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COMMITTEE ON ARMED SERVICES
U.S. SENATE

STATEMENT

BY

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BEFORE THE

SENATE ARMED SERVICES COMMITTEE

STRATEGIC FORCES SUBCOMMITTEE

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SASC – MARCH 25, 2015

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Chairman Sessions, Ranking Member Donnelly, and distinguished Members of the Committee, thank you for the opportunity to discuss missile defense testing and my assessment of the Ballistic Missile Defense System (BMDS) and the elements that comprise it.

Testing conducted during the past five years of the Regional/Theater missile defense elements has demonstrated their effectiveness under an expanding set of realistic operational conditions. Testing conducted during that period of the Ground-Based Midcourse Defense (GMD) element has revealed a number of important engineering shortfalls that needed correction, but the intercept failures caused by these problems precluded increased demonstration of GMD's effectiveness under a broader set of realistic operational conditions.

GMD Assessment

The Missile Defense Agency (MDA) has demonstrated GMD's capability to defend the United States against small numbers of simple ballistic missile threats launched from North Korea and Iran. Several Exo-atmospheric Kill Vehicle fixes were demonstrated during last year's developmental flight test (FTG-06b), which successfully intercepted the target. However, the reliability and availability of the operational Ground-based Interceptors are less than desired and need to be substantially improved; MDA is taking steps that, over time, should yield improvement.

The next flight test of the GMD system will take place later this year. Ground-based Midcourse Controlled Test Vehicle-02+ (GM CTV-02+) is a non-intercept test of a Capability Enhancement-II (CE-II) kill vehicle that will demonstrate the performance of alternate divert thrusters in a flight environment and the end-to-end discrimination of a complex target scene including countermeasures through the GMD fire control loop. Data collected from this test will be used to evaluate discrimination techniques which can help distinguish a real warhead from a decoy. A robust ability to discriminate is critical for an effective homeland defense and the planning and analysis being conducted for this test have already revealed issues regarding GMD's discrimination capabilities. The MDA is using this information to determine the content of the Agency's future research and development efforts. In the fourth quarter of fiscal year 2016, the MDA plans to conduct Flight Test GMD-15 (FTG-15), which will be the first intercept flight test for the CE-II Block 1 Ground-Based Interceptor and the first intercept attempt of an intercontinental ballistic missile-range target. This is also a critical flight test.

The CE-I interceptor is the oldest in the GMD inventory, and its last flight test in FY13 was a failure. Numerous CE-I interceptors remain deployed as part of the GMD system. Consistent with the high priority of the Homeland Defense mission, I recommend the MDA retest as soon as feasible the CE-I interceptor incorporating changes in its hardware and software made to correct the problems that caused the flight test failure to demonstrate the problems have actually been fixed.

As documented in MDA's Integrated Master Test Plan (IMTP), GMD flight testing is proceeding at a pace of one test per year. For these expensive flight tests to add value to the GMD program, enough time must be given to conduct analyses of the previous flight test data, to make system improvements based on the previous flight test results, and to plan for the next test. Substantial overlaps between analysis of data from a just-conducted test and planning for the next test would be counter-productive. The pace at which all these activities can be conducted depends on the quality, experience, and size of MDA's engineering staff and the capacity of the Agency's ground-test and analysis capabilities, not only on the number of interceptors available for flight testing or the number of targets available (target availability and readiness continue to be problematic). So, while it would be possible to increase the pace of GMD testing somewhat relative to the current (and historical) pace of about one test per year, doing so would require expanding MDA's staff of competent engineers and test infrastructure, both of which would require substantial resources and time to execute.

Aegis Ballistic Missile Defense (BMD) Assessment

The Aegis Ballistic Missile Defense (BMD) 4.0 system with Standard Missile-3 (SM-3) Block IB guided missiles completed Initial Operational Test and

Evaluation in early FY14. Testing has demonstrated that the Aegis BMD 4.0 system is capable of defeating short-range and simple-separating medium-range ballistic missiles and shorter-range intermediate-range threats in the midcourse phase of flight for many realistic operational scenarios. Analysis of data obtained during flight testing and the maintenance demonstration showed that the Aegis BMD 4.0 system is also suitable.

However, SM-3 Third-Stage Rocket Motor failures encountered during flight testing have affected the reliability of the SM-3 missile. The MDA has determined that a re-design of the Third-Stage Rocket Motor nozzle is needed to increase the missile's reliability. The MDA generated new design concepts and began the initial ground testing of the redesigned parts in FY14. The new design will have to be flight tested (not just ground tested) multiple times before its reliability can be determined with confidence.

