

September 1997

# BALLISTIC MISSILE DEFENSE

## Improvements Needed In THAAD Acquisition Planning



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**National Security and  
International Affairs Division**

B-274599

September 12, 1997

The Honorable William S. Cohen  
The Secretary of Defense

Dear Mr. Secretary:

We reviewed the Theater High Altitude Area Defense (THAAD) program to determine whether (1) planned testing would demonstrate operational effectiveness<sup>1</sup> before a significant number of units are produced for deployment and (2) missile target resources are adequate to support testing plans. We are addressing this report to you at this time because of the ongoing Department of Defense (DOD) evaluation of the THAAD program and schedule following a succession of test intercept failures.

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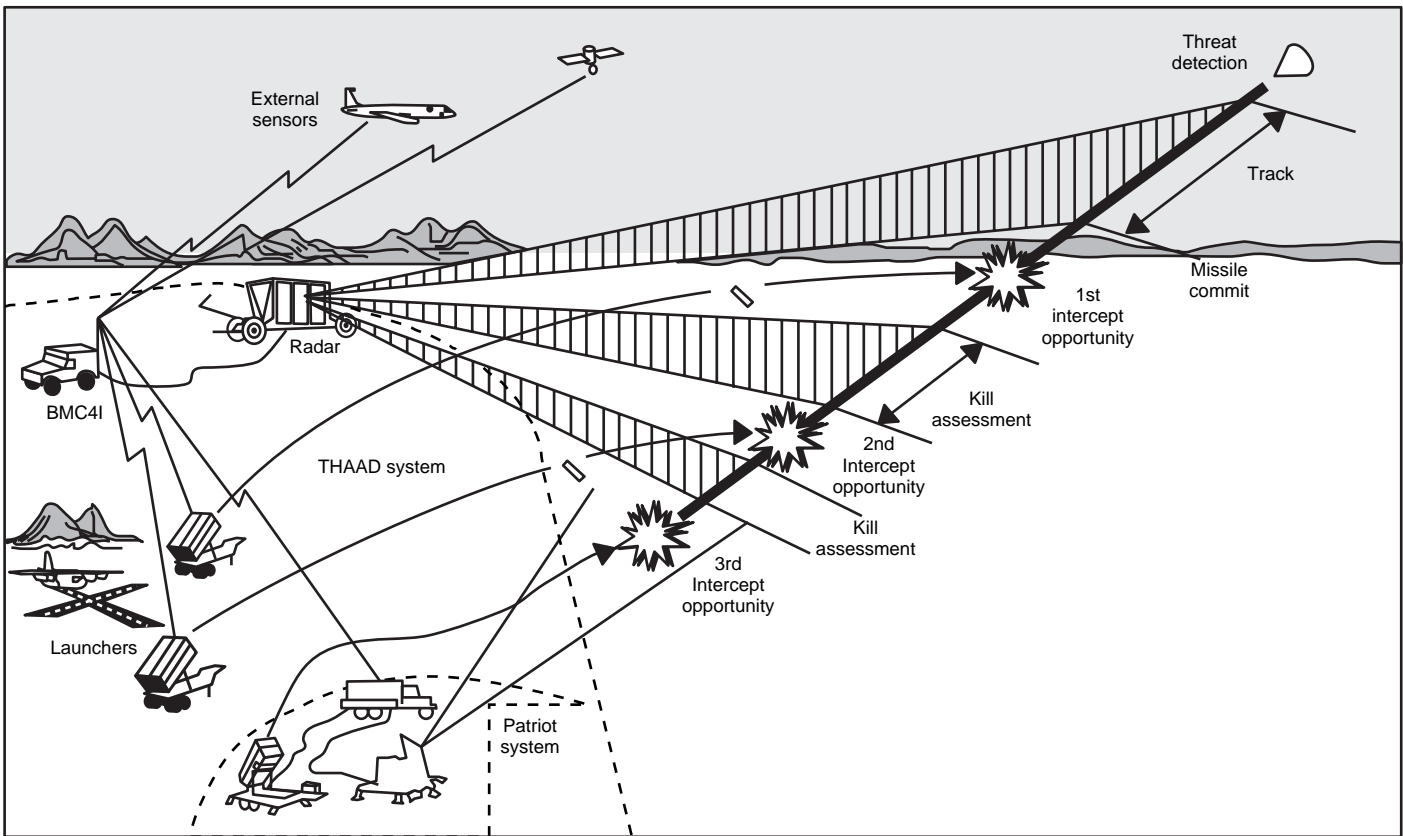
**Background**

