joint BMD training. This designation mandated the transfer of missile defense training resources and responsibilities from MDA to USSTRATCOM by the end of fiscal year 2013. JFCC IMD is executing this mission on behalf of USSTRATCOM and declared initial operating capability on October 1, 2013.

In coordination with USSTRATCOM, the Joint Staff, Combatant Commands, and the Services, we have developed a comprehensive program of actions and milestones to achieve a full operating capability with the creation of a Joint BMD training center of excellence by the end of next fiscal year. The center of excellence will be located in Colorado Springs and will coordinate and synchronize all aspects of BMD training and

education to further develop Commanders, Warfighters, and Civilians engaged in BMD planning and operations. This approach builds upon existing capabilities and closes gaps between Service, Joint, and regional BMD training and education. As part of the center of excellence construct, our training capability will evolve into a “blended learning/higher education” approach to improve efficiency and reduce the cost of providing Joint BMD training and education.

*Warfighter Acceptance and Integrated Master Test Plan:* As the missile defense architectures matures, operators call for a credible, comprehensive assessment of new capabilities to inform Warfighter operational acceptance. In 2013, the DoD conducted a new regional operational test that assessed the integrated capability of Aegis BMD, AN/TPY-2 FBM, and THAAD. This first-of-its-kind test validated the THAAD’s integrated regional capability against multiple threats in an operationally realistic environment. Our next operational test in fiscal year 2015 will build upon the success of the previous test. We plan to conduct an integrated test of key elements of EPAA Phase II, specifically the integrated capability in AN/TPY-2, Aegis BMD, and Aegis Ashore. Additionally, JFCC IMD is working closely with MDA, the Office of the Director, Operational Test and Evaluation, and USNORTHCOM to address issues uncovered in recent GBI testing of both the CE-I and CE-II variants. Although the investigation into last year’s CE-I flight test failure is not complete, the early indications provide assurance that technological remedies are being instituted for the GBI fleet. We will continue to partner with the MDA to ensure we maintain an annual test cadence to maintain Warfighter confidence.

In summary, JFCC IMD serves an integrating role for missile defense across multiple regions as we operationalize new capabilities, evolve command relationships, and reinforce our missile defense partnerships with allies. In view of worldwide events and current fiscal challenges, JFCC IMD remains focused on our key mission task to collaborate with the GCCs and MDA to posture our forces to meet current and future ballistic missile threats. Our missile defense capability continues to strengthen as Warfighters gain increased competence and confidence in the BMD System. While work remains to be done, we have made significant progress in evolving the global

missile defense capabilities, thereby strengthening the defense of the homeland, and advancing our partnerships with allies in this pressing endeavor.

### **Army Contributions to the Nation's Missile Defense Capabilities**

The Army is a close partner with the MDA in supporting its materiel development efforts. We continue to develop and field systems that are integral to our Nation's air and missile defense capabilities. A summary follows of the Army's major air and missile defense systems, aligned within the Assistant Secretary of the Army for Acquisition, Logistics, and Technology organizational structure.

*Army Integrated Air and Missile Defense (IAMD):* Air and missile defense (AMD) is an enduring Army core function and an essential component of the Army mission to provide wide area security. To meet this mission, the 2012 Army AMD Strategy details a plan of action to develop a comprehensive portfolio of IAMD capabilities intended to provide protection against the expanding threat of ballistic and cruise missiles, unmanned aerial systems, and long-range, precision rocket, artillery, and mortar attacks.

Within the AMD arena, the IAMD Battle Management Command System (IBCS) remains the Army's highest priority effort and serves at the foundation for Army AMD modernization. The program will field a common mission command system to all echelons of Army AMD forces to defend against rockets, artillery, and mortars; cruise missiles; manned and unmanned aircraft; air-to-ground missiles; and tactical ballistic missiles. IBCS provides a comprehensive solution for the AMD gap by coordinating air surveillance and fire control across Services and with coalition partners. During this past year, Soldiers demonstrated incremental capabilities of IBCS. Additional efforts are underway to integrate IBCS and C2BMC to support the BMD mission.

*Patriot/Patriot Advanced Capability-3 (PAC-3):* Patriot/PAC-3 is the Army's premier weapon system against air and tactical ballistic missile threats. With the DoD decision to end U.S. participation in the Medium Extended Air Defense System program at completion of the design and development phase, the Army continues to make improvement investments to the Patriot system to support the AMD strategy. The aim is to increase reliability, drive down operational and sustainment costs, and remain viable

well into the future. Seeing that about half of all Patriot units are currently deployed, operational tempo and stress remain high.

A number of significant Patriot/PAC-3 capability enhancements have been accomplished over the past year. Among the accomplishments were the completion of the Army's planned upgrades to all 15 PAC-3 fire units, fielding of the 15<sup>th</sup> Patriot battalion, and continued successful operational flight tests of the next generation PAC-3 missile, the Missile Segment Enhancement (MSE). During recent successful testing, both tactical ballistic missiles and air breathing threats were simultaneously engaged. The Army conducted a successful Milestone C defense acquisition board and remains on track for delivery of the MSE to the Warfighter by the fourth quarter of 2015. Additionally, the Patriot radar received a new digital processor. Coupled with recent software upgrades, the new digital processor increases performance of the radar against evolving threats while dramatically improving reliability, availability, and maintainability.

*Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System (JLENS)*: The JLENS system provides long-range, persistent, and elevated surveillance, detection, classification, identification, and fire control quality tracking of airborne objects such as cruise missiles, manned and unmanned aircraft, and large caliber rockets. The system has demonstrated the capability to track surface moving targets. In accordance with direction from OSD and the Joint Staff, the Army is scheduled to deploy the JLENS system to Aberdeen Proving Grounds, Maryland. With this deployment, the Army will initiate a three-year operational exercise of how surveillance aerostats improve missile defense sensor capabilities.

*Terminal High Altitude Area Defense System*: THAAD, a key component of the BMDS architecture, is designed to defend deployed and allied forces, population centers, and critical infrastructure against short- and medium-range ballistic missiles. THAAD is a high demand, low-density asset. A fully operational THAAD battery consists of 95 Soldiers, an AN/TPY-2 FBM radar, six launchers, a fire control and communications element, a battery support center, and a support element. THAAD has a unique capability to engage threats in both the endo- and exo-atmosphere using proven hit-to-kill lethality. There are now four activated THAAD batteries. Equipment

training and fielding has been completed for two of the batteries. In April 2013, one of these batteries conducted the first ever operational deployment of THAAD in response to the escalation of tensions in the Pacific region. The third THAAD battery is currently undergoing training and will be operationally available next year; the fourth battery is scheduled to become fully operational the following year. The addition of THAAD capabilities to the Army's air and missile defense portfolio brings an unprecedented level of protection against missile attacks to deployed U.S. forces, partners, and allies.

## **Conclusion**

Mr. Chairman and Ranking Member Sessions, as a member of the Joint missile defense community, the Army will continue to pursue enhancements to the Nation's missile defense system. As a Service, the Army has lead responsibility for GMD, AN/TPY-2 FBM, Patriot, and THAAD. Our trained and ready Soldiers operating GMD elements in Colorado, Alaska, and California remain on point to defend the homeland against a limited intercontinental ballistic missile attack. As a force provider to the GCCs, our Soldiers ensure essential regional sensor capabilities and ballistic missile early warning. USSTRATCOM, through the JFCC IMD, continues to integrate BMDS capabilities to counter global ballistic missile threats and protect our Nation, deployed forces, partners, and allies.

While the operational, doctrine, and materiel development enhancements of the BMDS are essential, our most essential assets are the Soldiers, Sailors, Airmen, Marines, and Civilians who develop, deploy, and operate our missile defense system. I appreciate having the opportunity to address missile defense matters and look forward to addressing any of your questions.



United States Government Accountability Office

Testimony

Before the Subcommittee on Strategic  
Forces, Committee on Armed Services,  
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## MISSILE DEFENSE

# Mixed Progress in Achieving Acquisition Goals and Improving Accountability

Statement of Cristina T. Chaplain, Director  
Acquisition and Sourcing Management

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# GAO Highlights

Highlights of [GAO-14-481T](#), a testimony before the Subcommittee on Strategic Forces, Committee on Armed Services, U.S. Senate

## MISSILE DEFENSE

### Mixed Progress in Achieving Acquisition Goals and Improving Accountability

#### Why GAO Did This Study

In order to meet its mission, MDA is developing a diverse group of BMDS components including (1) land-, sea-, and space-based sensors; (2) interceptors; and (3) a battle management system. These systems can be integrated in different ways to provide protection in various regions of the world. Since its inception in 2002, MDA has been given flexibility in executing the development and fielding of the ballistic missile defense system. This statement addresses recent MDA progress and the challenges it faces with its acquisition management. It is based on GAO's March and April 2014 reports and prior reports on missile defense.

#### What GAO Recommends

In April 2014, GAO recommended that MDA verify any changes needed for the SM-3 Block IB missile through flight testing before approving full production; retest the fielded GMD interceptor to demonstrate performance and the effectiveness of changes; and take actions to improve the clarity of its schedule baselines. DOD partially concurred with the recommendation on the SM-3, stating that MDA will verify the efficacy of any modifications by testing and that the production decision will be vetted through the DOD process. DOD did not agree with the recommendation on GMD, stating that the decision to flight test the interceptor will be made by the Director, MDA, based on the judgment of other stakeholders. GAO previously made recommendations on EPAA and testing. DOD generally concurred with them. GAO continues to believe all recommendations are valid.

View [GAO-14-481T](#) For more information, contact Cristina Chaplain at (202) 512-4841 or [chaplainc@gao.gov](mailto:chaplainc@gao.gov).

#### What GAO Found

The Department of Defense's (DOD) Missile Defense Agency (MDA) made progress in its goals to improve acquisition management, and accountability and transparency. The agency gained important knowledge for its Ballistic Missile Defense System (BMDS) by successfully conducting several important tests, including the first missile defense system-level operational flight test. Additionally, key programs successfully conducted developmental flight tests that demonstrated key capabilities and modifications made to resolve prior issues. MDA also made some improvements to transparency and accountability. For example, MDA improved the management of its acquisition-related efforts to deploy a missile defense system in Europe and MDA continued to improve the clarity of its resource and schedule baselines, which are reported to Congress for oversight.

Although some progress has been made, MDA acquisitions are still high risk, due to inherent technical and integration challenges, tight timeframes, strategies that overlap development and production activities, and incomplete management tools. More specifically:

- MDA faces challenges stemming from higher-risk acquisition strategies that overlap production activities with development activities. While some concurrency is understandable, committing to production and fielding before development is complete often results in performance shortfalls, unexpected cost increases, schedule delays, and test problems. GAO found that the Aegis Ballistic Missile Defense SM-3 Block IB and Ground-based Midcourse Defense programs, which have already produced some of their assets before completing testing, discovered issues during testing that have affected or continue to affect production.
- Testing continues to fall short of goals. For example, the first ever system-level operational flight test failed to demonstrate true integration. MDA also combined, delayed, and deleted some tests, and eliminated test objectives in other tests. These challenges reduced the knowledge they had planned to obtain in order to understand the capabilities and limitations of the BMDS.
- MDA has not yet fully developed or implemented a complete management strategy for synchronizing its efforts to deploy missile defense in Europe. As a result, it remains unclear how different European Phased Adaptive Approach (EPAA) efforts are aligned together and what constitutes success in delivering capabilities in Europe.
- Issues with the content and presentation of resource and schedule baselines continue to limit their usefulness as management tools. For the fourth year, GAO has found that MDA's cost estimates are unreliable for some BMDS elements and do not include certain costs for military services which may significantly understate total costs. Recently, Congress took steps to require that improvements be made to MDA's cost estimates, so GAO did not make any new cost recommendations. MDA's schedule baselines continue to be presented in a way that makes it difficult to assess progress. For instance, MDA's schedule baselines identify numerous events, but provide little information on the events and why they are important.

# MISSILE DEFENSE: Mixed Progress in Achieving Acquisition Goals and Improving Accountability

Chairman Udall, Ranking Member Sessions, and Members of the Subcommittee

I am pleased to be here today to discuss the acquisition progress achieved and challenges that remain for the Department of Defense's (DOD) Missile Defense Agency (MDA). Since 2002, MDA has been charged with developing and fielding the Ballistic Missile Defense System (BMDS), which is expected to be capable of defending the United States, deployed troops, friends, and allies against ballistic missiles of all ranges and in all phases of flight. It has spent over \$98 billion to develop and deploy a diverse collection of land-, sea-, and space-based assets, and has requested an additional \$38 billion for fiscal years 2014 through 2018 to continue its efforts. Since its inception, MDA has been operating in an environment of tight time frames for delivering capabilities—first with a presidential directive in 2002 to field a limited capability by 2004 and then with a presidential announcement in 2009 to deploy U.S. missile defense in Europe. Looking forward, it will also have to operate in an environment of budgetary constraints, which necessitate tough trade-off decisions. As a result, MDA will require additional steps to reduce acquisition risk to ensure it provides warfighters with systems whose performance and capability is understood, and which are delivered on time and on budget.

This year, we continue to report that missile defense acquisitions are high risk. MDA has made tangible progress in increasing the complexity and sophistication of missile defense tests, enhancing plans and processes for deploying U.S. missile defense in Europe, and increasing the completeness and clarity of cost and schedule reporting to the Congress. However, two key programs face challenges stemming from higher –risk acquisition strategies that overlap production activities and development activities; testing overall continues to provide less knowledge than initially planned and considerably more improvements are needed in both reporting to the Congress and in planning for deployment of missile defense in Europe. Many of the challenges MDA faces are tied to the technical and integration risks that are inherent in the capabilities MDA is seeking to deliver, while others are tied to tight time frames placed on MDA as well as changing demands. Nevertheless, MDA still has opportunities to take steps to reduce acquisition risk, increase transparency, and enhance oversight. MDA's new Director is

focused on doing so, though it may take time for his efforts to affect the MDA's broad portfolio of acquisitions, particularly older programs that began without sound foundations for success.

