

NAVY AREA THEATER BALLISTIC MISSILE DEFENSE (NATBMD)



The Navy Area Theater Ballistic Missile Defense (NATBMD) system is intended to protect amphibious assault forces and coastal cities from short-to medium-range ballistic missiles, while maintaining current Standard Missile capabilities against manned aircraft and cruise missiles. The NATBMD system consists of the following:

- Standard Missile-2 (SM-2) Block IVA, which incorporates an infrared (IR) seeker, a radio frequency adjunct sensor (RFAS), and a new autopilot to the proven Block IV airframe. Additionally, new predictive fuzing (forward looking fuze or FLF) algorithms provide highly accurate burst solutions well before intercept to place warhead fragments on the target.
- Upgrades to the AEGIS Weapon System (AWS) to enable tracking and engagement of high-speed, low radar cross-section, theater ballistic missiles (TBMs).
- Upgraded Link-16 message set that provides interoperability with Navy, other Service Theater Ballistic Missile Defense (TBMD) systems, and command and control systems.

BACKGROUND INFORMATION

The NATBMD system entered Engineering and Manufacturing Development (EMD) in March 1997. The EMD test phase will examine performance against TBMs, aircraft, cruise missiles, multiple targets, and debris and countermeasure environments. NATBMD began EMD flight-testing in FY00 with two successful Control Test Vehicle (CTV) firings at the White Sands Missile Range (WSMR). In FY01, EMD ground and flight tests were hampered by problems with the integration of guidance section hardware and software components. These problems have resulted in a delay of over one year in WSMR flight-testing.

Because of the delays, the NATBMD program breached the majority of its cost and schedule parameters in FY01. Due to scope of this program breach, USD AT&L did not certify the program as required under Nunn-McCurdy legislation. The NATBMD program was terminated on December 14, 2001.

TEST & EVALUATION ACTIVITY

The TEMP was approved in February 1997. Significant progress has been made toward an updated TEMP, which proposes a six-phase flight test program in support of an FY05 MS III. The test program includes missile firings at WSMR and the Pacific Missile Range Facility (PMRF) against real and surrogate TBMs and cruise missiles, tracking exercises, multiple simultaneous engagements, dual salvo intercepts, and raid rate scenarios. Seven tests during OPEVAL will complete the test program.

No flight tests occurred in FY01. The next WSMR shot, TBM Fly-By, is scheduled for 2QFY02, and will provide the first in-flight test of a Block IVA guidance section with integrated flight hardware. The follow-on TBM shots will attempt to intercept a target using a fully functional FLF.

In February 2001, the NATBMD program participated in the Theater Missile Defense Critical Measurements Program-3B (TCMP-3B) at Kwajalein Missile Range. TCMP-3B provided an opportunity to collect RF and IR data on a high fidelity threat-representative re-entry vehicle. During TCMP-3B, a LINEBACKER test ship successfully gathered tracking data for AWS assessment. The LINEBACKER system consists of a LINEBACKER version of the AWS software installed on two cruisers. Unlike the objective system, which will engage all threats (unitary and separating) simultaneously, LINEBACKER has either a TBMD capability engaging unitary targets *or* an air-defense capability. Another NATBMD participant in TCMP-3B included an SM-2 Block IVA spectral imager on Gagan Island, which collected images for endo-atmospheric IR characterization.

TEST & EVALUATION ASSESSMENT

The Navy has not demonstrated, via live testing, an integrated system (AWS and missile) capable of acquiring, tracking, and intercepting TBMs. LINEBACKER demonstrated that the AEGIS SPY-1 radar can track a TBM and, in a separate test, an early prototype version of the SM-2 Block IVA demonstrated that it could engage and intercept a Lance target using guidance data from WSMR tracking instrumentation. A number of technical challenges exist:

- SM-2 Block IVA guidance section integration: The IR seeker and RFAS are unique to the SM-2 Block IVA and are the primary FLF sensors. Integration of the FLF sensors and software has proven difficult. Because ground tests alone cannot fully assess FLF adequacy to meet the fuze timing requirements, the FLF will remain a risk until it is fully flight-tested.
- AWS B/L 6.3 computer program complexity and development: The AWS B/L 6.3 computer program may have difficulties maintaining both TBM and air-defense missions given the high radar loading levels required for multiple, high-speed, low radar cross-section TBM targets. Maintaining AWS B/L 6.3 computer program stability, mainly in the SPY radar element, during performance testing has been a problem.
- Linear Search and Track Processor (LSTP) development: The LSTP is an adjunct processor that improves the object resolution and detection range of the AEGIS radar. This processor is required for resolving closely spaced objects at long range. The LSTP has experienced stability problems under high track loads when integrated with the SPY radar control computer in the test environment.

Based on an assessment of the discrimination challenges posed by certain threats, DOT&E requested the addition of a missile shot to the flight test matrix to assess NATBMD discrimination

performance. In 1QFY01, the Navy conducted a study on the feasibility of adding a discrimination shot to the test-flight matrix. The Navy study suggests that NATBMD will have heretofore-unexpected performance capability against these certain threats. A flight test was planned for DT/OT to examine this capability.

The proposed restructure plan opened up a previously compressed flight test schedule and allowed more time to review test data and incorporate any changes needed. Previously, to stay on schedule, the NATBMD program both removed shots from the flight test matrix and deferred risk to later flights. The effect was to increase overall program risk by delaying the assessment of key NATBMD technical elements.

As part of the restructure, the program proposed to shift later WSMR shots to PMRF given early success to reduce risk for follow-on at-sea testing. DOT&E supported this approach as long as these shots added to, but did not replace, the scheduled at-sea tests. A limitation of an early move to at-sea testing was the inability to examine debris in assessing LFT&E requirements. The effect of the restructure on the deployment of AWS B/L 6.3 ships was also a concern. To maintain the deployment schedules, some AWS B/L 6.3 ships would have likely deployed without TBMD capability.

The content of FOT&E testing in the TEMP and the need to coordinate the Navy Area FOT&E test strategy with the DDG51 and AEGIS AN/SPY-1D (V) programs was an area of concern for DOT&E. The cost of the FOT&E for NATBMD was a factor in USD AT&L's decision not to certify the program.

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