The MDA also demonstrated the capability of the Aegis Ashore test site at the Pacific Missile Range Facility to fire, establish uplink/downlink communication, provide guidance commands, and provide target information to an SM-3 Block IB guided missile. The Aegis Ashore Controlled Test Vehicle-01 test was the first SM-3 missile firing from Aegis Ashore. Flight Test Operational-02 (FTO-02), scheduled for FY15, is a BMDS system-level operational test, consisting of two events. Event 1 will provide critical data needed for my assessment of Aegis Ashore's capability to defend Europe as part of the President's European Phased Adaptive Approach (EPAA). An AN/TPY-2 radar in forward-based mode will provide the target track data that will enable Aegis Ashore to conduct a launch-on-remote engagement. Space-based sensors and command, control, battle management, and communications systems will also participate. Event 1 will be the first intercept test of Aegis Ashore and it will be conducted against an intermediate-range ballistic missile target. Event 2, which will also provide data critical to my assessment of the EPAA's ability to integrate the defense provided by Aegis Ashore with the defense capabilities of Aegis ships, will use a U.S. European Command scenario to test the Aegis BMD capability to engage a medium-range ballistic missile in the presence of post-intercept debris while simultaneously conducting anti-air warfare operations against a cruise missile surrogate. To create the debris scene for Aegis BMD, THAAD will engage a short-range ballistic missile with its advanced radar algorithms and new Lot 4 interceptor.

As a result of a successful critical design review conducted in 2013, the design of the new and larger SM-3 Block IIA guided missile is now complete and the program is proceeding to product development and testing. In October 2013, the MDA conducted a propulsion test vehicle test called PTV-1. It demonstrated that the SM-3 Block IIA missile can launch from the Aegis BMD vertical launch system.

In its FY15 appropriations bill, Congress reduced MDA's funding for testing and flight test targets. The MDA addressed these funding cuts by eliminating the FTM-24 Aegis BMD flight test. In my view, this flight test is critical to determining the Aegis BMD system performance against a key ballistic missile threat. I urge MDA to work with the Congress to restore FTM-24 as soon as possible. I would be happy to elaborate further on this issue in the appropriate forum.

Terminal High Altitude Area Defense (THAAD) Assessment

The Terminal High Altitude Area Defense (THAAD) system has demonstrated effectiveness against short- and medium-range targets. In 9 flight tests, beginning with FTT-06 and including one multi-simultaneous engagement, conducted between FY07 and FY13, THAAD intercepted all 10 target ballistic missiles including 8 short-range and 2 medium-range ballistic missiles. One flight test in FY09 demonstrated a salvo engagement and another flight test in FY12 demonstrated a multiple simultaneous engagement. Further flight testing is planned to demonstrate the performance of the radar's advanced algorithms against more complex short- and medium-range ballistic missile targets and the system's capabilities against intermediate-range ballistic missile threats (which could be employed against Guam), with the latter test now scheduled to occur during the fourth quarter of FY15.

Analyses of data from the Reliability Confidence Test and multiple flight tests suggest that THAAD system components are not exhibiting consistent or steadily increasing reliability growth between test events. The tools and diagnostic equipment available to Soldiers are insufficient to accurately emplace, maintain, and assess the operational status of THAAD equipment. THAAD has also demonstrated deficiencies during natural environment testing, which tests a system's ability to withstand expected temperature extremes, temperature shock, humidity, rain, ice, snow, sand, and dust. The deficiencies need to be addressed to ensure THAAD is capable of operating properly when and where it is needed.

A primary concern to me is the training being offered to THAAD Soldiers. The high demand for operational THAAD units overseas has reduced the time available for operator training, and I urge both MDA and the Army to work together to address this issue. For example, during recent tests, THAAD operators commented on the lack of opportunities to train with THAAD in an operationally realistic environment alongside other missile defense systems like Aegis BMD and Patriot. These systems are frequently expected to operate in conjunction with THAAD, and operators' ability to conduct proper coordination among all BMD systems is necessary for these missile defense systems to operate together effectively.