Since 2002, we have been mandated to prepare annual assessments of MDA's progress toward its acquisition goals.<sup>1</sup> Our report in response to this mandate was issued on Tuesday, April 1, 2014.<sup>2</sup> This testimony highlights the findings from that report as well as relevant findings from other recent related reports.<sup>3</sup> To assess MDA's progress and related challenges, we examined the acquisition accomplishments of individual missile defense programs and supporting efforts that MDA is currently developing and fielding. We conducted this work in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. Additional information on our scope and methodology is available in our issued reports.

## **Background**

MDA's BMDS is being designed to counter ballistic missiles of all ranges—short, medium, intermediate, and intercontinental. Because ballistic missiles have different ranges, speeds, sizes, and performance characteristics, MDA is developing multiple systems that, when integrated, provide multiple opportunities to destroy ballistic missiles in flight for the strategic defense of the United States and regional defense of its deployed forces and allies. The BMDS architecture includes space-based sensors, ground- and sea-based radars, ground- and sea-based interceptor missiles, and a command and control, battle management, and communications system to provide the warfighter with the necessary communication links to the sensors and interceptor missiles.

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<sup>1</sup>National Defense Authorization Act for Fiscal Year 2012, Pub. L. No. 112-81, § 232 (2011) mandated our most recent report. Our reports include references to all prior legislation that mandated our work.

<sup>2</sup>GAO, *Missile Defense: Mixed Progress in Achieving Acquisition Goals and Improving Accountability*, GAO-14-351 (Washington, D.C.: April. 1, 2014).

<sup>3</sup> GAO, *Missile Defense: Precision Tracking Space System Evaluation of Alternatives*, GAO-13-747R (Washington, D.C.: July 25, 2013); and *Regional Missile Defense: DOD's Report Provided Limited Information; Assessment of Acquisition Risks is Optimistic*, GAO-14-248R (Washington, D.C.: Mar. 14, 2014). Currently, our work on Homeland Ballistic Missile Defense is ongoing.

Table 1 provides a brief description of some of the BMDS systems, which MDA refers to as elements, and programs included in this year’s assessment. More details can be found in our report.<sup>4</sup>

**Table 1: Description of Selected Ballistic Missile Defense System (BMDS) Elements and Programs**

<b>BMDS element/ program</b>	<b>Description and key components</b>
Aegis Ballistic Missile Defense (BMD) with Standard Missile-3 (SM-3) Block IB	Aegis BMD is a sea-based system developed to defend against short-, medium-, and intermediate-range ballistic missiles in the middle part of their flight. MDA is developing several versions of missiles and associated ship-based software and processors. The SM-3 Block IB features additional capabilities over the previous SM-3 version to identify, discriminate, and track objects during flight. All sea-based Aegis BMD systems also include a shipboard radar and command and control systems.
Aegis Ashore	A land-based, or ashore, version of Aegis BMD initially using SM-3 Block IB missiles with plans to use various versions of SM-3 missiles and Aegis weapon system software as they become available.
Command, Control, Battle Management, and Communications (C2BMC)	C2BMC is a globally deployed system that links and integrates individual missile defense elements. It also allows users to plan ballistic missile defense operations, see the battle develop, and manage networked sensors.
Ground-based Midcourse Defense (GMD) System	The GMD program is a ground-based defense system designed to defend the United States against a limited intermediate and intercontinental ballistic missile attack in the middle part of their flight. Key components include a ground-based interceptor consisting of a booster with a kill vehicle on top, as well as a communication system and a fire control capability. There are currently two versions of the kill vehicle: the initial design known as the Capability Enhancement-I (CE-I) and the upgraded design known as the Capability Enhancement-II (CE-II).
Targets and Countermeasures	MDA develops and manufactures highly complex targets that represent realistic threat scenarios during BMDS flight tests to aid other BMDS elements’ developmental efforts. MDA develops and manufactures a variety of targets including short-, medium-, intermediate-, and eventually intercontinental ranges.
Terminal High Altitude Area Defense (THAAD)	THAAD is a mobile, ground-based missile defense system designed to defend against short- and medium-range ballistic missiles in the late-middle and end of their flight. THAAD is organized as a battery, which includes interceptors, launchers, a radar, a fire control and communications system, and other support equipment.

Source: GAO analysis of MDA data.

<sup>4</sup> GAO-14-351

When MDA was established in 2002, the Secretary of Defense granted it exceptional flexibility to set requirements and manage the acquisition of the BMDS in order to quickly deliver protection against ballistic missiles. This decision enabled MDA to rapidly deliver assets, but we have reported that it has come at the expense of transparency and accountability.<sup>5</sup> Examples of key problems we have cited in reports in recent years and which continue to affect MDA's acquisitions are highlighted below.

- MDA's highly concurrent acquisition approach has led to significant cost growth, schedule delays, and in some cases, performance shortfalls. Concurrency is broadly defined as the overlap between technology development and product development or between product development and production. While some concurrency is understandable, committing to product development before requirements are understood and technologies are mature or committing to production and fielding before development is complete is a high-risk strategy that often results in performance shortfalls, unexpected cost increases, schedule delays, and test problems. At the very least, a highly concurrent strategy forces decision makers to make key decisions without adequate information about the weapon's demonstrated operational effectiveness, reliability, and readiness for production.<sup>6</sup> According to MDA officials, they have taken some steps to identify and track concurrency in their programs. However, high levels of concurrency adopted earlier for some programs persist today.
- Testing disruptions have reduced the knowledge planned to be available to inform acquisition decisions and understand performance. For example, flight test failures disrupted MDA's acquisitions of several components and forced MDA to suspend or slow production of three out of four interceptors, including the GMD interceptor and the Aegis BMD Standard Missile-3 Block IB (SM-3 Block IB).<sup>7</sup> In the Ground-based Midcourse Defense (GMD) case, because MDA moved forward years ago with CE-I and CE-II interceptor production before completing its flight testing program, test failures

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<sup>5</sup>GAO, *Missile Defense: Opportunity Exists to Strengthen Acquisitions by Reducing Concurrency*, GAO-12-486 (Washington, D.C.: Apr. 20, 2012); *Missile Defense: Actions Needed to Improve Transparency and Accountability*, GAO-11-372 (Washington, D.C.: Mar. 24, 2011).

<sup>6</sup> GAO, *Missile Defense: Opportunity to Refocus on Strengthening Acquisition Management*, GAO-13-432 (Washington, D.C.: Apr 26, 2013) and GAO-12-486.

<sup>7</sup> GAO-12-486

have exacerbated disruptions to the program. Specifically, because the program has delivered approximately three-fourths of the interceptors for fielding, it faces difficult and costly decisions on how it will implement corrections from prior test failures. Additionally, after fielding these assets, the program has had to add tests that were previously not planned, in order to assess the extent to which prior issues were resolved. It also had to delay tests that were needed to understand the system's capabilities and limitations.

- MDA has been challenged to meet some of its goals for the European Phased Adaptive Approach (EPAA). During the past several years, MDA has been responding to a mandate from the President to develop and deploy new missile defense systems in Europe. This four-phase effort was designed to rely on increasingly capable missiles, sensors, and command and control systems to defend Europe and the United States. Each successive phase is expected to defend larger areas against more numerous and more capable threat missiles. DOD delivered the first phase, for short and medium range defense of Europe, in December 2011, and has been making progress in developing some systems to support future phases. However, in March 2013, the Secretary of Defense canceled two programs, planned for the fourth phase, thus eliminating the fourth phase, which was intended to provide additional layer for defense of the United States against intercontinental ballistic missiles. The cancelations were driven in part by affordability concerns, schedule delays and technical risks associated with these programs.<sup>8</sup> Our previous work found similar issues with other EPAA efforts.<sup>9</sup> We also found that MDA has lacked a comprehensive management approach to synchronize key EPAA activities.<sup>10</sup>
- Finally, MDA's acquisition baseline reporting has provided limited insight into the cost and schedule progress of the BMDS. Due to the acquisition flexibilities it has been granted, BMDS's entrance into DOD's acquisition process is deferred, and laws and

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<sup>8</sup> The two programs canceled in fiscal year 2013 were the Standard Missile-3 Block IIB (SM-3 Block IIB) and Precision Tracking Space System (PTSS).

<sup>9</sup> GAO-11-372, GAO12-486, and GAO-13-432.

<sup>10</sup> GAO, *Missile Defense: European Phased Adaptive Approach Acquisitions Face Synchronization, Transparency, and Accountability Challenges*, GAO-11-179R (Washington, D.C.: Dec 21, 2010), and *Ballistic Missile Defense: DOD Needs to Address Planning and Implementation Challenges for Future Capabilities in Europe*, GAO-11-220 (Washington, D.C.: Jan.26, 2011).

policies that generally require major defense acquisition programs to take certain steps at certain phases in the acquisition process will not apply until the program enters this process. For example, major defense acquisition programs are generally required to document key performance, cost, and schedule goals in an acquisition baseline at certain phases in the acquisition process; because BMDS has not progressed through threshold phases of the DOD acquisition process, this requirement is not yet applicable.<sup>11</sup> To improve the transparency and accountability of BMDS development efforts, Congress has enacted legislation requiring MDA to establish some baselines.<sup>12</sup> MDA reported baselines for several BMDS programs to Congress for the first time in its June 2010 BMDS Accountability Report (BAR). Specifically, MDA's baselines, including resource and schedule baselines, are reported in the BAR and are updated annually. Since 2011, although progress has been made to improve the reporting, we have found issues affecting the usefulness of MDA's acquisition baselines for oversight due to (1) a lack of clarity, consistency, and completeness; (2) a lack of high-quality supporting cost estimates and schedules; and (3) instability in the content of the baselines.<sup>13</sup>

Our work has recommended a number of actions that can be taken to address the problems we identified. Generally, we have recommended that DOD reduce concurrency and more closely follow knowledge based acquisition practices. We also made recommendations designed to reduce testing risk, and to improve schedule and cost reporting. DOD has generally concurred with our recommendations, and has undertaken some actions to reduce acquisition risk, and improve accountability and transparency.

### **MDA made progress on testing and further improved some management practices**

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<sup>11</sup>10 U.S.C. § 2435 requires an approved program baseline description for major defense acquisition programs before the program enters system development and demonstration (now known as engineering and manufacturing development), production and deployment, and full-rate production. The BMDS program meets the definition of a major defense acquisition program, which is defined in 10 U.S.C. § 2430 and implemented by DOD in its acquisition policy.

<sup>12</sup> Pub. L. No. 112-81, § 231(a)(2011)(codified as amended at 10 U.S.C. § 225) requires MDA to establish and maintain baselines for certain elements or major portions of elements prior to the product development phase (or its equivalent) and prior to production and deployment, and report these to the congressional defense committees annually. See also, e.g., Pub. L. No. 110-181, § 223(g), *repealed by* Pub. L. No. 112-81, § 231(b)

<sup>13</sup>GAO, *Schedule Best Practices Provide Opportunity to Enhance Missile Defense Agency Accountability and Program Execution*, GAO-12-720R (Washington, D.C.: Jul 19, 2012), GAO-14-351, GAO-13-432, GAO-11-372.

This year we found that MDA gained important knowledge about the BMDS system-level performance and individual elements by successfully executing several flight tests. We also found that MDA further improved some of its acquisition practices for managing the European Phased Adaptive Approach (EPAA) and improved the clarity of its resource and schedule baselines.

#### Progress: MDA Demonstrates BMDS Capability Through Testing

In April 2014, we reported that MDA made progress in demonstrating the systems' capabilities by conducting the first system-level operational flight test in September 2013.<sup>14</sup> This is a significant achievement because it is the first time that MDA conducted an operational flight test that involved multiple elements working simultaneously. The test involved warfighters from several combatant commands, and according to independent testing officials, recreated a potentially realistic scenario. During this test, MDA launched two medium-range ballistic missile targets, including its newly developed air-launched extended-medium range ballistic missile (eMRBM). Both the Aegis SM-3 Block IA and THAAD successfully intercepted their targets, demonstrating progress towards achieving an integrated BMDS. In addition, the Aegis BMD SM-3 Block IB and GMD programs successfully conducted developmental flight tests in 2013 that demonstrated key capabilities and modifications made to resolve prior issues. Specifically, the Aegis BMD SM-3 Block IB intercepted all targets in its last three flight tests. GMD also successfully conducted a non-intercept flight test of its CE-II interceptor, demonstrating the performance of a guidance component that MDA redesigned in response to a December 2010 flight test failure.

#### Progress: EPAA Acquisition Management Improves

We also found that DOD improved the acquisition management of EPAA.<sup>15</sup> In our first report on the subject in 2010, we assessed progress of EPAA acquisition planning against six key acquisition principles that synchronize acquisition activities and ensure accountability.<sup>16</sup> We found that DOD has established testing and acquisition plans for technology development and engineering, and had begun work on identifying key stakeholders. This year, we found

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<sup>14</sup> GAO-14-351

<sup>15</sup> GAO-14-248R

<sup>16</sup> GAO-11-17R

improvements in these areas. For example, DOD completed identifying EPAA stakeholders and in 2012 issued a directive updating the warfighter role in testing and capability acceptance.

Lastly, in April 2014, we found that MDA continued to improve the clarity of its resource and schedule baselines, which are reported to Congress in its annual acquisition report called the BAR.<sup>17</sup> In its 2013 BAR, MDA continued to incorporate useful changes it made last year, and took some additional actions to improve the completeness and clarity of the BAR baselines by:

- identifying the date of the initial baseline and, if applicable, the date when the initial baseline was most recently revised;
- explaining most of the significant cost and schedule changes from the current baseline estimates against both the estimates reported in the prior year's BAR and the latest initial baseline; and
- making the baselines easier to read by removing cluttered formatting such as strikethroughs and highlights that made some of the events listed in past BARs unreadable.

