Audit Report

OFFICE OF THE INSPECTOR GENERAL

ACQUISITION OF THE THEATER HIGH ALTITUDE AREA DEFENSE PROGRAM

Report No. 96-014

October 23, 1995

This special version of the report has been revised to omit contractor proprietary and DoD Planning, Programming, and Budget System data

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Acronyms

ABM	Anti-Ballistic Missile
BM/C^3I	Battle Management/Command, Control, Communication, and Intelligence
BMDO	Ballistic Missile Defense Organization
DAB	Defense Acquisition Board
GAO	General Accounting Office
OSD	Office of the Secretary of Defense
RDT&E	Research, Development, Testing, and Evaluation
THAAD	Theater High Altitude Area Defense
UOES	User Operational Evaluation System

INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
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October 23, 1995

MEMORANDUM FOR AUDITOR GENERAL, DEPARTMENT OF THE ARMY

SUBJECT: Audit Report on the Acquisition of the Theater High Altitude Area Defense Program (Report No. 96-014)

We are providing this audit report for information and use. We considered management comments on a draft of this report in preparing the final report.

Comments on a draft of this report conformed to the requirements of DoD Directive 7650.3 and left no unresolved issues. Therefore, no additional comments are required.

We appreciate the courtesies extended to the audit staff. Questions on the audit should be directed to Mr. John Meling, Audit Program Director, at (703) 604-9091 (DSN 664-9091) or Mr. David Wyte, Audit Project Manager, at (703) 604-9027 (DSN 664-9027). See Appendix H for the report distribution. The audit team members are listed inside the back cover.

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Office of the Inspector General, DoD

Report No. 96-014 **October 23, 1995**
(Project No. 5AE-0006)

Acquisition of the Theater High Altitude Area Defense Program

Executive Summary

Introduction. The Theater High Altitude Area Defense System is the upper tier of the Army's two-tiered theater ballistic missile defense plan. With the lower tier Patriot system, the Theater High Altitude Area Defense systems are being designed to negate theater ballistic missiles at long range and high altitudes. Its long-range intercept capability will help protect broad areas, dispersed assets, and population centers against theater ballistic missile attacks. The program is budgeted by the Ballistic Missile Defense Organization and executed by the Army. The Ballistic Missile Defense Organization plans to acquire 80 launchers; 1,319 intercept missiles; and 14 fire-control radar sensors and battle management/command, control, communication, and intelligence tactical operating centers at a cost exceeding $10 billion (then-year dollars).

Objectives. The audit objective was to evaluate the acquisition management of the Theater High Altitude Area Defense system. Specifically, we determined whether the Army's Theater High Altitude Area Defense Project Office was cost-effectively developing and preparing the system for the engineering and manufacturing development phase of the acquisition process. We also evaluated the adequacy of the Project Office's management control program as it applied to the audit objective.

Audit Results. Overall, the Army was effectively managing the Theater High Altitude Area Defense system acquisition and had an adequate management control program in place. Both the Ballistic Missile Defense Organization and the Project Office were receptive to auditor suggestions and made positive changes to improve the acquisition as discussed in Appendix C. We did, however, identify two conditions that warrant further management action.

o The Project Office did not use multiyear contracting for the production phase in its current acquisition strategy. Due to economies of scale, production efficiencies, and reduced administrative burden, the Army could reduce acquisition costs beyond the Future Years Defense Program by as much as $110 million (Finding A).

o The Project Office's acquisition strategy for the Theater High Altitude Area Defense system did not address the feasibility of component breakout. By addressing component breakout, the Army could reduce program production costs beyond the Future Years Defense Program by $7.2 million (Finding B).

Recommendations in this report, if implemented, will help the Army allocate acquisition funds effectively and use them efficiently. By reducing the cost of Theater High Altitude Area Defense system during full-rate production, the Army could put to better use as much as $117.2 million beyond the Future Years Defense Program. Appendix F summarizes the potential benefits of the audit.

Summary of Recommendations. We recommend the Project Manager, Theater High Altitude Area Defense Project Office:

o Determine the benefits of multiyear contracting; if warranted, revise the acquisition strategy; and request congressional authority to award a multiyear production contract.

o Conduct a component breakout review and break out components if results show cost savings.

