

## Pentagon Report Highlights Hurdles for Missile Defenses

- [Arms Control Today](#)

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In its latest annual report, released March 2, the Defense Department's office of operational test and evaluation expressed strong concerns about the testing program for the U.S. national missile defense (NMD) system and highlighted several technical challenges confronting U.S. theater missile defenses. The review office also disputed the contention that a sea-based theater missile defense currently under development could be simply or quickly modified to defend against strategic ballistic missile attacks.

As part of its annual assessment of all Pentagon weapons testing programs, the office of operational test and evaluation reviewed the Pentagon's several ballistic missile defense programs, all of which are still proceeding under the Bush administration. The completed evaluations buttressed Lieutenant General Ronald Kadish's common cautionary refrain about the difficulties of building missile defenses, that "this is rocket science." Kadish is director of the Ballistic Missile Defense Organization (BMDO), which oversees U.S. missile defense programs.

Designed to protect all 50 U.S. states from strategic ballistic missile attacks by intercepting warheads as they cruise through space, NMD is the most high profile of the missile defense programs. The system will initially consist of 20 ground-based missile interceptors deployed in Alaska supported by advanced radars and eventually two new satellite constellations.

In its evaluation of the NMD program, the review office noted that the system represented only a "limited functional representation of the objective system" because only prototype and surrogate NMD elements were being tested. For example, none of the five flight tests to date, three of which have been intercept attempts, have employed the system's planned actual booster, which is still under development.

Earlier this year, BMDO projected the booster's first flight test, previously scheduled for early last year, could happen as soon as March, but a BMDO spokesperson said March 23 that the test will not take place before August because of additional design and material changes to the booster. The number of solo flight tests of the booster scheduled before it is used in an actual intercept attempt has also been trimmed from three to two.

The NMD test program, according to the Pentagon review office, is "not aggressive enough to match the

pace of acquisition to support deployment and the test content does not yet address important operational questions." Specifically, the office did not feel that the flight testing is realistic enough with regard to intercept altitudes and closing velocities. It also asserted that the decoys planned for deployment with the targets in future testing are too simple and noted that established nuclear powers already use countermeasures that are more sophisticated. BMDO responded that it was exploring options to make the testing more stressful.

Aside from flight tests, the review office pointed out that a key tool for running simulations of intercept scenarios that cannot be flight-tested was delivered late and not fully developed, thereby preventing it from being used in any "significant" way. In addition, the office faulted integrated

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ground tests of NMD system elements as being "unrealistic" because of simplification and the low number of objects used in testing scenarios.

The report recommended that, when assessing system performance, more weight should be given to the discrimination capabilities of the system's radars and the exoatmospheric kill vehicle (EKV), which is designed to seek out and collide with an incoming warhead in space. Ultimately, the EKV's ability to discriminate will be the "biggest challenge" for the NMD system to work properly, according to the evaluation. All other NMD tasks appear to be technologically possible, the report stated.

The review office declared that any successful intercept would be a "significant achievement" but cautioned the success would need to be viewed within the context of the testing program's limitations. Of the three NMD intercept tests, the first resulted in an intercept while the last two failed.

### **Theater Missile Defenses**

In addition to the proposed NMD system, the United States is also developing defenses to protect deployed U.S. forces from attack by slower and shorter-range theater ballistic missiles. Not counting laser-based and cooperative defenses, the Pentagon is working on four different theater missile defense systems: Theater High Altitude Area Defense (THAAD); Patriot Advanced Capability-3 (PAC-3); Navy Area Theater Ballistic Missile Defense (NATBMD); and Navy Theater Wide (NTW).

A mobile ground-based system intended to intercept incoming theater ballistic missiles inside and outside the atmosphere during their mid-course and early terminal phases, the THAAD system experienced six straight intercept failures, starting in December 1995, before achieving two successive hits in 1999. While characterizing the THAAD program as having made "significant progress," the office of operational test and evaluation noted that the two intercepts demonstrated only a "limited integrated system performance."

The THAAD missile is now undergoing a redesign to address problems identified in the earlier flight tests. The missile's "reliability, testability, producibility, and affordability" must be increased, according to the Pentagon review office, and the entire system should be exposed to "extreme operating environments" to validate that it will work wherever deployed. The Defense Department is calling for five successful intercepts with the redesigned missile before moving further with the program.

Whereas THAAD is targeted at upper-tier threats, the PAC-3 system will be focused on lower-tier threats, such as cruise missiles, aircraft, and tactical ballistic missiles in their terminal stage. PAC-3 has achieved six intercepts in six attempts, but due to delays in software development and unexpected hardware problems, only one flight test involved what the review office deemed a "production representative" PAC-3 missile. Five of the successful intercepts were also conducted against what the review office described as "limited threat representative targets."

Moreover, other tests of the PAC-3 ground system revealed a number of "reliability" and "high priority" problems concerning difficulty in identifying, classifying, discriminating, and tracking targets. These problems must be fixed before the PAC-3 ground system is fielded, the report stated.

Largely built upon upgrades to existing weapons systems—mainly the Aegis combat system, which can track more than 100 targets simultaneously, and the Standard Missile, which is used for air defense—the NATBMD is a "technically solid" program, according to the review office. But the Navy has not conducted a live test to prove the system can acquire, track, and intercept a theater ballistic missile. The NATBMD system will be ship-based and is envisioned as protecting coastal cities and amphibious forces against short- to medium-range ballistic missiles.

While tests have shown that the Aegis system can track a ballistic missile, the review office cautioned that the system could have difficulty in simultaneously defending against ballistic missiles and performing its anti-air-war function. In addition, the complexity of upgrading the Aegis' Weapons System computer program may have been "underestimated" the report stated.

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The proposed Navy Theater Wide system, which will be tasked with intercepting medium- and long-range theater ballistic missiles from the late ascent phase through the early descent phase, rests upon more substantial upgrades to the Aegis system and the Standard Missile. The review office expressed concern about the Aegis system's autonomous ability to perform the required detection and tracking functions, particularly its ability to locate a smaller target (when compared with airplanes, as the system was originally designed to track) at a much greater distance. Other potential problems are whether the infrared seeker on the NTW's warhead will be able to adequately discriminate between the target and debris and whether it could be blinded by its own propellant plume.

Although geared toward countering theater ballistic missiles, some missile defense advocates have suggested that NTW could be adapted or upgraded relatively easily to permit it to intercept strategic ballistic missiles in their boost phase, when the rocket engines are still burning. However, the review office asserted such a change in mission would require "major upgrades."

Citing the Aegis system's limited detection and tracking range for strategic ballistic missiles, the review office concluded the Aegis' radar is "not capable of supporting NMD-class engagements." The planned NTW Standard Missile-3 (SM-3), which just completed its first successful flight test involving all of its three stages in January, lacks the velocity needed for ascent-phase or mid-course intercepts and would need "major propulsion upgrades," according to the report. In fact, the SM-3's burnout velocity is less than half of what is needed to engage strategic ballistic missiles in mid-course trajectory. The review office also assessed the NTW kill vehicle's detection and divert velocity capabilities as being inadequate for "NMD endgame performance" and noted that the NTW warhead does not meet the NMD mission requirement of being "nuclear hardened."

Taken together, these "major shortcomings," according to the review office, led it to conclude that neither NTW nor even a five-year upgrade of the NTW system could be considered a "viable sea-based NMD option." The Defense Department is currently conducting a review of its ballistic missile defense options.

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