### **MDA continues to face testing and acquisition challenges**

Although MDA has taken some steps to improve its acquisitions, the agency continues to face several challenges that we have found in previous reviews. Specifically, it faces challenges stemming from high-risk acquisition practices, as well as challenges in BMDS testing, managing the development of EPAA capabilities, and reporting resource and schedule baselines that support oversight. Until MDA addresses these challenges, the agency and decision makers may not obtain the information needed to assess the capabilities of the BMDS or make informed acquisition and investment decisions.

#### Challenge: Implementing Higher Risk Acquisition Programs

While MDA has gained important insights through testing and taken some steps to improve management and increase transparency, it still faces challenges stemming from higher-risk acquisition strategies that overlap production activities with development activities. While some concurrency is understandable, committing to production and fielding before development is

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<sup>17</sup> GAO-14-351

complete often results in performance shortfalls, unexpected cost increases, schedule delays, and test problems. It can also create pressure to keep producing to avoid work stoppages. Our April 2014 report found that Aegis BMD SM-3 Block IB and GMD, which have already produced some of their assets before completing testing, discovered issues during testing that could affect or have affected production.<sup>18</sup> Although both programs demonstrated progress in resolving previous issues, some of which stemmed from their concurrent acquisition strategies, testing revealed new issues. Specifically:

- An interceptor failure during a September 2013 test of Aegis BMD SM-3 Block IB means that a key component, common to the deployed SM-3 Block IA, may need to be redesigned and flight tested. While the failure review is not yet complete, if a redesign is necessary, interceptors that were already produced may require retrofits. MDA continues to procure new SM-3 Block IBs while it investigates the cause of the failure.
- A GMD CE-I interceptor failure in a July 2013 flight means that MDA did not demonstrate the interceptor could perform under more challenging conditions than previously tested, further delaying knowledge of the interceptors performance capability. Additionally, the failure precluded confirmation that previous design changes improved performance, and delayed the upcoming test needed to resume production of CE-II interceptors. According to program officials, the failure review is not complete, but the failure could have been caused by a component common to both the CE-I and CE-II interceptors. It is still unclear what, if any, corrective action will be needed. The GMD program has had many years of significant and costly disruptions caused by production getting well ahead of testing and then discovering issues during testing. Consequently, even though some assets have already been produced, MDA has had to add tests that were previously not planned and delay tests that are necessary to understand the system's capabilities and limitations. Additionally, since it has delivered approximately three-fourths of its interceptors, MDA faces difficult and costly decisions on how it will implement corrections from prior test failures. As a result of these development challenges, the GMD program will likely continue to experience delays, disruptions, and cost growth.

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<sup>18</sup> GAO-14-351

We made recommendations to address the ongoing issues with both systems in our April 2014 report.<sup>19</sup> First, we recommended that the Secretary of Defense direct MDA's Director to flight test any modifications that may be required to the Aegis SM-3 Block IB, before the Under Secretary of Defense, Acquisitions, Technology, & Logistics approves full production allowing the program to manufacture the remaining interceptors. Second, we also recommended testing the fielded GMD CE-I interceptor in order to complete the original purpose of the failed test to (1) demonstrate the CE-I's effectiveness against a longer range threat in more challenging conditions, and (2) confirm the effectiveness of previous upgrades as well as (3) confirm any new modifications to address the failure work as intended. DOD partially concurred with the recommendation on the Aegis SM-3 Block IB, stating that MDA will verify the efficacy of any modifications by testing and that the full production decision will be vetted through the DOD process. DOD did not agree with the recommendation on GMD, stating that the decision to flight test the interceptor will be made by the Director, MDA, based on the judgment of other stakeholders.

#### Challenge: Gaining Expected Knowledge From Testing

In this year's reports, we found that testing has provided less knowledge than initially planned.<sup>20</sup> While MDA accomplished some testing goals, it experienced testing shortfalls, including failures of Aegis and GMD interceptors I mentioned above. The agency also combined, delayed, and deleted some tests, and eliminated test objectives in others. These changes reduced the knowledge expected to be available to understand the capabilities and limitations of the BMDS. Examples of key testing problems we cited in this year's reports are:

- Operational Integration -- Although the September 2013 operational flight test demonstrated layered defense between Aegis BMD and THAAD, the Director, Operational Test and Evaluation concluded that the test did not achieve true integration. Specifically there were system network issues, interoperability limitations, and component failures. For example, the test uncovered several issues with communication networks that are needed for interoperability between the elements. Interoperability is

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<sup>19</sup> GAO-14-351

<sup>20</sup> GAO-14-351 and GAO-14-284R

important because it can improve missile defense effectiveness and mitigate some limitations of the systems working alone.

- Test plan revisions continue to reduce the knowledge planned to be available to understand BMDS performance and inform acquisition decisions. In our March 2014 and April 2014 reports, we found that MDA combined, delayed, and deleted some tests, and eliminated test objectives in others. For example, MDA had to make some adjustments to its September 2013 operational flight test, reducing the number of targets from five to two and removing the participation of more mature elements. The agency also reduced the number of ground tests, which are used to assess performance and interoperability. While MDA added other ground tests to mitigate some effects of this reduction, they are smaller in scope and may not provide the same amount of data about how the systems work together.

Previously GAO has made recommendations to improve MDA's ability to gather expected knowledge from testing. For example, we recommended that MDA add non-intercept tests for new targets and ensure that its test plan can absorb unforeseen events, like failures, in order to minimize disruptions to the test schedule.<sup>21</sup> We also recommended that MDA synchronize its testing with development and delivery schedules for its assets.<sup>22</sup> MDA generally concurred with our recommendations, but has not fully implemented them.

#### Challenge: Managing Development and Deployment of U.S. Missile Defense in Europe

In March 2014 we found that while MDA made further improvements to the way it manages EPAA, it has yet to develop or implement a complete management strategy for synchronizing these efforts.<sup>23</sup> Specifically, MDA has not established an integrated schedule and has yet to completely define EPAA requirements. As a result, it remains unclear how different EPAA efforts are aligned together and what constitutes success in delivering EPAA capabilities. Considering that defensive capability planned for EPAA increasingly depends on integrated performance of the participating systems, an acquisition approach that identifies and

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<sup>21</sup> GAO13-432 and GAO-11-372

<sup>22</sup> GAO, *Defense Acquisitions: Production and Fielding of Missile Defense Components Continue with Less Testing and Validation Than Planned*, GAO-09-338 (Washington, D.C.: Mar 13, 2009).

<sup>23</sup> GAO-14-284R

synchronizes all needed activities becomes increasingly important. While flexibility is a hallmark of the EPAA policy, it also increases the risk of delivering less capability than expected without demonstrating the actual performance of what is delivered.

In fact, our March 2014 report found concurrency, fragmentation of development activities, and delays for some originally planned capabilities. For example, we found that some systems may be delivered later than originally anticipated for integration activities. This reduces the time to discover and correct issues. We also found schedule delays that reduced both the capability MDA plans to deliver and the understanding of how that capability will perform. For example, although MDA delivered the first set of capability in December 2011, an upgrade originally planned for 2014, is now expected in 2015. Additionally, we found that MDA split the delivery of capability it initially planned to deliver in 2015 into two segments. It now plans to deliver what it calls “basic” or “core” capability in 2015 and the remainder in 2017. Similarly, MDA also realigned its plans for the capability it initially planned for 2018 into two segments—designating a subset of originally planned capability to be delivered in 2018, with the remainder in 2020 or later. Finally, MDA postponed its plans to conduct a formal system-level end-to-end assessment of EPAA capabilities because of concerns with data reliability associated with such tests. MDA is currently making investments to develop the tools it needs to improve the reliability of their system-level assessments, but they are expected to be ready after two-thirds of EPAA capabilities have been delivered.

We have previously made recommendations to improve management of EPAA, which are highlighted in this year’s report.<sup>24</sup> Although DOD generally concurred with these recommendations, it has not yet fully implemented them.

#### Challenge: Reporting Resource and Schedule Baselines that Support Oversight

Although we found in March 2014 that MDA took some additional steps to improve the clarity of its resource and schedule baselines, this was the fourth year that we have found MDA’s resource baselines are not sufficiently reliable to support oversight.<sup>25</sup> Additionally, issues with the content and presentation of the schedule baselines continue to limit the usefulness of the information for decision makers. According to agency officials, MDA is taking steps to improve

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<sup>24</sup> GAO-14-284R

<sup>25</sup> GAO-14-351

the reliability of their resource baselines, however, until MDA completes these efforts, its baselines will not be useful for decision makers to gauge progress.

Since MDA first reported baselines in June 2010, we have found that the underlying information supporting its resource baselines does not meet best practice standards for high-quality cost estimates.<sup>26</sup> MDA's resource baselines reported in its 2013 BAR remain unreliable because the agency is still in the process of improving the quality of the cost estimates that support its baselines. For example,

- **MDA has not fully implemented its cost estimating handbook.** In April 2013, we reported that, in June 2012, MDA completed an internal Cost Estimating Handbook, largely based on *GAO's Cost Estimating and Assessment Guide* which, if implemented, could help address nearly all the shortfalls we identified. According to MDA officials, the agency is still in the process of applying that handbook to its cost estimates and therefore revised estimates for BMDS elements included in the 2013 BAR were not ready for our review.
- **MDA has not obtained independent cost estimates of the reported baselines.** Officials from DOD's Office of the Director for Cost Assessment and Program Evaluation told us that although they examined costs for some BMDS elements over the last two years, they have not completed a formal independent cost estimate for a BMDS element since 2010.<sup>27</sup>
- **MDA's cost estimates reported in the 2013 BAR do not include operation and support costs funded by individual military services.** In April 2013, we found that MDA was not reporting the operation and support costs borne by other military services and concluded that as a result MDA's reported costs may significantly understate the full costs for some BMDS elements. We recommended MDA include these costs in its resource baselines reported in the BAR.<sup>28</sup> DOD agreed that decision makers should

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<sup>26</sup>GAO, *GAO Cost Estimating and Assessment Guide*, GAO-09-3SP (Washington, D.C.: March 2009).

<sup>27</sup> A formal independent cost estimate would be conducted or approved by DOD's Office of the Director for Cost Assessment and Program Evaluation. It would be an independent cost estimate of the full life-cycle cost of the program and would include all costs of development, procurement, military construction, and operations and support.

<sup>28</sup> Our previous and ongoing work notes the importance of including the long-term costs associated with operations and support in cost estimates for BMDS weapons systems (for example see GAO-11-372).

have insight into the full costs of DOD programs, but the department stated that the BAR should only include content for which MDA is responsible. However, limiting the baseline reporting to only MDA costs precludes decision makers from having insight into all the costs associated with MDA's weapons systems. We continue to believe that reporting these costs would aid both departmental and congressional decision makers as they make difficult choices of where to invest limited resources. DOD does not currently report the full costs for MDA's missile defense acquisitions.

In the National Defense Authorization Act for Fiscal Year 2014, Congress took steps to address concerns over MDA's cost estimates.<sup>29</sup> As a result, we did not make any new recommendations regarding cost this year. However, we plan to continue to monitor MDA's progress because establishing high-quality cost estimates that are accurate, credible, and complete is fundamental to creating realistic resource baselines.

In April 2014, we also found that assessing MDA's progress in achieving its schedule goals is difficult because MDA's 2013 schedule baselines are not presented in a way that allows decision makers to understand or easily monitor progress.<sup>30</sup> For instance, MDA's schedule baselines identify numerous events, but provide little information on the events and why they are important. In addition, MDA's schedule baselines do not present any comparisons of event dates. Because MDA's schedule baselines only present current event dates, decision makers do not have the ability to see if and how these dates have changed.

We recommended that the Secretary of Defense direct the MDA Director to improve the content of the schedule baselines by highlighting critical events, explaining what these events entail and why they are important, and by presenting information in a format that allows identification of changes from the previous BAR as well as from the initial baseline. DOD concurred with our recommendation.

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This concludes my statement, I am happy to answer any questions you have.

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<sup>29</sup>Pub. L. No. 113-66, § 231.

<sup>30</sup> GAO-14-351

### **GAO Contact and Staff Acknowledgments**

For future questions about this statement, please contact me at (202) 512-4841 or chaplainc@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. Individuals making key contributions to the work this statement is based on include David B. Best and Patricia Lentini, Assistant Directors; Susan C. Ditto; Aryn Ehlow; Wiktor Niewiadomski; John H. Pendleton; Karen Richey; Brian T. Smith; Jennifer Spence; Steven Stern; Robert Swierczek; Jay Tallon; Brian Tittle; and Hai V. Tran; Alyssa Weir; and Gwyneth B. Woolwine.

**DEPARTMENT OF DEFENSE AUTHORIZATION  
OF APPROPRIATIONS FOR FISCAL YEAR  
2015 AND THE FUTURE YEARS DEFENSE  
PROGRAM**

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**WEDNESDAY, APRIL 2, 2014**

U.S. SENATE,  
SUBCOMMITTEE ON STRATEGIC FORCES,  
COMMITTEE ON ARMED SERVICES,  
*Washington, DC.*

**BALLISTIC MISSILE DEFENSE POLICIES AND  
PROGRAMS**

The subcommittee met, pursuant to notice, at 2:33 p.m. in room SR-222, Russell Senate Office Building, Senator Mark Udall (chairman of the subcommittee) presiding.

Committee member present: Senators Udall, King, and Sessions.

Majority staff member present: Richard W. Fieldhouse, professional staff member.

Minority staff member present: Robert M. Soofer, professional staff member.

Staff assistant present: Lauren M. Gillis.