The \$17.9 billion THAAD is a ground-based weapon system being developed by the Ballistic Missile Defense Organization (BMDO) and the Army to defeat theater ballistic missiles. It supports the national objective of protecting U.S. and allied deployed forces, population centers, and industrial facilities from theater missile attacks. The THAAD system consists of four major components: (1) truck-mounted launchers, (2) interceptors, (3) the radar system, and (4) the battle management/command, control, communication, computer, and intelligence (BM/C4I) system. The launcher is to provide rapid reload of interceptors. Each interceptor is to consist of a single stage booster and a kill vehicle that is designed to autonomously home on an enemy missile during the last phase of interceptor flight and destroy the missile by colliding with it, called "hit-to-kill." The radar is being designed to support the full range of surveillance, target tracking, and fire control functions and provide a communications link with THAAD interceptors in flight. The BM/C4I system is to manage and integrate all THAAD components and link the THAAD system to other missile defense systems to support an interoperable theater missile defense architecture. Figure 1 shows THAAD as the upper tier in a two-tier theater missile defense architecture.

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<sup>1</sup>DOD defines "operational effectiveness" as the overall degree of mission accomplishment of a system when used by representative personnel in the environment planned or expected for operational employment of the system considering organization, doctrine, tactics, survivability, vulnerability, and threat.

Figure 1: THAAD System



Source: GAO.

The THAAD program has undergone two major revisions. One revision delayed fielding from fiscal year 2002 until 2006 and was the result of DOD reducing planned funding by about \$2 billion during the fiscal year 1997 budget process. The delay increased total system cost from \$16.8 billion to \$17.9 billion, or by \$1.1 billion. The other revision accompanied DOD's fiscal year 1998 budget request and involved accelerating fielding to fiscal year 2004 by adding a total of \$722 million for fiscal years 1998 through 2003.

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To date, the Army has conducted four THAAD intercept tests. All four attempts failed. After the system failed the fourth attempt to intercept its target in March 1997, the Director, BMDO, established two independent teams to assess program requirements. One team was to determine if the system design can meet warfighter needs; and the other team was to evaluate the interceptor design and quality assurance. According to a THAAD project office representative, the teams' results are to be used to revise the THAAD acquisition plan.