Patriot Assessment

Patriot is effective against many types of short-range tactical ballistic missiles, and has demonstrated capability against a medium-range missile target. Patriot successfully engaged tactical ballistic missiles in flight tests against more than 30 short-range ballistic missile targets since 1999 and in one flight test against a medium-range ballistic missile target in 2002. Sixteen flight tests since

2000 included multiple simultaneous Patriot engagements against two targets. In its most recent operational test conducted between May 2012 and January 2013, Patriot did not meet its operational requirements for reliability, maintainability, or availability.

The recent operational test highlighted the growing complexity of the Patriot system, which requires a higher level of operator expertise and more intensive training than that which the Army currently provides. As with THAAD, there is a high demand for operational Patriot units in the field. In response to this demand, the Army deactivated its dedicated Patriot test unit in FY13. Soldiers from the Patriot Test Battalion provided valuable user insight during development testing and provided operationally representative Soldiers for operational testing. The Test Battalion helped ensure proper training materials were developed and tested. The deactivation of the Test Battalion will lengthen the duration of operational testing and delay the fielding decisions for the Patriot Missile Segment Enhancement and Post-Deployment Build-8 software. The loss of the Test Battalion has reduced the Army's ability to ensure Patriot unit Soldiers are trained to operate the system safely and effectively in combat, when U.S. and coalition aircraft and other BMD systems will be sharing Patriot's battlespace. Also, Patriot's ability to operate (or not) in the presence of the proliferating and increasingly effective capabilities for electronic attack our potential adversaries are developing and fielding needs to be fully characterized through robust testing, and key shortfalls in performance revealed by that testing corrected without delay. I commend the Army for its recent efforts to begin that characterization testing.

Command, Control, Battle Management, and Communications (C2BMC) Assessment

Effective battle management is crucial for the success of the integrated BMDS, and Command, Control, Battle Management, and Communications (C2BMC) is the primary element intended to enable battle management at the system level. Battle management capability is needed to ensure effective engagement of threat missiles in a complex battlespace with multiple BMD systems, and to prevent interceptors being wasted by firing at enemy missiles which have already been engaged by other systems.

Spiral 6.4, operational since 2011, is the currently deployed version of C2BMC. Spiral 6.4 provides situational awareness for the BMDS, forwards track data between BMDS elements, and provides battle management and engagement monitoring. However, it does not have the capability to provide automated engagement direction among BMD elements.

With the addition of the Global Engagement Manager Suite, Spiral 6.4 added the capability to manage multiple AN/TPY-2 forward-based radars. Dual radar management by the Global Engagement Manager was demonstrated during distributed ground testing in the United States European Command in support of European Phased Adaptive Approach Phase 1. Spiral 6.4 has participated in flight tests FTM-15, FTG-06a, FTI-01, and FTO-01, in which it collectively demonstrated control of a single AN/TPY-2 radar and track forwarding capabilities. Spiral 6.4 also participated in FTG-07 and FTG-06b by forwarding Aegis Weapon System tracks to GMD.

Test Adequacy

The MDA conducted eight flight tests and five ground tests during FY/CY14. Data from a ninth flight test conducted at the end of FY13, the first system-level operational test, Flight Test, Operational-01 (FTO-01) were also analyzed during the year. The MDA conducted these tests in accordance with the DOT&E-approved IMTP. In FY15, the MDA plans to conduct 12 flight tests, and in FY16, 7 flight tests.

Flight testing of the Regional/Theater BMDS autonomous combat systems is sufficient to support a quantitative assessment of the systems' performance against short- and medium-range ballistic missile threats. However, flight testing is not adequate to provide quantitative assessments of effectiveness against intermediate-range ballistic missile threats. The classified sections of my annual report on BMD provide those quantitative estimates of effectiveness for the cases in which they are feasible.

Homeland Defense flight test data and modeling and simulation (discussed subsequently) are not yet sufficient, and likely will not be until the beginning of the next decade, to enable a rigorous quantitative assessment of GMD effectiveness.

As discussed above, MDA addressed a Congressionally-directed cut to the MDA test and targets programs in FY15 by deleting FTM-24, a critical test of the SM-3 Block IB guided missile. This test should be restored and conducted as soon as feasible.

Cybersecurity

The United States faces a growing cyber threat, and our Nation's ballistic missile defenses need to be secure against that threat. Over the last year the MDA conducted four experiments on a cyber testing range using independent cyber red teams provided by my office. The purpose of these experiments was to better understand the cyber robustness of BMDS capabilities to insider threats, and to address any cybersecurity vulnerabilities that were found. The MDA plans to continue to use cyber ranges to improve its cybersecurity posture, and plans to conduct its next cyber range experiment in May 2015.