Management Comments. The Army and the Ballistic Missile Defense Organization concurred with the recommendations. Since the Theater High Altitude Area Defense system production will begin after FY 2000, the Army stated it was premature to comment on the validity of the monetary benefits resulting from the audit until final decisions are made on multiyear contracting and component breakout. Part I contains a summary of management comments and Part III contains the complete text of management comments.

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Part I - Audit Results

Audit Background

The Theater High Altitude Area Defense System is the upper tier of the Army's two-tiered theater ballistic missile defense plan. With lower tier Patriot systems, the Theater High Altitude Area Defense (THAAD) systems are being designed to negate theater ballistic missiles at long range and high altitudes. Its long-range intercept capability will help protect broad areas, dispersed assets, and population centers against theater ballistic missile attacks. In total, the Ballistic Missile Defense Organization (BMDO) plans to acquire 80 launchers; 1,319 intercept missiles; and 14 fire-control radar sensors and battle management/command, control, communication, and intelligence (BM/C^3I) tactical operating centers. The Army's THAAD Project Office (Project Office) executes the acquisition for the BMDO.

In September 1992, the Army awarded Phase I demonstration and validation contracts for the THAAD system acquisition. Lockheed Missiles and Space Company (Lockheed) was awarded a cost-plus-fixed-fee contract for missiles, launchers, BM/C^3I tactical operation centers, and program integration. Raytheon Corporation was awarded a cost-plus-incentive-fee/award fee contract for X-band surveillance and fire-control radars. In total, the target price for the two demonstration and validation contracts exceeded $1 billion.

As part of the Phase I contracts, Congress required the contractors to deliver one User Operational Evaluation System (UOES) THAAD prototype battalion. The battalion will consist of two firing batteries, one headquarters, and an assortment of hardware and missiles. Although the UOES will not be as robust, complete, or operationally capable as production systems, the Project Office plans to use the UOES for training, evaluation, and possible deployment in a national emergency. Because of budget constraints and performance uncertainties, the Phase I contracts were limited to acquiring only 40 intercept missiles for the UOES systems.

On November 7, 1994, the Army modified Lockheed's Phase I contract due to missile design and BM/C^3I concept changes; missile seeker, booster, and divert attitude control system difficulties; and overhead rate increases. Due to Lockheed's underestimation of technical risks and a subsequent decrease in its business base, the contract cost increased $232 million or 31 percent from $758 million to $990 million. As part of the modification, the Project Office revised the scope of work to reduce live fire tests from 20 to 14 and moved or deleted some system capabilities to subsequent acquisition phases. In total, the Project Office estimated that the modification shifted as much as $33 million of THAAD Phase I requirements to Phase II, the engineering and manufacturing development phase. The contract modification will not impact the Defense Acquisition Board (DAB) Milestone II exit criteria for the THAAD.

The DAB is scheduled to meet in October 1996 to consider the readiness of the THAAD to enter engineering and manufacturing development, Phase II. The BMDO estimates that THAAD research, development, test, and evaluation costs will total $* and production costs will total $* in then-year dollars (Appendix D).

Audit Objectives

The audit objective was to evaluate the management of the THAAD acquisition to determine whether the system was being cost-effectively developed and prepared for Phase II engineering and manufacturing development. We followed our critical program management elements for the audit and tailored them to the demonstration and validation acquisition phase. We reviewed requirements' evolution and affordability, acquisition planning and risk management, engineering and manufacturing, logistics and other infrastructure, test and evaluation, contract performance measurement, contracting, and management controls related to these objectives. See Appendix A for the audit scope and methodology.

We identified two issues that may affect acquisition planning for the THAAD system. Findings A and B discuss the feasibility of multiyear procurement and component breakout for full-rate production systems. The Project Office was adequately managing requirements' evolution and affordability, engineering and manufacturing, logistics and other infrastructure, test and evaluation, contract performance measurement, and contracting (Appendix C). Prior coverage related to the audit objectives is in Appendix B.