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## Results in Brief

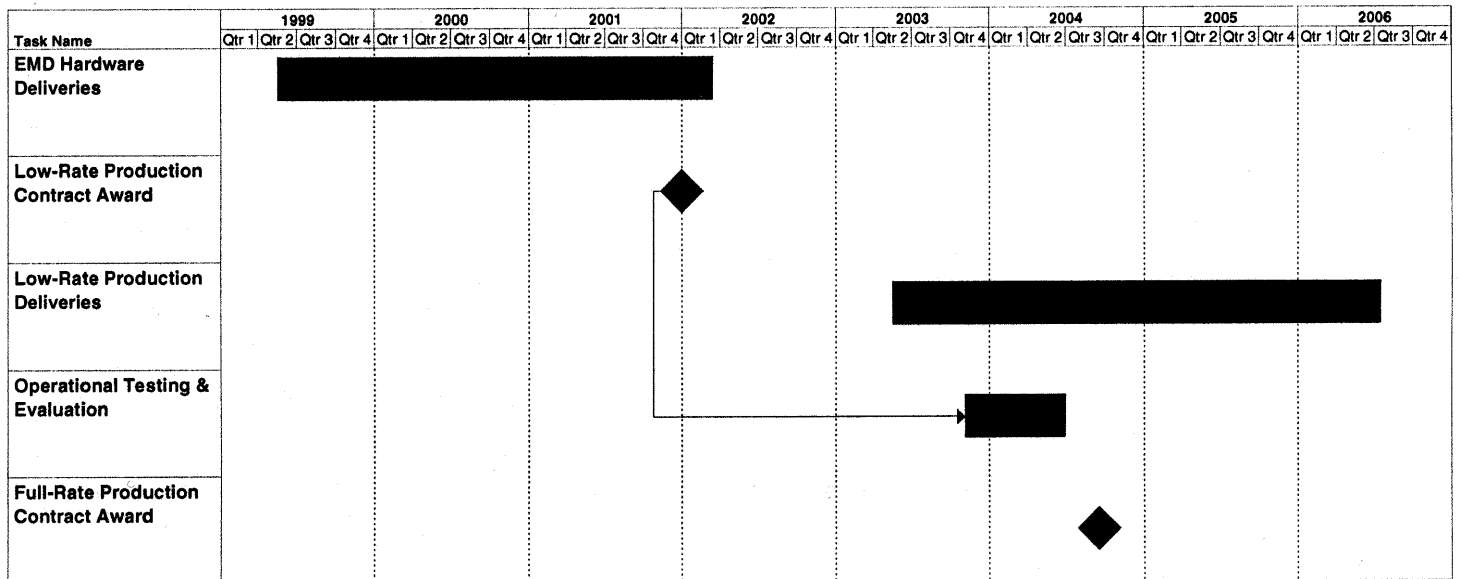
The current THAAD program review and evaluation provides DOD with the opportunity to (1) reduce risk and minimize the number of initial quantities of unproven system hardware by reexamining the schedule for operational testing and production and (2) ensure that realistic targets will be used for testing. The last approved THAAD acquisition plan calls for significant production of deployment hardware almost 2 years before beginning independent operational testing to assess the system's operational effectiveness. The Army maintains that it needs to buy a number of THAAD systems during low-rate initial production to "ramp-up" to the full rate of production. Delaying production until after completing sufficient testing that provides assurance that key performance requirements can be met reduces the risk of buying unproven systems and facilitates production of proven systems at more efficient rates.

A suitable target for testing the THAAD system against longer range missiles does not exist, and funds have not been requested for target development and production. Without a longer range test target to represent the more formidable, higher velocity missiles that THAAD could face, the system's operational effectiveness will remain in doubt and DOD will not have reasonable assurance that it could rely on THAAD in an actual conflict.

**Acquiring Significant Quantities of Hardware Before Key Performance Requirements Are Tested in an Operational Environment Increases Risk**

BMDO's current schedule calling for award of the low-rate initial production contract almost 2 years before the start of operational testing and evaluation increases the risk associated with the THAAD program. The Director, BMDO, acknowledged that the initial THAAD schedule was high risk and contributed to THAAD development problems. In May 1997, he stated that THAAD's aggressive schedule led to problems probably traceable to "hurry up." The THAAD Project Manager informed us that both the contractor and the project office were overly optimistic regarding the test schedule. In addition, he pointed out that, in hindsight, additional component testing could have prevented some test flight failures. Prior to the last test flight, the number of test flights planned as the basis for entering the engineering and manufacturing development phase was reduced from 20 to 9 flights partly to stay on schedule. DOD established three successful intercepts as the criterion for THAAD entering the engineering and manufacturing development phase. Figure 2 shows the most current approved THAAD schedule for operational testing and production of units for deployment. The figure shows that contract award of the low-rate initial production contract will precede the start of operational testing and evaluation by almost 2 years.