THAAD and Patriot Training

As I mentioned previously, there are deficiencies in the training provided to THAAD and Patriot Soldiers. THAAD is a complex automated system that is designed to operate effectively with other BMD systems in the region where it is deployed. Training issues continue to surface during test events and as Soldiers rotate into and out of THAAD units. Some of these issues have been mitigated through the installation of a THAAD-specific training facility at the Ft. Sill

Schoolhouse; by increasing the amount of training; and by developing training aids, devices, simulators, and simulation. However, the need to make additional improvements remains.

Current Army training for THAAD emphasizes training for individual Soldiers. Current THAAD training does not provide the Soldier with a crew, team, or Joint-based operationally realistic fighting experience as part of an integrated BMDS. Hence, currently THAAD soldiers are not "trained as they will fight."

Current institutional training devices do not implement the latest system software version and do not provide the Soldier with timely feedback. Training devices that do not accurately emulate the system and prepare the Soldier to operate and maintain the system to yield the best system performance can result in missed intercepts.

THAAD-specific training gaps and deficiencies continue to be discovered. Soldiers are assigned to a THAAD unit without THAAD-specific training support. This impedes the Soldier's ability to effectively and efficiently carry out the THAAD mission, resulting in a greater reliance on contract support.

An integrated, team-based, and Joint interoperability training environment is essential to ensuring THAAD effectiveness during a conflict. The Army, in coordination with the MDA, should modify its institutional training policy and move from an individual Military Occupational Specialties (MOS)-centric training approach to a systemic, integrated, team-based approach that includes Joint interoperability training.

To properly implement such an approach, the Army should ensure the availability of adequate funding, training aids, software and radar simulator capabilities, and evaluate whether changes to career progression, crew rotation, and professional development programs are required.

The Army should implement an objective and quantifiable Army training standard that reflects the level of expertise required for team and Joint operations, develop and fund a training plan with a sufficient number of training weeks to develop Soldier expertise, and consider the benefit of a THAAD-specific MOS.

Patriot training is currently provided to Patriot unit Soldiers and as a foundation for THAAD unit Soldiers. However, the level of Patriot training is insufficient, given the complexity of the Patriot system and the fact that in combat a Patriot unit may be called upon to operate in a congested battlespace with friendly and enemy aircraft, high numbers of threat missiles, and numerous other U.S. and coalition BMD assets. Since my FY10 Annual Report to Congress, I have recommended that the Army improve Patriot training to equip Soldiers with the required level of expertise to ensure a Patriot unit can effectively operate in a realistic combat environment. The Army should consider reestablishing the Patriot Test Battalion to help address both Patriot and THAAD training deficiencies.

Modeling and Simulation

Realistic flight tests of BMD systems are expensive, and there is no practical way to conduct a flight test for all possible BMD scenarios. Hence, verified, validated and accredited modeling and simulation, grounded in flight test data, is required to ensure BMD systems will be effective in combat. My BMDS assessments are limited by the lack of properly accredited modeling and simulation. As the MDA executes its flight test program over the next several years and additional validation data are gathered, the MDA should ensure those data are used to improve the Agency's modeling and simulation capabilities. This effort will require dedicated resources and the support of MDA leadership.

My BMD assessments often contain subjective content due to the limited amount of flight test data and the limited progress toward verification, validation, and accreditation of the BMDS models and simulations. This is especially true for the GMD program. Many of the models and simulations used in BMD system ground testing are still not accredited for performance assessment, thereby limiting quantitative assessments based on their results. I recommend strongly that the MDA work with the Congress to assure robust funding enabling timely development and rigorous accreditation of the models and simulations critical to understanding and assuring the effectiveness of all elements of the BMDS, including, in particular, GMD.

IMTP Assessment

Admiral Syring leads a rigorous IMTP development process that has produced a well-justified set of tests within a budget-constrained environment. In 2014, the MDA continued to emphasize operational realism when planning for and conducting both ground and flight testing and my office continues to be involved substantively with each update of the IMTP. The process has enabled the IMTP to be revised in a timely manner consistent with policy changes, flight test results, and changes in budgetary resources. The IMTP continues to be a defensible and rigorous plan for obtaining the test information needed to assess BMDS performance more quantitatively over time.