Committee members' assistants present: Christopher R. Howard, assistant to Senator Udall; Rachel H. Lipsey, assistant to Senator Donnelly; Stephen M. Smith, assistant to Senator King; and Lenwood A. Landrum, assistant to Senator Sessions.

**OPENING STATEMENT OF SENATOR MARK UDALL, CHAIRMAN**

Senator UDALL. The subcommittee will come to order. The Strategic Forces Subcommittee meets today to consider the ballistic missile defense programs and policies supporting the President's budget request. We have five expert witnesses joining us today to help us review these important and complex issues.

Ms. Elaine Bunn is the Deputy Assistant Secretary of Defense for Nuclear and Missile Defense Policy. She's testified before the subcommittee on nuclear policy, and she's here today as the Defense Department's expert on missile defense policy issues.

The Honorable Michael Gilmore is the Director of Operational Test and Evaluation within the Department of Defense. He provides the DOD and Congress with independent assessments of the adequacy and results of our missile defense testing and also plays a critical role in reviewing and approving the semi-annual integrated master test plan for missile defense.

Vice Admiral Jim Syring is the Director of the Missile Defense Agency, which researches, designs, develops, tests, and fields our ballistic missile defense system and supports its operation and improvement. He is responsible for roughly \$7.5 billion in this year's budget request.

Lieutenant General David Mann is the Commander of the U.S. Army Space and Missile Defense Command. He is also the Joint Functional Component Commander for Integrated Missile Defense under U.S. Strategic Command. He represents the crucial warfighter perspective on missile defense issues, which we always want to keep in mind since they are the customer and the user.

Ms. Cristina Chaplain is the Director of Acquisition and Sourcing Management at the Government Accountability Office and leads the GAO evaluation of our missile defense acquisition programs. Congress has benefited from her work on this topic, among many others.

We welcome you all back to the subcommittee and we thank each of you for your long and dedicated service to the Nation and to our security.

Ballistic missile defense has taken on a growing importance as missile threats have grown. We all want operationally effective, cost effective, and affordable missile defenses to protect our homeland, our forward deployed troops, our allies, and our partners. We also recognize such missile defense is both technically challenging and expensive.

Unfortunately, by imposing sequestration on the budget of the Defense Department and the rest of government Congress has made the effort more difficult. Those constraints mandated by Congress affect our missile defense programs just like all other government programs. If we let sequestration return with full force next year, it will make things worse. I would continue to urge my colleagues on both sides to work to avoid that.

With respect to our homeland missile defense capability, we have a system in place today that protects the entire Nation from limited missile attacks from North Korea and a potential Iranian threat. Yet we all know that we have had problems with the kill vehicles on that system and we need to fix those problems and demonstrate the fixes through realistic testing before we buy more interceptors. That's what we call fly before you buy.

Those kill vehicle problems occurred because we deployed the system before it was properly designed, engineered, and tested. In other words, in its haste to deploy the system quickly the Bush Administration did not practice fly before you buy. Consequently, I am pleased that the budget request includes funds to redesign the kill vehicles so that they will be more effective, robust, and reliable. This committee has supported such a redesign. In order to avoid repeating any of the previous mistakes, we also need a rigorous acquisition approach with stringent engineering design and testing to be confident it will work before we deploy it.

As the Pentagon has told us, we also need to improve our homeland defense capabilities by investing in additional sensor and discrimination capabilities. That is their highest and best priority because it will make our current system more effective and allow us

to defeat more threat missiles with our existing and planned interceptors.

Regional missile defenses are a high priority for our regional combatant commanders because they need a capability to address existing missile threats to Europe, the Middle East, and Asia, especially those from Iran and North Korea. That's why the Joint Chiefs of Staff and Secretary of Defense Robert Gates unanimously recommended the European Phased Adaptive Approach, or EPAA, to the President. It would rapidly provide the capability they needed to protect NATO Europe against the growing Iranian missile threat.

Phase 1 of the EPAA was deployed in 2011 and we are on track to deploy phase 2 in Romania next year. Phase 3 is planned for deployment in Poland in 2018 at the same site we agreed with Poland back in 2008. We will be interested to hear more about the progress of EPAA and on our regional defense efforts, particularly with our allies and partners in the Middle East and Asia.

So with all of that said, we look forward to your testimony on these important topics. Before we turn to you for brief oral statements, let me turn to my friend and ranking member, Senator Sessions, for any comments that he wishes to make. Senator Sessions.

Senator SESSIONS. Thank you, Mr. Chairman. I think you make some very important observations that I share in your remarks. Thank you for that.

In March of last year, Secretary Hagel announced steps to strengthen homeland missile defense, including the deployment of 14 more GBIs in Alaska, which was really bringing it back up to the Bush plan after they had been reduced, and deploying a second AN/TPY2 radar in Japan to provide improved early warning, particularly from North Korean launches. This was a recognition, I think, that we face a long-range missile threat to the homeland and that threat is increasing faster than we expected.

This year the budget request includes several important initiatives meant to improve the GMD system. They include: a redesigned exoatmospheric kill vehicle for the ground-based interceptor, which you made reference to; and a new long-range discrimination radar to be deployed in Alaska; and software improvements for threat discrimination. So those are good steps. I believe they'll save money in the long run. If we can get our discrimination ability and our ability to discriminate against false threats, we can use fewer launches and have more effect. So I commend Admiral Syring and Secretary Hagel for these steps.

Back in 2009, the Department of Defense decided to cease deployment of GBIs at 30 at Fort Greely and that has now been overcome. I recall a meeting in Senator Lieberman's office with Secretary Gates and other Senators where we discussed our concern about the decision to go to 30 from 44. While Secretary Gates assured us that the intention was to improve the GMD system at the time, funding shortfalls and the administration's emphasis on regional missile defense meant there was very little real improvement available to GMD.

So today I think we move forward. So the next 5 years, MDA intends to spend around \$700 million to design a new kill vehicle and I believe this is overdue.

Speaking of funding, let me show this chart. It looks awfully crowded, but it sort of tells us how in Washington things start eroding when we don't really understand what's happening to us. The President made a commitment at the time of the New START treaty that we would be involved in this, but this is how it looks.

According to our staff estimates, the President's proposed 5-year spending plan that he's submitting today for missile defense is about \$6 billion less than the President's fiscal year 2012 spending plan. This is what he submitted as his spending at 8.8 in 2015 and 2016, billion dollars. So here we are for 2015 and we're at 7.8, and dropping down to 7.3 in fiscal year 2019.

So based on that, we're talking about over the FYDP about \$6 billion less than we were expecting to spend. Now, if this is because you've saved money on the Energy buildings at their laboratories, maybe we could survive that. Maybe it wouldn't be so devastating, because I have doubts about whether all that money, \$5 billion, \$10 billion buildings, was necessary. But we do not want—all I'm saying, Mr. Chairman, is having a credible missile defense system is so fundamentally important, and it's less than 5 percent of our total defense budget for the whole system, and we ought to be able to—actually, that's about 2 percent. \$7 billion out of \$500 billion is a lot less than that.

So I guess I would say that just points out where we are. That's what we're wrestling with, the kind of issue we're dealing with today. We want a good strong missile defense system. Can we complete it with those numbers and do you have a plan that will work? It would be great if you can do it at those numbers, but I'm a bit uneasy about it.

Thank you, Mr. Chairman—I would say one more thing. The sequester does not require us to cut any more in the future. The big cuts were this year and somewhat next year. But that Ryan-Murray bill filled in the hole this year and filled in some next year, leaving us at basically, the 050 account, at 521 this year, 521 in 2015, 561 in 2016—no, 523 in 2016, 536 in 2017, 549 in 2018, 562 in 2019, 576 in '20, and 590 in 2021.

We're going to have some pretty good increases, about a 2.5 percent increase, after the next 2 years, after the cuts we've already taken. You had to make big cuts this year, even with the little extra money that Ryan-Murray put into the account. But it avoided, I think, disastrous pain and some very unwise decisions you would have had to make. So I'm sympathetic with the problem, but we're going to all have to tighten our belt and defend America without wasting money, because the interest on the debt is going from \$233 billion this year to \$880 billion 10 years from today, according to CBO, and that passes the whole defense budget in 4 or 5 years.

Thank you.

Senator UDALL. Thank you, Senator Sessions.

We will hear from the panel from our left to your right. We'll start with Ms. Bunn, and if you'll keep your oral statements brief, and I know you came prepared to do so, then we can open the committee up to questions from you. So, Ms. Bunn, you're recognized.

**STATEMENT OF M. ELAINE BUNN, DEPUTY ASSISTANT SECRETARY OF DEFENSE, NUCLEAR AND MISSILE DEFENSE POLICY, DEPARTMENT OF DEFENSE**

Ms. BUNN. Thank you, Chairman Udall, Ranking Member Sessions, Senator Donnelly. Thank you for the opportunity to testify today, and thank you for the work you do to provide for the common defense.

That defense with regard to ballistic missiles includes the defense of our Nation, deployed forces, allies, and partners from the threat posed by ballistic missiles of many ranges—short, medium, intermediate, long-range missiles. So we need a variety of defenses for two missions: first, defending the United States against limited long-range ballistic missile attacks from countries such as North Korea and Iran, as you've said; second, defending against regional missile threats to U.S. forces, while protecting allies and partners and enabling them to defend themselves.

For both homeland and regional missile defense, our strategy has to take into account uncertainties, including both the uncertainty of future threat capabilities and the technical and fiscal uncertainties inherent in our own program development. The steps we've taken to strengthen our missile defense posture are focused on developing and deploying proven, cost-effective capabilities to address both existing and emerging threats.

With regard to homeland defense, we know that North Korea has taken actions that are provocative and concerning. They've conducted three nuclear tests. They continue their efforts to bring the KN08 road-mobile ICBM to operational capacity. While Iran has not yet deployed an ICBM, its continued efforts on space launch vehicles, along with its desire to deter U.S. and our allies, provide Iran with both the means and the motivation to develop longer range missiles, including an ICBM.

The U.S. Homeland is currently protected against potential ICBM attacks from states like North Korea and Iran. But to ensure that we stay ahead of the threat, we're taking several steps to strengthen our homeland defense posture. Deploying 14 more interceptors in Alaska will provide additional protection against both North Korea and Iranian ICBM threats as they emerge. We are also deploying, as you mentioned, a second missile defense radar to Japan, and are requesting funding to develop a radar that when it's deployed in Alaska will provide persistent sensor coverage and improved discrimination against capabilities from North Korea.

Finally, as you mentioned, we're initiating a redesign of the kill vehicle for the GBI. That will not only improve the reliability and performance of the interceptor, make our missile defenses better; it should also be easier to build, upgrade, and maintain than previous versions.

While the ICBM threat from the Middle East has not yet emerged, the regional ballistic missile threat from Iran as well as Syria exists today. Iran already has the largest inventory of ballistic missiles in the Middle East and is capable of striking targets throughout the region and into the eastern part of Europe. The Assad regime in Syria has several hundred short-range ballistic missiles that can reach much of Israel and large portions of other countries, including Turkey.

North Korea also possesses regional ballistic missiles and has recently conducted a number of short-range missile launches.

Our response—our responses are tailored to the circumstances of each region, that is Europe, the Middle East, Asia Pacific. We're continuing to implement regional missile defenses that are both phased—that is, as technology becomes available we phase them—and adaptive to the emerging threats. Our focus is on developing and fielding capabilities that are mobile, scaleable, relocatable. We're also encouraging our allies and partners to acquire missile defenses and to strengthen operational missile defense cooperation. So it's both the stuff and the operations.

We have made progress in strengthening our regional missile defense posture in the past 2 years. We've upgraded five additional Aegis ships with missile defense capability and increased our inventory of both the THAAD and Standard missile interceptors. In Europe, we already maintain a missile defense ship presence in the eastern Mediterranean, along with the radar deployed in Turkey, and plans to deploy Aegis Ashore sites in Romania in 2015 and in Poland in 2018 are on schedule. In the Asia Pacific region, we maintain an Aegis ship presence along with Patriot batteries deployed in Japan and South Korea. Last year we also deployed a THAAD battery to Guam in response to North Korean provocation. And of course we also maintain a missile defense presence in the Middle East and a strong missile defense partnership with Israel, and are working with Gulf Cooperation countries as they expand their air and missile defense as well.

We have made progress over the last several years, but we cannot afford to stand still. The President's budget reflects our goal of retaining the flexibility to adjust and enhance our defenses as the threat and technologies evolve.

Thank you for having me here today and I look forward to your questions.

[The prepared statement of Ms. Bunn follows:]

Senator UDALL. Thank you, Secretary Bunn.

Dr. Gilmore.

**STATEMENT OF HON. J. MICHAEL GILMORE, DIRECTOR, OPERATIONAL TEST AND EVALUATION, DEPARTMENT OF DEFENSE**

Mr. GILMORE. Mr. Chairman, Senator Sessions, Senator Donnelly: I'll just briefly discuss what I see as the highlights of the test program over the last year. We learned a lot during the last year. We conducted the first ever operational test of elements of the ballistic missile defense system, working together to demonstrate a layered defense such as might be necessary in the Central Command area of operations or elsewhere in the world.

In that test, Aegis performed an intercept of a medium-range ballistic missile. THAAD was available to perform an intercept of Aegis failed, and in fact THAAD did fire an interceptor at the Aegis target, which then ended up intercepting a piece of the debris after Aegis successfully intercepted its target. Then THAAD had to plan its intercept in the presence of the debris from the Aegis intercept, and that's an important thing to demonstrate because in the kinds of large raids that many of the scenarios that we are worried about

might occur there would be multiple intercepts and the systems would have to plan intercepts in the presence of debris and other junk that was created by previous intercepts. So that was a very important test.

