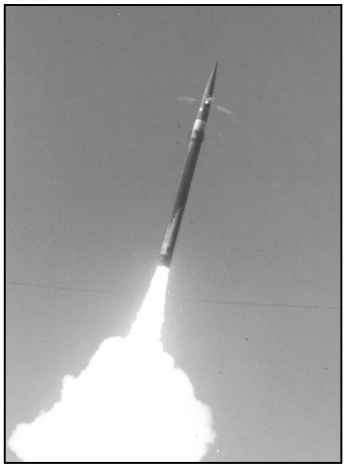
THEATER HIGH ALTITUDE AREA DEFENSE (THAAD)



The Theater High Altitude Area Defense (THAAD) is a mobile ground-based Theater Ballistic Missile Defense (TBMD) system designed to protect forward-deployed military forces, population centers, and civilian assets. THAAD intercepts ballistic missiles using hit-to-kill technology at either endoatmospheric or exoatmospheric altitudes. THAAD provides upper-tier missile defense in concert with the lower-tier PATRIOT Advanced Capability-3 (PAC-3). THAAD must be fielded with a lower tier system to provide near leak-proof protection.

The THAAD system consists of mobile launchers; interceptors; radars; Battle Management/ Command, Control, Communications, and Intelligence (BM/C^3I) units; and ground support equipment. The launcher system is based on a modified U.S. Army palletized loading system truck. The interceptor consists of a single-stage, solid-fuel booster with thrust vector control and a separating kill vehicle that uses an infrared seeker and divert thrusters for terminal guidance and control. The THAAD X-band, phased-array radar performs search and track functions and also delivers mid-course guidance target updates to the kill vehicle. The THAAD BM/C^3I segment controls and integrates all THAAD weapon system components.

The THAAD program is proposing two sequenced Engineering and Manufacturing Development (EMD) configurations. Configuration 1 is intended to meet the seven key performance parameters (KPPs) of threat, range and radar cross-section, defended area, protection effectiveness, lethality, kill probability, and interoperability. The missile will also be delivered as part of Configuration 1. The Configuration 2 system will deliver additional software development for the BMC^3I and Radar.

BACKGROUND INFORMATION

THAAD entered Program Development and Risk Reduction (PDRR, formerly called Dem/Val) in 1992. THAAD entered Engineering and Manufacturing Development (EMD) in June 2000. THAAD has an approved TEMP for EMD. Currently, Configuration 1 will enter production in FY09. Configuration 2 is planned to enter production in FY12.

The THAAD PDRR T&E program performed system flight testing (at White Sands Missile Range, NM, 1995 through 1999), hardware-in-the-loop (HWIL) testing, element ground testing, and digital simulations. The program completed 11-PDRR flight tests, including eight intercept attempts. The first six of the eight intercept attempts failed. THAAD achieved "hit-to-kill" target intercepts on the last two flight tests.

Subsequently, the Department authorized the THAAD program to enter the EMD phase. Developmental tests in EMD are planned at White Sands and Kwajalein Missile Ranges to prove out the new system redesign prior to committing to the production configuration. The THAAD missile redesign features implemented between PDRR and EMD include a new missile mission computer, elimination of course elevation gimbal gyro, a new Divert and Attitude Control System (DACS) with 40 percent more fuel and 10 percent more nozzle thrust, and an improved booster thrust vector control system.

THAAD's PDRR lethality test activities included both Light Gas Gun (LGG) and high-speed sled testing, focusing on emerging targets specifically identified in the THAAD System Threat Assessment Report (STAR). In FY98 and FY99, the Army conducted a series of 12 LGG tests against submunition targets at the University of Alabama-Huntsville (UAH) facility (at Redstone Arsenal). These tests showed that THAAD is lethal against a submunition target under a wide range of conditions. During FY95, the program conducted 15 sled tests at Holloman AFB, NM, against a static, threat-representative target to study THAAD endgame lethality. In October 1996, 10 quarter-scale LGG tests were conducted at UAH. These lethality tests provided the baseline for planning formal LFT&E for EMD. In 1996, DOT&E approved THAAD's live fire strategy.

The Army and OSD test and evaluation communities participated throughout PDRR test planning and execution using element and system-level data to support the EMD decision.

TEST & EVALUATION ACTIVITY

There was very little test and evaluation activity in FY 2001. BMDO completed a feasibility study to move some or all of THAAD testing from Kwajalein Missile Range to the Pacific Missile Range Facility (PMRF) in Kauai, Hawaii. Based on the study, BMDO directed that PMRF would be the preferred alternative flight test range, pending environmental determination; Kwajalein may be used for the longer-range flight tests that cannot be conducted at PMRF.

TEST & EVALUATION ASSESSMENT

THAAD PDRR testing was plagued with failures. These failures derived from an urgency to develop and deploy a prototype THAAD capability, the User Operational Evaluation System (UOES). This urgency drove the program to adopt an overly optimistic development schedule. This in turn contributed to deficient product assurance and inadequate ground testing. Quality control deficiencies in manufacturing the interceptor were a major factor in all but one of the flight test failures. Also, the integration of hit-to-kill technologies proved more difficult than anticipated. Pressures to field a TBMD capability quickly, coupled with program instability due to budget cuts and the freedom and flexibility allowed by acquisition reform, led to program decisions that resulted test failures that delayed the program several years. The Welch Panel in their 1998 Report concluded that the THAAD PDRR program "rushed to failure" because the program was schedule-driven.

The THAAD program has made significant progress since then by achieving two hit-to-kill intercepts with high accuracy. The intercepts demonstrated limited integrated system performance among the missile, launcher, radar, and BMC^3I segments using scripted scenarios. DOT&E supported the decision to terminate testing on the PDRR missile and focus efforts on developing and testing the new EMD missile design that is intended to improve the performance, reliability, testability, producibility, and affordability of the missile.

DOT&E's proposal for early flight-testing with the new, "next-generation" missile has been integrated into the THAAD program schedule – first at White Sands, then at Kwajalein. The early flight-testing is designed to demonstrate the capability of the new missile design to reliably and accurately intercept "threat representative" ballistic missile targets. Five successful intercepts are planned prior to the Department's proceeding with the second limited production buy of the new missile design. The five intercepts will also provide critical data needed to validate the missile fly-out simulation for the redesigned missile. This approach provides an incentive for the contractor and Project Manager to conduct the necessary ground testing to achieve the five intercepts with the minimum number of flight test attempts.

The THAAD program should carry out ground and HWIL testing of the THAAD system, including system end-to-end testing. To support the system end-to-end testing, the THAAD program must incorporate a disciplined modeling and simulation approach for verification, validation, and accreditation and use element and system-level model and simulation extensively to ensure that adequate data are generated to support integrated test and evaluation.

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