**Figure 2: Last Approved Schedule of THAAD Operational Testing and Production**



Source: GAO.

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In light of recent test failures, the THAAD program is being revised. While BMDO and DOD have not yet approved a revision to the THAAD acquisition plan and schedule, a proposed plan currently being discussed within the Army, BMDO, and DOD would equip the first unit in fiscal year 2006. However, that proposed plan still calls for significant low-rate initial production before operational testing.

According to 10 U.S.C. 2400, low-rate initial production is the minimum quantity needed to (1) provide weapons for operational test and evaluation, (2) establish an initial production base for the weapon, and (3) permit an orderly increase in production before full-rate production begins.

With regard to the need for weapons used in operational test and evaluation, THAAD equipment produced during low-rate initial production is currently intended for deployment to operational units rather than for use in operational test and evaluation. The low-rate initial production contract was scheduled for award almost 2 years before beginning operational testing to assess operational effectiveness. During low-rate initial production, the Army plans to produce significantly more than the amount of THAAD system components needed to equip the first deployed unit (battery). For example, the first deployed unit is to consist of 9 launchers, 72 interceptors, 1 radar, and 3 BM/C4I systems. But the plan calls for production under the low-rate initial production contract of 32 launchers, 253 interceptors, and 3 radars. Of the 253 interceptors, 234 are planned for deployment and 19 are planned for production verification and reliability testing. The 234 interceptors are more than three times the number needed to equip the first fielded unit and would represent about 20 percent of the total 1,178 interceptors planned for full deployment.

Concerning the other two purposes of low-rate initial production—establishing an initial production base and permitting an orderly increase in production before full-rate production begins—we believe that starting production of significant quantities of an unproven system 2 years before beginning operational testing increases risk. If the production line prove-out and ramp-up were delayed until after the completion of sufficient independent testing in an operational environment, initial quantities of unproven systems would be reduced and additional funding would become available to buy the proven systems at more efficient rates. As we previously reported, DOD often budgets available funding for unnecessary increases in low-rate production quantities of unproven weapons whose designs are not yet stabilized with

the result that it is unable to buy proven weapons at originally planned full rates because of insufficient funds.<sup>2</sup>

The Army's latest approved THAAD acquisition plan calls for initial fielding in fiscal year 2004. Under this schedule, a contract is to be awarded early in the engineering and manufacturing development phase to produce components for operational testing and later a \$1.2-billion low-rate initial production contract for production of system components for deployment. In prior reports, we pointed out that an aggressive schedule is also the basis for the Army's current plans to procure prototype interceptors well before it knows whether the interceptors will be operationally effective.<sup>3</sup>

## Longer Range Target Requirement Is Not Funded

According to a representative from the Office of the Director, Operational Test and Evaluation, several flight tests against targets having a range of more than 2,000 kilometers will be required during developmental and operational testing to validate THAAD's operational effectiveness against longer range missiles. Because the velocity of attacking missiles increases with range, longer range targets represent a more formidable threat than shorter range targets. In addition, the longer range targets generally represent attacking missiles having a different flight trajectory than shorter range targets. Seven longer range THAAD flight tests are being planned by the Army Space and Strategic Defense Command's Targets Office with an eighth target as a spare.

A suitable longer range target does not exist. The Storm and Hera targets used in THAAD testing, to date, have only a maximum range of about 750 and 1,100 kilometers, respectively, rather than the roughly 2,000 kilometers needed. According to the Targets Office Product Manager, numerous studies were conducted between 1992 and 1997 to determine the best options for longer range theater missile defense targets. The options studied included land/sea-launched and air-launched/dropped targets. According to Army officials, however, the use of longer range target options and target launching platforms is limited by the 1991 Strategic Arms Reduction Talks and 1987 Intermediate Range

<sup>2</sup>Weapons Acquisition: Better Use of Limited DOD Acquisition Funding Would Reduce Costs (GAO/NSIAD-97-23, Feb. 13, 1997).