The integration demonstrated in that test between Aegis and THAAD was limited. The organic systems, the organic Aegis and THAAD radars, and the organic Aegis and THAAD battle management systems were used to plan those intercepts. They did share information through the command and control system that BMDS is working on. But true integrated battle management won't be possible until further upgrades for the command and control system, the BMDS command and control system, come on line later in this decade.

Nonetheless, it was a significant test. Many important things were learned. There were actually some surprises in the test. The intercepts were successful, but there were some surprises, and those surprises are being used to plan upgrades and changes in tactics, techniques, and procedures that our deployed forces can use as they today use these systems in CENTCOM and elsewhere.

So in my view it was a very valuable test, and as far as I can tell the combatant commands feel the same way. They strongly supported the test and felt that they learned a lot from it.

One thing that was demonstrated by the test—originally there were four targets that were going to be used in the test. We ended up only using two because we ran out of time because of problems associated with readying the two targets that actually were used for use. That's a problem that Vice Admiral Syring is working with and that his predecessor was working on and that continues to be a problem of note, with no easy solutions in sight, although I know Vice Admiral Syring and MDA are working very hard to make the targets more reliable, and it will be important to achieve that.

There was the failed intercept test of the Capability Enhancement 1 kill vehicle on a ground-based interceptor. We've learned a lot from that, and that's been alluded to. The Failure Review Board found several issues of concern associated with the design of the kill vehicle. I had recommended that MDA consider redesigning the kill vehicle and Vice Admiral Syring and the Department's leadership independently decided that that would be a good idea and funding, as you've noted, is provided for that. I think that's a good idea, and it's particularly important to use a rigorous systems engineering process in that redesign so that we don't end up with just patchwork fixes, but rather a more comprehensive fix to these problems that we've seen that will result in a robust kill vehicle as we go forward.

Finally, there were at least two important tests of the SM-3 1B interceptor, which provides additional capability, additional processing, and an improved seeker that will help discriminate lethal objects from things that we don't care about. When conducting ballistic missile tests, the so-called tests FTM-21 and 22, which my office is going to report on later this year, to support a full-rate production decision, those intercepts were successful and in fact the intercept of the second target was meant to and did in fact exercise the capabilities of the new seeker and the new processor in the SM-3 1B. That was successful.

Of course, that was a salvo shot. We were interested in seeing how the missiles would behave when there was one ahead of another and how the interceptors worked and the kill vehicles would work when one was looking at what the first one was doing and having to contend with the flash and other effects that are created by successful intercept as it trails the first interceptor.

Unfortunately, the second interceptor failed in flight, problems associated with the third-stage rocket motor, which is common to both the SM-3 1B and 1A, and MDA; and Vice Admiral Syring are conducted a Failure Review Board to understand that failure thoroughly. It could be connected to previous failures and MDA is going to look at a way ahead there.

So those are the highlights of the test program. I would also make one final note. My testimony, as it has for the past 4 or 5 years when I've testified, says that we're still several years away from validating the models associated with missile defense that we're going to need in order to do a thorough assessment of operational effectiveness and suitability for this system, because we're never going to be able to test in live tests over the full range of conditions under which it might be employed. So the models are very important.

Every year I've said, and I've said it again this year, that we're still several years away. Unfortunately, that is correct. One of the reasons, one of the primary reasons it's correct, is because of the 4½ year delay that we've had to suffer in gathering information on the performance of the ground-based missile defense system as a result of the three test failures that have occurred, and the last successful intercept using a GBI occurred in December 2008.

We have made progress on THAAD and Aegis, collecting information there and validating models. There's still more work to be done. But we're definitely lagging when it comes to the ground-based missile defense system because of the test failures and the need to recoup from those failures.

Thank you.

[The prepared statement of Mr. Gilmore follows:]

Senator UDALL. Thank you, Dr. Gilmore.

Admiral Syring.

**STATEMENT OF VADM JAMES D. SYRING, USN, DIRECTOR,  
MISSILE DEFENSE AGENCY, DEPARTMENT OF DEFENSE**

Admiral SYRING. Thank you, Mr. Chairman, Senator Sessions—

Senator UDALL. I think you should turn on your mike.

Admiral SYRING. Good afternoon, Chairman Udall, Senator Sessions, Senator King, Senator Donnelly. Out of our total request of \$7.46 billion for the fiscal year 2015 missile defense program, we are requesting approximately \$1.3 billion, including the Air Force early warning radar investments, for homeland defense as we prepare to expand our GBI inventory to 44 by 2017.

My highest priority remains the successful intercept flight test of the CE-2 exoatmospheric kill vehicle. In January 2013 we conducted a highly successful non-intercept test of the CE-2 EKV. Its performance exceeded our expectations and confirmed we're on the right track to return GMD to intercept flight testing. I am con-

cident we have fixed the problem we encountered in the December 2010 test and we look forward to conducting the FTG-06B intercept test this summer.

I'm also optimistic that we have identified the root cause of the intercept failure involving our first generation EKV last July, when the CE-1 kill vehicle failed to separate from the booster's third stage. We have accounted for that issue and its probability in the upcoming flight test this summer and are working towards a correction for the entire fleet before the end of the year.

Instead of continuing to make year-to-year reliability improvements in our GBIs, in fiscal year 2015 we will begin to redesign and improve the GBI EKV. The new EKVs will be more producible, testable, reliable, and cost effective, and eventually replace the kill vehicles used in our current GBI inventory.

We will also begin development of the long-range discriminating radar, with deployment planned in 2020. The new midcourse tracking radar will provide persistent coverage and improved discrimination capabilities against threats to the homeland from the Pacific theater.

We will continue to improve the performance of the Aegis weapon system and request to procure 30 Standard Missile Block 1B guided missiles in fiscal year 2015. We will request 4-year multi-year procurement authority next year for the SM-3 1B starting in fiscal year 2016.

In fiscal year 2015, we will also procure in our request 31 interceptors for THAAD and fund additional AN/TPY2 spares and an additional THAAD battery for the Army.

We remain on schedule to meet the presidential mandate for the deployments of phase 2 and 3 of the European Phased Adaptive Approach. With 15 flight tests planned in fiscal year 2015, we will continue to test elements of the system to demonstrate they work before we commit to fielding.

Thank you, Mr. Chairman. I look forward to the committee's questions.

[The prepared statement of Admiral Syring follows:]

Senator UDALL. Thank you, Admiral.

General Mann.

**STATEMENT OF LTG DAVID L. MANN, USA, COMMANDER, U.S. ARMY SPACE AND MISSILE DEFENSE COMMAND/ARMY FORCES STRATEGY COMMAND AND JOINT FUNCTIONAL COMPONENT COMMAND FOR INTEGRATED MISSILE DEFENSES**

General MANN. Chairman Udall, Ranking Member Sessions, Senator Donnelly, Senator King: Thank you for your continued support of our soldiers, civilians, and their families. This is my second appearance before this subcommittee and it is an honor to appear before you today to talk about the importance of missile defense for our Nation and the need to maintain these capabilities in the face of maturing threats and declining budgets.

Today I'd like to briefly discuss global missile defense operations, the Space Missile Defense Command/Army Forces Strategy Command's role as a force provider. To accomplish these assigned missions, we focus on three tasks, tasks that are very similar to what

I discussed during the space hearing: to provide trained and ready missile defenders; to build future missile defense forces and capabilities; and to develop future technologies.

In addition, I'd like to outline my role as the Joint Functional Component Command for Integrated Missile Defense, basically an operational integrator on behalf of Strategic Command. We execute four tasks in support of these responsibilities: first, to synchronize operational level planning; second, to support ongoing operations and asset management; third, to integrate training and exercises and test activities; and finally, to advocate for future capabilities.

This committee's continued support of missile defense capabilities and our soldiers, sailors, airmen, and marines and civilians who develop, deploy, and operate these missile defense capabilities is essential.

Again, I appreciate the opportunity to speak on the value of missile defense for our Nation and look forward to addressing any questions that you may have. Thank you.

[The prepared statement of General Mann follows:]

Senator UDALL. Thank you, General.

Ms. Chaplain.

**STATEMENT OF CRISTINA T. CHAPLAIN, DIRECTOR, ACQUISITION AND SOURCING MANAGEMENT, GOVERNMENT ACCOUNTABILITY OFFICE**

Ms. CHAPLAIN. Chairman Udall, Ranking Member Sessions, Senators Donnelly and King: I'm pleased to be here today to discuss recent GAO findings on missile defense acquisitions. As you know, for the past 12 years we've been mandated by the Congress to assess MDA's progress in developing and delivering missile defense capabilities.

Overall, MDA has accomplished a great deal since it was formed in 2002, developing and delivering a broad set of systems that provide important protection to our Nation and our allies. But several acquisition challenges have persisted since we began our reviews.

First, in the face of time pressures, MDA has employed high-risk acquisition strategies that overall development and production activities. While this practice has decreased over time, programs that began with highly concurrent strategies still face problems. For example, the recent failure during a test of the Aegis Standard Missile 3 Block 1B, just discussed, means that a component common to the 1B and the deployed 1A interceptor may need to be redesigned and flight tested. While the failure review is not yet complete, if a redesign is necessary interceptors that were already produced may require retrofits. MDA continues to procure new 1B interceptors while it investigates the cause of the failure.

Also, a July 2013 failure in the GMD system test means that MDA did not demonstrate the CE-1 kill vehicle could perform under more challenging conditions than previously tested, further delaying knowledge of the interceptor's performance capability.

The GMD program has had many years of significant and costly disruptions caused by production getting well ahead of testing and then discovering issues during testing. Consequently, even though some assets have already been produced, MDA has had to add tests

that were previously not planned and delay tests that are necessary to understand the system's capabilities and limitations.

In the 12 years we've assessed MDA acquisitions, we've also reported that testing has been hampered by reliability and availability problems with targets, as well as optimistic planning. MDA has worked to mitigate these risks. This year we reported significant progress in testing, with the first system-level operational flight test in 2013 that Dr. Gilmore just described.

A third area of challenges we have highlighted in the past decade is on reporting acquisition progress to the Congress. Our recommendations have included making sure baselines and annual reports are complete, that they follow best practices, that they better explain variances, and that they be stabilized.

For fiscal year 2013, the Agency's cost and schedule reporting still lack the clarity, completeness, and quality necessary to track actual costs and schedule growth over time. For instance, baselines were still not supported by independent cost estimates, nor did they fully reflect operations and sustainment costs.

In recent years, however, MDA has been devoting resources and attention to improving its baselines. For instance, we reported this year that MDA took steps to explain most of the significant cost and schedule changes both in the short- and long-term. MDA is also in the process of implementing new cost reporting standards based on best practices. As such, we anticipate significant improvements in our next review.

Lastly, in a separate review this year we found MDA has enhanced management for deploying missile defense systems in Europe under the EPAA. Also, key EPAA programs, such as Aegis Ashore, are making good progress. However, the success of the EPAA policy hinges on the delivery and integration of an array of complex systems. Further, while the United States is generally meeting its commitments, some capabilities specifically needed to achieve greater levels of integration are not planned to be delivered as originally anticipated. Since integration is critical to achieving the capability desired in EPAA, we have recommended that MDA develop an integrated master schedule that pulls together the complex set of activities that need to be done. Such a schedule makes good sense whether we view EPAA as a policy or an acquisition program.

This concludes my statement and I'm happy to answer any questions.

[The prepared statement of Ms. Chaplain follows:]

Senator UDALL. Thank you, Ms. Chaplain.

Let me start. I think we'll do 7-minute rounds.

We've not had a successful intercept test with the ground-based midcourse system since 2008, as has been acknowledged. But we have had a series of test failures with both the early and most recent model of deployed kill vehicles. Admiral Syring, you've said your highest near-term priority is to return to a successful intercept test this summer to demonstrate corrections to the system.

I want to ask if each of our witnesses agrees that it is our essential near-term priority to fix the problems we have encountered with our current kill vehicles and to demonstrate those fixes in realistic intercept testing before we build or deploy any additional

interceptors. I assume these are yes or no answers, but I'll start with Ms. Bunn and move across.

Ms. BUNN. Yes, sir.

Senator UDALL. Dr. Gilmore?

Mr. GILMORE. I agree.

Senator UDALL. Admiral, I think you agree.

Admiral SYRING. Yes, sir. I'll keep it to one word, two words: Yes, sir.

Senator UDALL. General Mann?

General MANN. Yes, sir.

Senator UDALL. Ms. Chaplain?

Ms. CHAPLAIN. Yes.

Senator UDALL. Using that same approach, let me turn to acquisition rigor for redesign of the GMD kill vehicle. Given the numerous problems we've encountered with our current GMD kill vehicles, the budget includes funds to start a redesigned kill vehicle for the GMD system, one that will be reliable, robust, producible, and other attributes that are lacking in the current kill vehicles because we did not follow rigorous design, engineering, and acquisition process—practices, I should say.

I want to ask each of our witnesses if they agree that in order to avoid repeating the kill vehicle problems we had with the previous rush to failure approach, we need to follow a very rigorous acquisition approach to the redesigned kill vehicle, an approach that includes robust design, engineering, development, testing, and demonstration of a kill vehicle before we deploy it.

Could I ask if you agree to that as well? Ms. Bunn?

Ms. BUNN. Yes, Mr. Chairman. But could I add one thing?

Senator UDALL. Please, yes.

Ms. BUNN. And I think we've got the right man to add that rigor to the acquisition process.

Senator UDALL. Thank you for that.

Dr. Gilmore.

Mr. GILMORE. I view that as essential.

Senator UDALL. Admiral?

Admiral SYRING. Absolutely critical. We have one chance to get this right.

General MANN. Yes, sir.

Senator UDALL. Ms. Chaplain?

Ms. CHAPLAIN. Yes. Thanks for asking.

Senator UDALL. Thank you for answering.

