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COMMITTEE ON ARMED SERVICES
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STATEMENT

BY

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BEFORE THE

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STRATEGIC FORCES SUBCOMMITTEE

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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.