<sup>3</sup>We have previously expressed our concerns regarding the Army's plan to commit over \$200 million for producing prototype interceptors, called User Operational Evaluation System (UOES) interceptors, to provide an early deployable capability before testing that would provide some assurance of the system's effectiveness. DOD has indicated that it still plans to commit funds to UOES interceptor production on very limited testing—one successful intercept. See Ballistic Missile Defense: Issues Concerning Acquisition of THAAD Prototype Systems (GAO/NSIAD-96-136, July 9, 1996) and Ballistic Missile Defense: Prototype THAAD System (GAO/NSIAD-97-70R, Jan. 6, 1997).



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Nuclear Forces Treaties. This makes selection of a longer range target more difficult. As of June 1997, BMDO had not selected a specific longer range target solution.

In testimony on May 15, 1997, before the Subcommittee on Military Research and Development, House Committee on National Security, the Under Secretary of Defense for Acquisition and Technology acknowledged that targets built for lower tier systems simulate the short-range threat but do not provide the greater range targets that are needed for upper tier theater missile defense systems such as THAAD. The Under Secretary noted that BMDO had recently completed a study of long-range target alternatives to determine the best treaty compliant, cost effective, and flexible solution. The study recommended an air-launched target that would support testing of both Army and Navy upper tier theater missile defense systems. The Under Secretary stated that BMDO would examine the technical and programmatic feasibility of the air-launched concept in 1997.

The Acting Director, BMDO Test and Evaluation Directorate, has advised us that longer range targets for THAAD are now a pressing need. While the specific target concept has not been defined, the Acting Director stated that about \$55 million would be required to develop the target between fiscal years 1999 and 2001. Production of eight longer range THAAD targets is estimated to cost another \$56 million to \$72 million. BMDO expects to develop a more precise estimate in late fiscal year 1997. However, funding to develop and produce a longer range target for the system is not currently contained in DOD's future years funding plan for fiscal years 1999 through 2003.

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## Conclusions and Recommendations

The current THAAD program review and evaluation provides DOD with an opportunity to (1) reduce risk in the acquisition program and minimize the number of initial quantities of unproven systems by reexamining the schedules for operational testing and production and (2) ensure that realistic targets will be used for testing. We recommend that you direct BMDO to delay low-rate initial production of the THAAD system until after the Director, Operational Test and Evaluation, has certified, based on sufficient independent testing in an operational environment, that the system can meet its key performance requirements.

We also recommend that you include in DOD's fiscal year 1999 budget submission, the estimated funds needed to implement a treaty compliant,

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longer range missile target program consistent with THAAD's revised test schedule.

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## Agency Comments and Our Evaluation

In commenting on a draft of this report, the Director, Strategic and Tactical Systems, Office of the Under Secretary of Defense (Acquisition and Technology), disagreed with our recommendation concerning the delay of low-rate initial production until after certification of THAAD's operational effectiveness. He partially concurred with our recommendation that the fiscal year 1999 budget submission should include funding for targets that is consistent with the THAAD revised schedule. He cited Title 10 of the United States Code, which describes low-rate initial production of a new system as the minimum quantity necessary to: (1) provide production-configured or representative articles for operational tests, (2) establish an initial production base for the system, and (3) permit an orderly increase in the production rate of the system. However, he also stated that THAAD low-rate initial production is not planned to provide representative articles for operational tests—although such an option still exists.