Let me try the same format one final time, and I want to move to fly before you buy from missile defense. Admiral Syring, your prepared statement makes clear that you are following a fly before you buy approach on the GMD system, and that you will not build or deploy additional ground-based interceptors unless we have successful flight test results first.

I have a two-part question, first to ask you, Admiral, if you plan to use the same approach before deploying further variants of the ground-based interceptor? And then after you've answered, I'd like our other witnesses, if they agree that we need to follow this fly before you buy approach. Admiral?

Admiral SYRING. Sir, in this year's budget request we've asked for, requested an intercept test every year on an annual basis be-

tween now through the FYDP. But to address your question on 2017, there's an interceptor test that's scheduled before each next block of the interceptors is fielded. I'm confident that that will test the configuration before it goes into the ground adequately. As I've said before, intercept testing on an annual basis is a critical need for the GMD program.

Senator UDALL. Ms. Bunn.

Ms. BUNN. Mr. Chairman, the fly before you buy was a policy enunciated in the ballistic missile defense review of 2010 and it continues to be our policy.

Senator UDALL. Thank you.

Dr. Gilmore.

Mr. GILMORE. I agree. I'd just like to add one thing, and that is that the modeling and simulation that I discussed in my opening statement is also critical here, because we're never going to get enough replications to reach conclusions about statistical confidence in the system without rigorous modeling and simulation.

So the flight testing and the modeling and simulation go hand in hand, and in fact I've been working with Vice Admiral Syring and his predecessors to assure that that's the case. Both are needed.

Senator UDALL. General Mann.

General MANN. Yes, sir. We're in total agreement with MDA's way ahead and the importance of testing.

Senator UDALL. Ms. Chaplain.

Ms. CHAPLAIN. Yes, we agree with the importance of fly before you buy.

Senator UDALL. Let me direct a question to Admiral Syring, General Mann, and Ms. Bunn. You've each indicated that, in addition to improving interceptor reliability, our investment priority for homeland defense is to improve our sensor discrimination capability, rather than deploying an additional interceptor site on the east coast. The budget requests funds for a number of sensor and discrimination improvements.

Can you each tell the committee why improving our sensor and discrimination capabilities is so important and how it will improve our existing homeland defense system? For example, would they allow us to defeat more ICBM threats with our planned number of interceptors, thus making the system both more operationally effective and more cost effective? Ms. Bunn, do you want to take a shot at that first?

Ms. BUNN. Yes, sir. What you said, that is that better discrimination makes the interceptors we have more effective and more efficient.

Senator UDALL. Admiral.

Admiral SYRING. Sir, as the enemy continues to increase in both capacity and capability, the need for discrimination in sensing is vital to, one, address those capability improvements of the enemy threat and, two, to get the most intercept capability out of our inventory of interceptors. Both are critical to the escalating capability and capacity of the threat missiles.

Senator UDALL. General Mann.

General MANN. Yes, Senator. I think it's acknowledged that we'll never have enough interceptors to address the size of the threat in-

ventory out there. So it's very, very important that we're as effective as we are with what we have. Also, by improving the effectiveness of the missile we also—it gives us a little bit more breathing space in terms of how we operationally employ the system. I'll leave it at that. Thank you.

Senator UDALL. Could I follow up. There's of course no limit to what you could do. There's always a limit to resources. What I hear being said is that it's a higher priority to improve our sensor discrimination capabilities than it would be to deploy an additional interceptor site on the east coast. I say that in the context that we don't have unlimited resources.

Ms. Bunn, would you comment on that, and then the Admiral and the General?

Ms. BUNN. Yes, sir. The priority for this budget is in improving the EKV on the interceptors that we have, redesigning that, and improving the discrimination. While an east coast site might provide additional defense against an emerging, not yet here threat from Iran, the next dollars spent need to be on EKV improvement and discrimination and sensors.

Senator UDALL. Admiral, do you have anything to add to that?

Admiral SYRING. Sensors and discrimination, really on an equal priority with improving GBI reliability. They both inform the warfighter shot doctrine.

Senator UDALL. General?

General MANN. Yes, sir, I concur with the previous witnesses.

Senator UDALL. Thank you for that.

My time is up. It's my privilege to recognize Senator Sessions, the ranking member.

Senator SESSIONS. Thank you.

You know, testing—Dr. Gilmore, testing has proved that we can utilize a kill vehicle to kill on a hit-to-kill basis, through the other tests of other systems; is that correct?

Mr. GILMORE. That's correct.

Senator SESSIONS. I mean, the concept is proven, and we're doing it in others. But with our GMD system is the one that's the most lacking and problematic at this time?

Mr. GILMORE. We have the least information—

Senator SESSIONS. The least testing.

Mr. GILMORE.—about the performance across the full possible battle spaces, to use the colloquialism, for GMD in comparison with the other elements of the BMDS.

Senator SESSIONS. So that the THAAD, the Theater High Altitude Area Defense, is 11 for 11 in its tests as I understand it. Aegis is 18 for 21, Patriot 21 for 25. We were successful with the satellite engagement launch. But we're 3 for 6 on ground-based midcourse.

Mr. GILMORE. Yes, that's correct. And in fear of adding too much, I would also point out that, yes, THAAD has a very good record, although we've only just in the past couple of years started testing against medium-range ballistic missiles. A lot of the testing had been against short-range ballistic missiles, and now THAAD is deployed on Guam because Guam otherwise wouldn't have a defense against an intermediate-range ballistic missile. And coming up shortly, Vice Admiral Syring, at the request of the combatant com-

mands, is going to do a test of THAAD against an intermediate-range ballistic missile.

So there's still—I certainly agree with all of the figures that you just cited. They're absolutely correct. I would just point out that there's still more to learn about the performance of these systems, and it's not just from the standpoint of what an independent operational tester might want to know. It's actually, even more importantly, from the standpoint of what the combatant commanders want to know about how these systems will be used, how they want to use them, and how they will perform.

Senator SESSIONS. Good. I just think it's important that the Americans and our adversaries know that we have very effective missile systems that will work, but we've got some testing to do.

Admiral Syring, my impression is that you are firmly convinced that testing must be more vigorous than we've had in the past and that you intend to see that that happens. Would you share your personal view with us about what it takes to ensure we have a viable missile defense system?

Admiral SYRING. Yes, sir. As you know, we've added and are requesting one GMD missile test every year now. I would say that we hadn't done enough before, for whatever reason. We haven't done the work necessary for us to give—to improve the models, to give Dr. Gilmore confidence in an assessment of the system. All of that has been lacking.

But it's all anchored in flight testing and the need to test more often and for us not to be afraid to test. To not test a CE-1 interceptor for almost 5 years is not where we want to be long term. We want to continue to test and we'll continue to request annual testing of the GMD system.

Senator SESSIONS. I couldn't agree more.

Ms. Bunn, how is it that—we thought we were putting in money for testing for the last several years. It's really sort of surprising to me that we haven't had a GMD test in 4 years. Can you explain that?

Ms. BUNN. Sir, I've been in this office for a year, so I don't have quite the history for that. Could I defer to Dr. Gilmore?

Senator SESSIONS. Well, let's ask Dr. Gilmore. He's been there.

Ms. BUNN. He may have a more—

Mr. GILMORE. We've had tests, Senator. The last successful test—

Senator SESSIONS. Is he responsible to you?

Ms. BUNN. No, sir. No, sir. We all work together quite closely, but no.

Senator SESSIONS. No, you have different roles, okay.

Mr. GILMORE. I'm the independent tester.

The last successful intercept that we had—

Senator SESSIONS. Explain that? You're part of the Defense Department—

Mr. GILMORE. Sure.

Senator SESSIONS. But your role is set up to be an independent tester of the systems.

Mr. GILMORE. Correct.

Senator SESSIONS. To help Congress and others know that we're getting accurate testing, realistic testing, on the kind of situations we might face.

Mr. GILMORE. I'm charged by law with assuring the testing is adequate, meaning it is set up to give us the information we need about how the systems will perform in realistic combat conditions. I think that's an exact quote from the law. Then it's my responsibility to report factually, comprehensively, and objectively on the test results. I'm supposed to not be an advocate for the system. I am not. So I'm supposed to have no stake in the outcome one way or another and just serve up the facts the way they are, which is what I have tried to do.

Senator SESSIONS. Well, how is it we didn't do much—we haven't done any sufficient testing on GMD in the last several years?

Mr. GILMORE. We have actually—the last successful intercept was in December 2008. Since that time we've actually done a bit more. We've attempted a bit more than one test per year. Unfortunately, with the exception of the captive carry test that was conducted last year of a partial solution to the problem that was manifested in the CE-2 kill vehicle failure in FTG-06A—that was a success, but it was a non-intercept test—all the other tests have failed.

So we have been attempting to test, and in fact Admiral Syring had set up tests that were exceeding somewhat the pace of one per year. But unfortunately, because of problems with the kill vehicle and its design, those tests have failed. The very first failure, in FTG-06, had to do with a quality control issue. A cable wasn't securely fashioned and came loose in flight.

Then there was the problem that was discovered in FTG-06A with the IMU saturating because of vibrations in the structure of the kill vehicle, and that was unanticipated. Then there was the most recent failure—

Senator SESSIONS. Which is the reason you need to test, right?

Mr. GILMORE. Absolutely.

Senator SESSIONS. It's unanticipated.

Mr. GILMORE. Essentially, all of these failures, but you can put the quality control issue with the first failure in a separate bin if you would like. The other failures that have had to do with the IMU, for example, it saturating, and the failure with the CE-1 to separate, those are failure modes that really can't be predicted by modeling and simulation.

The modeling and simulation, although it's essential, basically assumes that the kill vehicles will function mechanically, for lack of a better way to put it, the way that they're supposed to. However, it's turned out there have been some surprises there because of the way those kill vehicles were designed.

Senator SESSIONS. Admiral Syring, my time is basically up, but you intend to continue to deploy the next 14 interceptors. You will place on those what kind of kill vehicle? And then you have a plan to develop an entirely new kill vehicle that would replace those in the future—I mean, those that have already been placed on the system?

Admiral SYRING. Yes, sir. The plan to get to 44 by 2017 includes reliability improvements to the CE-2 interceptor. There's been—

Senator SESSIONS. That's the one now?

Admiral SYRING. Yes, sir, that's the current interceptor that we will fly this summer. There's small reliability—not small, but reliability improvements on top of that, that will be tested in fiscal year 2015 and 2016. One example would be the alternate divert thrusters, which will address the systemic problem of vibration that we addressed with isolating the IMU to get at the heart of the problem, to address not only the IMU issue but another issue we had with the divert system.

So again, before those are fielded we'll go through intercept testing and prove to me and to Dr. Gilmore that we're ready to go.

Senator SESSIONS. And then finally, you will be bringing on a system that I guess uses some of the proven technology of the SM-3 and Patriot and THAAD for the future?

Admiral SYRING. Yes, sir. The components of those systems, which you articulated very well in terms of their success, would be candidates for the EKV design. And we've got three very interesting, viable, technically capable concepts from three companies that we'll be evaluating over the next year as we continue to work on requirements in the kill vehicle arena as well.

We've got to get the kill vehicle requirements right. We've got to get the homeland defense requirements allocated properly across all parts of the kill chain, of which the kill vehicle is one.

Senator SESSIONS. Thank you.

Senator UDALL. Senator Donnelly.

Senator DONNELLY. Thank you, Mr. Chairman.

Thank you to all of you.

This would be for whoever wants to answer the question. We've seen extraordinary circumstances in the Ukraine, along the border there, and actions taken by Russia and their leader. One of the things that had been worked on was a missile defense system very nearby. So I am wondering as to—we obviously have Navy ships in the area. But I am wondering if there has been any further discussion since these activities started where Russia invaded Crimea, massed troops on the Ukrainian border? Has there been any additional discussions with Poland, the Czech Republic, Romania, and other nations about the missile defense systems we have there?

Ms. BUNN. Senator Donnelly, let me say a couple of things here. As you know, the NATO missile defense, the EPAA, was designed against threats from the Middle East, not Russia.

Senator DONNELLY. I understand that.

Ms. BUNN. In general—

Senator DONNELLY. However, it was of significant concern to Mr. Putin as well.

Ms. BUNN. Yes, sir. Yes, sir, it was.

In general, I would say that Russia's intervention in Ukraine in violation of international law has put into flux a lot of our policies with regard to Russia. As Secretary General of NATO Rasmussen said yesterday, we are—NATO is considering a lot of options for dealing with Russia now, relooking at its policies. General Breedlove calls it a paradigm shift.

So let me just say that the government's looking at a lot of options, the USG, NATO, yes, economic and diplomatic, but also what military options for strengthening collective defense. I don't want

to get out in front of, in open session, out in front of our NATO allies.

Senator DONNELLY. Have you been speaking with our allies in Poland or in the Czech Republic or in Romania or our NATO allies?

Ms. BUNN. We've had a lot of discussions with them on a number of issues. I don't want to—as I say, I don't want to get out in front of our allies—

Senator DONNELLY. Well, do you think it's—

Ms. BUNN.—on a particular option.

Senator DONNELLY. Do you think at some point it would be a good indication to Mr. Putin to tell him we are working on these things, we are moving forward with these things, we are strengthening these things?

Ms. BUNN. I think indeed that's one of the reasons Secretary General Rasmussen came out, after the NATO ministerial of all the foreign ministers yesterday, and said we are looking at lots of ways to enhance our collective defense.

Senator DONNELLY. Okay. I guess maybe it's a game of semantics, but are we at some point planning to tell him that we're not just looking at them, but we're moving forward with some of them?

Ms. BUNN. Indeed, there have been things. We've moved forward with, obviously, some reinforcements of aviation detachments, Baltic air policing. So there are some steps that have already been taken. And yes, there will come a point where—

Senator DONNELLY. I understand you may have to talk around this a little bit as well, but how long would it take to finish the missile defense shield system in the region?