The Director's response does not address our main point. We recognize that the existing low-rate initial production legislation does not include specific standards on when and how programs should begin low-rate initial production, or on the type and amount of testing to be done before low-rate initial production begins. Instead, the thrust of our recommendation is that delaying production of system components intended for deployment until enough realistic testing information is secured would reduce risk and minimize the procurement of unproven equipment. As discussed in the report, current plans provide for producing about 20 percent of the THAAD interceptors during low-rate production. If DOD buys unproven weapons during low-rate initial production at minimum rates—the rate needed to complete initial operational test and evaluation and prove the production line—more funds would be available to buy proven weapons in full-rate production at more efficient rates and at lower costs. Implementing our recommendation could also reduce the number of THAAD systems that may have to be modified based on the results of operational testing and evaluation thus allowing full-rate production of more THAAD systems with demonstrated performance.

Although the Director points out that an early operational assessment is planned prior to the commitment to low-rate initial funding, it is our view that such an assessment will not provide sufficient realistic and

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independent testing information. The Staff Assistant to DOD's Director, Operational Test and Evaluation—the organization which is responsible for certifying that a new weapon system is operationally effective—confirmed that early operational assessments were never intended to, and do not, provide a basis for assuring operational effectiveness. He stated that early operational assessments are only interim assessments of equipment that indicate a system's progress and problems. Thus, we continue to believe that our recommendation to delay the low-rate initial production is valid. Our recommendation has been clarified to reflect the basis of DOD's certification as being the completion of sufficient independent testing in an operational environment.

We agree with the Director's statement that the statute and regulations envision that low-rate production will begin before completion of initial operational test and evaluation. We are not recommending that all initial operational test and evaluation be completed before beginning low-rate initial production. We recommend only that sufficient independent testing be conducted in an operational environment to show that the system can meet its key performance requirements. This is an appropriate criterion for systems being produced for deployment.

Concerning our second recommendation, the Director stated that BMDO's long-range target strategy is to pursue an air-launched target platform that will demonstrate its capability in fiscal year 2001, earlier than THAAD's planned test requirement; but that BMDO is examining other options to meet its target needs. He stated that BMDO is reviewing funding shortfalls for inclusion in the fiscal year 1999 budget submission as we recommended.

DOD's comments are reprinted in appendix I.

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## Scope and Methodology

We performed our work at the Office of the Secretary of Defense and Headquarters, BMDO, in Washington, D.C.; the Office of the Director, Operational Test and Evaluation, Alexandria, Virginia; the U.S. Army Air Defense Artillery School at Fort Bliss, Texas; the White Sands Missile Range, New Mexico; and the THAAD Project Office and the U.S. Army Space and Strategic Defense Command in Huntsville, Alabama. At these locations, we interviewed responsible agency officials and analyzed pertinent acquisition and testing documents.

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We conducted our work from July 1996 to September 1997 in accordance with generally accepted government auditing standards.

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As you know, the head of a federal agency is required by 31 U.S.C. 720 to submit a written statement of actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Reform and Oversight not later than 60 days after the date of this report. A written statement also must be submitted to the Senate and House Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to appropriate congressional committees; the Director of BMDO; and the Secretaries of the Army, the Navy, and the Air Force. We will also make copies available to others on request.

If you or your staff have any questions concerning this report, please contact me on (202) 512-4841. Major contributors to this report are listed in appendix II.

Sincerely yours,



Allen Li  
Associate Director, Defense Acquisitions Issues

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# Comments From the Department of Defense

Note 1: We incorporated DOD's technical comments as appropriate.



ACQUISITION AND  
TECHNOLOGY

## OFFICE OF THE UNDER SECRETARY OF DEFENSE

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12 AUG 1997

Mr. Allen Li  
Associate Director  
Defense Acquisitions Issues  
National Security and International Affairs Division  
U.S. General Accounting Office  
Washington, D.C. 20548

Dear Mr. Li:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "BALLISTIC MISSILE DEFENSE: Improvements Needed In THAAD Acquisition Planning", dated July 8, 1997, (GAO Code 707191), OSD Case 1406. The Department non-concurs on the first recommendation, and partially concurs on the second recommendation.

The DoD detailed comments in response to the recommendations are provided in the enclosure. Technical comments were provided separately for accuracy and clarification.