Ms. BUNN. They are—the plan is 2015 and 2018 for the next two phases. If you're asking what's technically feasible—

Senator DONNELLY. Have we talked to them about moving up those time lines? Mr. Putin apparently has no interest in time lines. So you know, he's not going to wait for 2018. His interests are not the same as ours.

Are we taking a look at our time lines and other things in regards to that? And are those time lines that are flexible, that can be moved up if necessary?

Ms. BUNN. No discussions at this point with them—

Senator DONNELLY. By “with them” who do you mean?

Ms. BUNN. You asked about—

Senator DONNELLY. Our allies.

Ms. BUNN.—the Nations—

Senator DONNELLY. Yes.

Ms. BUNN.—specific nations. But I would—I guess I would defer on the technical, what's possible, to Admiral Syring.

Admiral SYRING. Senator, if I can, the Poland capability—

Senator DONNELLY. Is your mike on?

Admiral SYRING. Yes, sir.

Senator DONNELLY. Okay.

Admiral SYRING. The Poland capability in 2018 is on track. The program of record is doing well. It is hinged on two things. It's hinged on the SM-3 Block 2A development schedule, which is progressing well with our Japanese partners, but again paced by development progress, schedule, and funding. And then the actual site proper for the MILCON and the equipment. We've proven very

successful in Romania. We've built the site now in Moorestown and at PMRF out in Hawaii. We'll build it again in Romania here before next year.

All of that funding is mostly in the fiscal year 2016 timeframe. So to go faster it would require money in 2015 in terms of the technical feasibility of accelerating, which I don't have.

Senator DONNELLY. So it is not—it may be more a question of money than the ability to technically move up time lines if we need it?

Admiral SYRING. It's money and it's the SM-3 2A development schedule.

Senator DONNELLY. Okay. When we look at our Navy-based systems—as we talked about, much of the ground-based is in concerns about Iran, but obviously caused concern by the Russians as well. With the Navy-based systems, they can be, based on where the ships are and the angles and all those things, they can cover other areas besides Iran. They can cover Russia if necessary, couldn't they?

Admiral SYRING. In this forum I'll say they can cover a wide range of geographic areas.

Senator DONNELLY. Okay. When we look at Iran—and again, whoever wants to answer it—what is your best judgment on how far they are right now to having a nuclear weapon completed? And obviously, you know, they're in discussions now, but if they were to decide, okay, the discussions didn't work out, how long would it take for them to reach completion?

Ms. BUNN. Senator, for the record I'll go back and look at the DNI's worldwide threat assessment. As you know, we're trying to get them not to go there.

Senator DONNELLY. I'm hopeful of that, too.

Ms. BUNN. Yes, I understand. But let me get that for you for the record, because it's an intelligence assessment.

[The information referred to follows:]

[SUBCOMMITTEE INSERT]

Senator DONNELLY. And if they complete that, do they have the delivery systems in place already to deliver it?

Ms. BUNN. They have short- and medium-range missiles already. That's the reason for the EPAA in Europe. They have those short- and medium-range missiles already. They're working on a longer-range missile.

Senator DONNELLY. Does that long-range—would that longer-range missile reach our country?

Ms. BUNN. If they are successful in developing and testing that. They are trying for it, and so yes, they're trying for one that would reach us.

Senator DONNELLY. Unfortunately, my time is up. Thank you, Mr. Chairman.

Senator UDALL. Thank you, Senator Donnelly.

Senator King.

Senator KING. Thank you, Mr. Chairman.

Would you give me an update—I guess, Ms. Bunn, maybe this is you; or if not, whoever the appropriate person is—on the status of the environmental impact statements on the four locations for the ground-based interceptor site, the east coast site?

Ms. BUNN. I will just—Admiral Syring is actually the best for that, because MDA has named the four sites and they've begun the environmental impact statement on the—let's see, Michigan, Maine, Ohio, and New York. And I will ask Admiral Syring, with your permission.

Senator KING. Michigan's on the east coast? I hadn't noticed that.

Ms. BUNN. In the eastern part of the United States, even though Michiganders might not like to—

Senator KING. The guy from Indiana—

Ms. BUNN. They don't want to call themselves—

Senator DONNELLY. Chairman Levin will be surprised. [Laughter.]

Senator KING. Oh, that Chairman Levin.

Admiral?

Admiral SYRING. Yes, sir. We completed the down-select in January of this year to the four sites, and it's Portsmouth SERE up in Maine, Fort Drum, New York, Camp Ravenna in Ohio, and—I'll get it wrong—Fort Custer in Michigan.

The EIS process has started. We've said it's going to take us—it will take us 24 months to complete that. That's actually faster than the historical DOD EIS process, but we're confident that we've got a great team in place that does this in terms of deployment for other systems that we deploy around the world.

We'll develop a contingency plan, and you know what that is, Senator, in terms of how would you do—how would you actually build the site, how would you design the site, how would you field what we call it, is a CONUS interceptor site, since it is both mid-west and the east, based on the threat trajectories of the areas that we're considering. That'll be a cost, schedule, acquisition-focused contingency plan.

We've actually already developed a very detailed requirements document, overarching requirements document, that we've been working on for the last 6 months. That'll inform the contingency plan and the detailed plan for all four sites to not wait if the decision is so made, to be able to get on with it if the requirement comes from the combatant commander and the Department makes that decision.

Senator KING. So you'll have essentially a mockup of a plan, so you don't start from scratch after the EIS?

Admiral SYRING. Yes, sir. There's a plan—there's planning work that can go on at a level below the detailed planning level, that will be done on each of the sites, so we don't have to wait another 2 years for that work to be done. We can do a lot of this work in parallel prior to selecting a site, that will be then tailored to the individual site that we select.

Senator KING. Thank you.

I was in Israel a few months ago and visited an Iron Dome site. Talk about real-time R&D. Are we—I understand that we're doing a lot of funding of that system, but we're also getting a lot of the intellectual property back. Are we incorporating—and I know that's a different, that's not intercontinental. But it's certainly missile defense and it seems to be working. They claim an 85 percent efficiency.

Are we learning anything from that, from that system?

Admiral SYRING. We are. Let me address programmatically what we're doing and then I will pass it to General Mann if that's okay in terms of what the Army may be looking at. We were very successful with the Israelis to sign an Iron Dome coproduction agreement this year, which will set us up for 30 percent of production of that interceptor in the United States this year, 55 percent next year, which is a good thing for us and it's a good thing for Israel that that's in place, because we'll have a second source for the provider of that interceptor.

We've also requested in this year's budget \$175 million for Iron Dome, both interceptor and battery procurement, that will be informed in terms of how many interceptors, how many batteries we actually buy, through the coproduction work that's going on.

There's a very detailed contract negotiation that's going on between Rafael and Raytheon today. We don't have any privity of contract on that, so our insight is somewhat limited. But I'm confident that as we allow that process to work forward that the right answer will come out.

Senator KING. But you're satisfied with the privity of intellectual property, if you will, that we're learning the lessons along with them?

Admiral SYRING. Yes, sir. Yes, sir, the design and the technical data packages come, are coming and will come with it.

Senator KING. Now, having been through this hearing last year and then a briefing afterwards and another hearing today, it's clear that this is a tough problem. This is a tough scientific problem, physics problem. Are we thinking about alternatives? Is it possible, instead of sending a missile up, high-powered lasers or some other alternatives to this, what is appearing to be a very difficult piece of construction and engineering?

General MANN. I'll take this. I don't know if Admiral Syring wants to jump on. But there's a lot of different efforts that are under way. When you're talking about cruise missiles or rockets, artillery, mortars, things like that, we're looking at directed energy very, very aggressively. In fact, we've already had a successful test back in December of last year in the 10 kilowatt range, where we were able to knock out mortars and it was also effective against UAVs.

What we're doing right now is we're working with the Navy. We've transported that demonstrator to Florida and we're doing testing with the Navy under more environmentally challenging scenarios. We're looking at by 2017 we could probably get up to the 50 kilowatt. Again, we're looking at threats that are low-level threats, whether it's UAVs, possibly cruise missiles.

I know that MDA is also looking at directed energy, really looking at a higher level platform, maybe post-launch or post-boost level type engagements. So we're working collaboratively with MDA to really leverage, like you were talking about, other technologies, in this case directed energy.

Senator KING. But in dealing with an intercontinental missile, the only option is another missile at this point?

General MANN. At this point.

Senator KING. One of our advantages is naval power. I'm worried about anti-ship missiles. How do we—in terms of missile defense, how do we—is that up to the ship or how do we think about missile defense of our naval vessels?

Admiral SYRING. I'll talk about the ballistic missile defense and then General Mann can talk about the cruise missile defense of the ship. We've got a very robust sea-based terminal defense program that's requested in this year's budget, that helps us to defend the carrier sea base against that exact threat. I'd like to share the details of that in a classified forum, but it's based upon the SM-6 missile that the Navy has successfully tested and developed.

Senator KING. I'd like to, if we could follow up, have that briefing.

Admiral SYRING. Yes, sir, we'd be happy to.

Senator KING. Cruise missile defense?

General MANN. Again, cruise missile defense, right now I think there's nine countries that are currently aggressively involved in cruise missile technologies, and I think there's another 20 that's looking into this. Right now—I talked about using directed energy as a technology that we can leverage to get after that threat.

We're also right here locally—I think you all are aware of JLENS, the Joint Attack Netted Sensor, that aerostat that we're going to be placing at Aberdeen Proving Ground. It's going to be a test from fiscal year 2014 through 2017. We're working with NORTHCOM on this, and that basically provides greater surveillance and fire control radar capabilities, so when netted with interceptors like the NASAMS that we have here locally that's protecting the National Capital Region—we're going to do a test that will provide us with greater range, greater sensor coverage of this area. We're looking forward to learning from that to help us get after the cruise missile threat, which, as we know, is growing.

Senator KING. It's a serious threat.

General MANN. Yes, sir.

Senator KING. Admiral, I can't resist. The studies you're doing for the east coast site remind me of when God came to Moses and said: I have good news and bad news. The good news is I'm going to empower you to part the waters of the Red Sea and let my people escape to freedom. Moses said: What's the bad news? God said: You have to prepare the environmental impact statement. [Laughter.]

Thank you, Mr. Chairman.

Senator UDALL. Thank you, Governor King.

Let me turn back to the GMD system and the question whether it protects all of the United States. I'll direct this to General Mann, Admiral Syring, and Ms. Bunn. In your prepared testimony you each state that the current ground-based midcourse protects the United States against a limited ballistic missile attack from North Korea and from potential Iranian ICBMs. This is an important point. I want to make sure the record is clear on this since there seems to be some confusion on this subject on the Hill.

So, Ms. Bunn, is it correct that our current GMB system covers the entire United States, including the east coast, from missile threats from North Korea and from Iran?

Ms. BUNN. Yes, sir, that's certainly my understanding.

Senator UDALL. Yes, Admiral Syring?

Admiral SYRING. Yes, sir.

Senator UDALL. And General Mann?

General MANN. Yes, sir.

Senator UDALL. On that note, General Mann, is that why your prepared testimony says, quote, "As the Secretary of Defense and various combatant commanders have previously testified, the warfighter remains confident in our ability to protect the Nation against a limited ballistic missile attack, even in the face of a changing fiscal environment"?

General MANN. Yes, sir. But it also goes to the point where we need to continue to improve our technology, whether it's sensor discrimination, EKV improvements, because we know that the threat is not just satisfied with the current capability.

Senator UDALL. It's not static.

General MANN. Yes, sir.

Senator UDALL. It's not always symmetrical, either.

Ms. Bunn, let me go back to this question. In addition to the EPAA, we are pursuing regional missile defense enhancements in the Middle East and Asia, including significant efforts at cooperation with our allies and partners in each region. From a policy perspective, can you describe what we are trying to accomplish with our allies and partners in each region, including our efforts in the Middle East, with Israel and with the Gulf Cooperation Council, and our efforts in Asia with Japan and South Korea?

Admiral Syring and General Mann, after the Secretary comments, if you have anything to add we'd appreciate it for the record.

Ms. BUNN. Well, Mr. Chairman, as General Mann pointed out, as we've all pointed out, the supply of short- and medium-range ballistic missiles is greater than the number of regional defense missile interceptors that we have and will have for the foreseeable future. So I think for protecting both our deployed forces as well as our allies and partners, it's important for others to also have their own missile defenses. And it's also important to net them together to make them interoperable in a way that the sensors that we each have can share information and make the use of each of our missile defense capabilities more effective, more efficient.

So as you know, in the Middle East we have a longstanding cooperative relationship with Israel. It goes back almost 28 years now. I was doing the math. I was the action officer for the first agreement with Israel. And that—in 1986. And that is a longstanding cooperative relationship.

We are making efforts with the Gulf Cooperation Council, as I said. A number of those countries are acquiring and interested in acquiring their own missile defense capabilities and, as the Secretary of Defense said in Manama recently, that working together, trying to get the GCC to also see that sensor interoperability, sensor sharing, makes every country's missile defenses more capable.

In the Far East, certainly with Japan, Japan is also—that was the other missile defense agreement in 1986. Japan we've had a longstanding cooperative program with, and in fact we are co-developing right now the SM-3 2A with the Japanese. They have their own deployed *Kongo*-class ships as well with missile defense capa-

bility. And South Korea is examining some integrated air and missile defense, moving forward on that as well.

Senator UDALL. Thanks for that update. Admiral?

Admiral SYRING. We're doing a lot around the world. Let me just highlight some of the main points, and I'll just add to what Ms. Bunn said. The NATO command and control system I think was a huge success in terms of that being operational at Ramstein and connected with our command and control system for the first time ever. That will enable us to add nodes to basically both networks in Europe.