The Department appreciates the opportunity to comment on the draft report.

Sincerely,

A handwritten signature in cursive script that reads "George R. Schneiter".

George R. Schneiter  
Director  
Strategic and Tactical Systems

Enclosure



**Appendix I**  
**Comments From the Department of Defense**

GAO DRAFT REPORT DATED JULY 8, 1997  
(GAO CODE 707191) OSD CASE 1406  
"BALLISTIC MISSILE DEFENSE: IMPROVEMENTS NEEDED IN THAAD  
ACQUISITION PLANNING"

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RECOMMENDATIONS

- **RECOMMENDATION #1:** The GAO asserted that the current Theater High-Altitude Area Defense (THAAD) program review and evaluation provided the DoD with an opportunity to (1) reduce risk in the acquisition program and minimize the number of initial quantities of unproved systems by reexamining the schedules for operational testing and production, and (2) ensure that realistic targets will be used for testing. Accordingly, the GAO recommended that the Secretary of Defense direct the Ballistic Missile Defense Organization (BMDO) to delay low-rate initial production of the THAAD system until after it has been certified operationally effective based on operational testing. (p. 11/GAO Draft Report)

**DOD RESPONSE:** Non-concur. The GAO's recommendation to delay the THAAD Low Rate Initial Production (LRIP) decision is not warranted, based on the requirements of Title 10 United States Code 2399 (10 U.S.C. 2399), DoD 5000.2-R, and AR 73-1, and is counter to the objectives of low-rate initial production. The statute authorizes the acquisition of LRIP quantities sufficient to provide production-representative articles required for operational tests, establish the initial production base for the system, and permit an orderly increase in production rate for the system. Although THAAD does not intend to use LRIP articles for initial operational test and evaluation (IOT&E), though that option still exists, it does intend to establish an initial production base for an orderly increase in production. The regulatory acquisition planning documents allow and expect LRIP to be exercised prior to the system successfully passing IOT&E.

The Army and the DoD operational test communities will provide an assessment of the system's operational effectiveness and suitability, based on combined developmental and operational testing, prior to LRIP. Mandatory Army and DoD regulations require an early operational assessment prior to the commitment of LRIP funding. The test plan will be documented and approved by the operational evaluator in the THAAD Test and Evaluation Master Plan (TEMP) prior to Milestone (MS) II. In THAAD's FY06 acquisition plan, developmental test flights and at least one combined developmental/operational test flight will be conducted before the LRIP decision is made. Under the operational evaluator's philosophy of continuous operational assessment, sufficient testing will have been completed to support the

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**Appendix I**  
**Comments From the Department of Defense**

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evaluator's operational assessment. The strategy provides sufficient data to assess the risks of making an LRIP decision in fiscal year (FY) 2004 and is consistent with the GAO objective, to minimize the risk associated with LRIP procurements.

- **RECOMMENDATION #2:** The GAO also recommended that the Secretary of Defense include in the DoD fiscal year 1999 (FY99) budget submission, the estimated funds needed to implement a treaty compliant, longer-range missile target program consistent with THAAD's revised test schedule. (p. 11/GAO Draft Report)

**DOD RESPONSE:** Partially concur. BMDO, in conjunction with the Services, is examining options for meeting a broad range of target needs, including the technical and programmatic feasibility for development of target alternatives. BMDO has programmed \$21.9 million over FY98-FY00 for the development of a long-range target. The GAO is correct in citing funding shortfalls; however, BMDO is reviewing these shortfalls for inclusion in the FY99 budget submission.

BMDO's long-range target strategy is to pursue an air-launched target platform that will demonstrate its capability in early FY01, two years prior to the THAAD planned test requirement. BMDO also maintains its option to pursue a Strategic Target System or a three-stage, Pile Driver, ground-launched approach, as a risk-reduction effort.



# Major Contributors to This Report

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