Spain has been very forthcoming and we're very thankful for their ability to host the four destroyers in Rota as part of EPAA. Turkey, as you know, hosted the TPY2 site. The Netherlands and Germany have stepped up with Patriot in Europe, as you know, with Patriot batteries. Romania and Poland, their ability to host our Aegis Ashore sites and their willingness to accept our systems there I think goes without further mention.

Israel, again just a great partner, partnered on actually three development programs with them: Iron Dome, Arrow 2, Arrow 3, and David's Sling, four programs if you include Iron Dome.

Asia, Japan, just shift to the west, the Japanese in terms of the SM-3 2A development program, but they have got the Aegis destroyers that have BMD capability on them as well, that actually serve on station. And we're in active discussions with them on how to upgrade their capability as well.

In the Gulf, back east, great progress with the UAE in terms of the THAAD agreement that we signed with them. I'm working actively for more opportunities across the Gulf region in the next year and hopefully we'll come back and report progress there.

Then South Korea, I think we're in the formative study discussions, just answering some of the questions that they have as well.

Finally, there's a lot of countries that have been discussing and are asking questions about how their ship sensors can help and how they can contribute to BMD in terms of search and track capability on our network.

Senator UDALL. General, do you have any additional?

General MANN. Just very quickly, Senator. In addition to the material acquisition programs that we're talking about here, we do a lot of collaborative exercises with a lot of our allies out there, especially in the CENTCOM AOR. I'm also about to do a capstone exercise later this month that's going to involve 22 nations.

At those exercises, not only do we get into in some cases tactics, techniques, and procedures, but we also get into some of the policy issues related to sharing of data, which sometimes causes some sticking points on sharing data, whether it's sensor data or whatever it might be. So very robust engagements are ongoing right now with our allies.

Senator UDALL. The three of you took us on quite a tour. It's impressive what we're doing. I know we want to do more.

I know my time is about to run about. But Admiral Syring, a short, concise comment, if you could, on what would happen if sequestration came back fully in fiscal year 2016?

Admiral SYRING. It would put all of the efforts that we have requested to begin development back on the table.

Senator UDALL. Thank you.

Senator SESSIONS.

Senator SESSIONS. Well, let me just tell you, you're going to be looking at \$521 billion. Is that sequestration or not? It's the same you had last year. Does that mean you can't fund what you've been talking about? We're talking beyond each other, like ships in the night, it seems to me, about numbers.

Admiral SYRING. Sir, with—

Senator SESSIONS. There is no more cuts if we stay on the Budget Control Act numbers. So if we—I'm trying to figure out what we're saying here. That's what I was asking at the very beginning.

Admiral SYRING. If we take a cut, be it to the proposed fiscal year 2016 program—

Senator SESSIONS. The proposed program?

Admiral SYRING. Yes, sir, the requested program from the Department.

Senator SESSIONS. And the Department is requesting more than the Budget Control Act?

Admiral SYRING. We haven't put a 2016 budget together yet. We've put together a 2015 budget that assumes controls in 2016.

Senator SESSIONS. Well, you better not be counting on spending more money than the Budget Control Act, because we've already got extra money this year and next year. If we can get by spending at 521 this year and 521 next year, we go up \$13 billion a year thereafter, we've made it past the danger period, which was this year and next year, really were the most crisis years.

But we're going to have to keep talking about that, because there's just confusion out there. I do think sometimes our Defense Department is talking about the projections that assume more money than is in the BCA, assume we will have to have another vote to bust the budget and spend above that, and sometimes they're not. So it's confusing. We need to be apples to apples when we talk about these numbers.

Admiral Syring, so this redesigned kill vehicle that need for the GBIs, the first test of that is supposed to be in 2018. When can we expect and you would hope and expect to be able to retrofit our 44 GBIs with this new system?

Admiral SYRING. Sir, the budget request asks for two flight tests in fiscal year 2018 of the new kill vehicle, first a non-intercept test and then an intercept test. But I would just caution that as we develop the acquisition approach and strategy you have my commitment to make sure that we don't cut corners and we do it right.

Right now I think we can make a flight test in 2018, for a fielding of the first interceptor by 2020. But again, that's going to be informed by proper design progress and testing progress.

Senator SESSIONS. What can you tell us in a public forum about the intelligence estimates of Iran and North Korea with regard to a missile system that can reach the United States?

Admiral SYRING. The Iranians are—the intelligence estimate is they're able to flight test, the projection is, to flight test an ICBM by 2015.

Senator SESSIONS. And we don't doubt that they eventually have the capability to make that a successful missile if left to their own devices?

Admiral SYRING. I'd like to take that into a classified forum, sir.

Senator SESSIONS. They've made progress with missiles. They're pretty sophisticated in them, as are the North Koreans. We would think, as much as their people suffer, it's not possible, but it apparently is possible. They already have proven fairly sophisticated technology.

Admiral SYRING. They are making capability improvements and capacity improvements every day.

Senator SESSIONS. Now, the plan, General Mann, to protect Europe and what we are trying to do there—maybe this is your question—that plan is to deal with Iran, not Russia; is that correct?

General MANN. That is correct.

Senator SESSIONS. We're not pretending that we have the capability to protect Europe or the United States from a massive Russian launch.

General MANN. Senator, you're correct. That is for threats emanating out of the Middle East, Iran.

Senator SESSIONS. Well, it's something I hope we can be successful on. I know we can if we work on that.

So thank you. I yield back my time.

Senator UDALL. Senator King.

Senator KING. One question. Admiral Syring, you said several times in your last answer, you talked about networks and connecting networks in Europe. It raises the question of how—are you thinking as you develop this project about cyber vulnerability? Because the good news is we have a very good, interconnected, wired society. The bad news is it makes us very vulnerable to cyber attack.

Are you—is part of your design strategy cyber attack resistance as far as the command and control and the networks that connect the sites and those kinds of things?

General MANN. Yes, sir. A very robust cyber program within MDA.

Senator KING. Good. Thank you. I appreciate that.

Thank you, Mr. Chairman.

Senator UDALL. Thank you, Senator King.

We've got a few more minutes. I've got a few more questions, so I'll pick up where we left off on the budget. General Mann, the budget request, if it was approved by Congress, does it meet the needs of the warfighter for improving our missile defense capabilities?

General MANN. Yes, Senator.

Senator UDALL. Admiral Syring, does the budget request put us on a path to improving our ability to defend against both homeland and regional missile threats? And if so, what are some of the initiatives that will provide such improvements?

Admiral SYRING. It does put us on that path, sir. The one marker I'll put on the table is that discrimination capability to the east is equally important, and long-term we're going to be looking to address that gap. Right now the strategy would be to move SBX to the east as the long-range radar is built to the west.

The other gap I would say would be infrared, IR, sensing capability, which is heavily in the R&D phase right now, and we're working hard on that.

Senator UDALL. I know Senator Sessions and you had an exchange about the budget. We talked briefly about ensuring that we're all on the same page, apples to apples, oranges to oranges. There will be additional time to discuss that as we move forward, and we'd welcome clarifications, additional information, in the testimony you'd submit for the record. I think it is important to understand where we are.

Ms. Chaplain, you've been patient. You're the watchdog that we all appreciate being involved. The GAO has been a consistent advocate for the fly before you buy approach and has warned for years that deploying missile defense systems before they're fully developed and tested could end up taking more time and costing more money than using a more rigorous acquisition approach.

We've spent I think at least 3 years trying to diagnose and fix the problems with the kill vehicles for the GMD and have conducted or will conduct a number of very expensive and previously unplanned flight tests to demonstrate those fixes. Can you give us a rough order of magnitude of what it has or will cost us to try to fix these problems after the fact, including the additional flight tests? I imagine it may be over \$1 billion.

If we had used a more rigorous fly before you buy approach with GMD, do you believe we might have been able to avoid those additional costs? I ask the second question not to pile on, but just because everybody in this hearing wants to learn from mistakes, shortcomings, you name it.

Ms. CHAPLAIN. Our estimate for fixing the problems in the flight tests and recovering from it is at \$1.3 billion right now. So it is close to what you said, even more than that. We do believe those costs could have been avoided had a fly before you buy approach been followed. [Pause.]

Senator UDALL. Excuse me for not—thank you for that clarification. As the hearing comes to a close, I wanted to see if Senator Sessions had any other questions he might like to ask.

Let me ask one more and go back to Dr. Gilmore. You've approved several versions of the integrated master test plan. That lays out the schedule and the testing for—the objectives, I should say, for missile defense testing. There have been suggestions that we should substantially increase the pace of testing our missile defense systems, particularly our ground-based midcourse defense system, and that that would greatly help accelerate system development.

Could you comment on the factors that drive our testing pace and whether you think we should or could accelerate testing significantly above the currently planned test pace? Although there have been some changes and delays in the testing, can you explain whether we've been able to really put in place a plan that helps us understand how we move forward?

I know you've been speaking of this. You're clearly the historian and the expert on much of this.

Mr. GILMORE. The historical pace of testing has been about 1.2, not to be too precise—

Senator UDALL. I want you to be precise.

Mr. GILMORE.—ground-based missile defense tests per year over the last decade since 2000. Early on the flight test pace was a little higher than that. It was up around 1.3, 1.4.

Senator SESSIONS. Are those complete tests? Or are some of those partial tests of the system?

Mr. GILMORE. I'm counting the tests that were meant to conduct intercepts.

Senator SESSIONS. Actual intercepts?

Mr. GILMORE. Yes. I can give you the details. I think I'm correct on that.

And it's also true, because I've reviewed the historical record, that both General Kadish and General Obering had testified at various times on their plans for the program before this subcommittee and other committees that they hoped to be able to do three or four tests a year. And they were never able to achieve that.

Would it be good to be able to do three or four or more tests per year for the ground-based missile defense system? Yes, it would. Can I sit here and say that there is absolutely no way that can be achieved with additional money? No, I can't prove that. But I can point to the historical record, where at least two MDA directors tried to increase substantially the pace of testing beyond one per year and did not succeed.

I can only guess to some extent, while that's true, but I hope you'll regard it as an educated guess, and this is based on my interactions with Vice Admiral Syring and his staff and his predecessor. There is just a certain amount—these are very complex tests and there's a huge amount of data that are collected, that have to be analyzed after the test. And if you don't take the time to analyze those data, then you're not going to be able to learn and understand what the problems are and what the corrections should be and what you want to pursue in the next test and what you want to put into your development program to improve the performance of the system.

Moreover, it takes many months to plan these tests. This first operational test that we did, which didn't involve the ground-based missile defense system but did involve THAAD and Aegis, was a tremendous, tremendously complex thing to plan. Then also Vice Admiral Syring's team had to deal with a lot of unanticipated events along the way, including problems with targets that had to be corrected in real time, and that's why the test got pushed out and why we didn't get all the information we hoped, but we still got a lot.

So it's not just a matter of buying additional interceptors and buying additional targets. You would think it might be that simple: Well, you know, instead of buying one additional GBI a year and one additional target a year, we'll buy more, that will enable us to test more. Certainly that's necessary, but you also have to have a lot of engineering expertise in house. A lot of this work can't be done in parallel.

You'd have to have larger teams of experts if you wanted to plan two tests simultaneously or three and execute two or three tests simultaneously instead of three. Then you would run into the infra-

structure problems. You know, there's only one Reagan Test Site, there's only one PMRF. There's only so much activity you can jam into them.

So could additional funding help increase the pace of testing for GMD or these other systems somewhat? Yes. But I think there's a limit. I can't state precisely what it is. And I also know that it wouldn't happen overnight. It would take a number of years to build up the additional engineering teams, the additional hardware in the loop facilities that have to be used to prepare for the tests.

So I can only go back to the historical record on GMD and these other tests, and the historical record is what I said. It's about 1.2 intercepts a year, even though various directors have tried to do more and, unfortunately, didn't succeed.

Senator UDALL. Thank you. I'd make two short comments, then I'll turn to Senator Sessions before we adjourn the hearing.

I think the average American family has 1.8 children, is that not right? So maybe there's some parallel here.

Mr. GILMORE. I won't speculate on that.

Senator UDALL. General Clapper was asked—by the way, for the record I wanted this, the comments that he made about the Iranian capability. I think he said the Iranians are moving to develop an ICBM. He said adding a weapon to that ICBM is a whole other problem. He implied that there would be additional time to weaponize that missile. But that doesn't mean we can rest easy, of course, and that's the mission you all are on.

I just want to thank you for your work, for your commitment to our country and our country's defense. And let me recognize Senator Sessions.

[The information referred to follows:]

[SUBCOMMITTEE INSERT]

Senator SESSIONS. Well, thank you. I just wanted to take one moment before we adjourn to express my sympathy to the family of Dr. Schlesinger, who passed away March 27th. What a national treasure he's been. He's given of himself to the country so much and was with Dr. Perry, former Secretary Perry, who was chairman, and he was vice chairman, of the American Strategic Posture Report in 2009, which I offered legislation to call for. They really produced a report. It was a bipartisan report, a bipartisan commission, that gave us, I think, the right advice on the strategic posture of the United States. We will make a mistake if we get far away from that in my opinion.

He in 1974 was—I guess was given credit for what came to be known as the Schlesinger shift when he was with Nixon, to move away from mutually assured destruction as the policy of the United States. Then he was Secretary of Energy under President Carter and just continued to be a source of wisdom on matters of technical and nuclear issues.

So I just wanted to share—this subcommittee has benefited from hours of his time that he's given when he could have been doing other things, and he was very valuable in helping us maintain a bipartisan strategic posture.

Senator UDALL. Thank you for that, Senator Sessions. I'd like to associate myself and the committee with what you just shared with us. We'd do well to emulate Dr. Schlesinger's role.

Thank you all. We'll keep the record open through the end of the week. As you know, we may want to direct some additional questions to you. You may want to amplify or add to your statements. Thanks again for taking the time to be here.

The committee is adjourned.

[Whereupon, at 4:03 p.m., the subcommittee adjourned.]