*DoD Planning, Programming and Budget System Information Removed

Finding A. Multiyear Contracting

The Theater High Altitude Area Defense (THAAD) Project Office did not include the use of multiyear contracting for the production phase in its current acquisition strategy. Through economies of scale, production efficiencies, and reduced administrative burden, the Project Office may put to better use as much as $110 million beyond the Future Years Defense Program by awarding a multiyear contract when buying full-rate production systems.

Use of Multiyear Procurement

Multiyear procurement involves contracting for more than the current year requirement. Multiyear contracts, as defined by Federal Acquisition Regulation, subpart 17.1, "Multiyear Contracting," are contracts covering more than 1 year but not more than 5 years' requirements, unless otherwise authorized by statute. Under multiyear contracting, total contract quantities and annual quantities are planned for a particular level and type of funding as displayed in a current 5-year development plan. Each program year is annually budgeted and funded. At the time of award, funds need only be appropriated for the first year.

Requirements for Establishing Multiyear Contracts. Title 10, United States Code, section 2306, provides that multiyear contracts can be used when:

o the use of such a contract will result in substantial savings of the total anticipated costs of implementing the program through annual contracts;

o the minimum need for the property to be purchased is expected to remain substantially unchanged during the contemplated contract period in terms of production rate, procurement rate, and total quantities;

o the head of the agency is expected to request funding for the contract at the level required to avoid contract cancellation;

o the design for the property to be acquired is stable and the technical risks associated with such property are not excessive;

o the estimates of both the cost of the contract and the anticipated cost avoidance through the use of a multiyear contract are realistic; and

o the use of such a contract will promote the national security of the United States.

DoD Policy. The provisions of title 10, United States Code, section 2306, are implemented in DoD Instruction 5000.2, "Defense Acquisition Management Policies and Procedures," February 23, 1991. The Instruction states that program acquisition strategies should be tailored to match the character of the program and allow the most efficient satisfaction of individual program requirements. The Instruction further states that, commensurate with risk and affordability, multiyear procurement should be considered.

Acquisition Strategy

The THAAD Project Office did not include the use of multiyear contracting for the production phase in its current acquisition strategy. We analyzed program plans and documentation and determined that the THAAD will meet the requirements established in title 10, United States Code, section 2306, for use of multiyear contracts during full-rate production. Specifically, we determined that:

o The use of multiyear contracts could result in substantial savings during full-rate production.

o The need to counter missile threats should remain unchanged through the procurement period. Also, funding should be available for production.

o The final nine production radars will have a stable design. In addition to the 14 production radars, one prototype system and two UOES firing batteries will have been produced before full-rate production begins.

o Both Lockheed and Raytheon Corporation projected anticipated multiyear contracting cost avoidances. Lockheed based its projections on savings resulting from subcontractors' material costs. Raytheon Corporation based its projections on production efficiencies resulting from a mature design.

o Congress has identified theater missile defense, to include the THAAD, as a defense priority.

Benefits From Multiyear Procurement

By awarding a multiyear contract for THAAD full-rate production, the Project Office will be able to avoid as much as $110 million beyond the Future Years Defense Program.

Economies of Scale. The THAAD contractors can pass on significant savings to the Government through economies of scale rather than placing annual orders with parts and supply vendors. For example, the Project Office estimated that Raytheon Corporation could avoid as much as $150 per transmit/receive module for the ground-based radar antennas through economies of scale by awarding a multiyear contract. Each antenna requires 31,000 transmit/receive modules. Additionally, the Project Office and Raytheon Corporation do not foresee dramatic design changes. Transmit/receive modules placed in production antennas will be the same as those placed in the UOES antennas. Because the final nine ground-based full-rate production radars will require a total of 279,000 modules plus spares, the Project Office estimated that as much as $42 million can be saved through a multiyear contract.

Production Efficiencies and Reduced Administrative Burden. In contrast to annual contracting, multiyear contracting provides production stability that allows for efficiencies and reduced administrative burden. Because Lockheed as the system integrator depends on assemblies, subassemblies, and components delivered by numerous vendors and suppliers for THAAD missiles, potential savings result from longer production runs, reduced order processing, economy-of-scale discounts, and cost escalations. Besides potential cost savings, multiyear contracting also reduces the risk of parts' suppliers going out of business or terminating product lines.

Lockheed estimated that savings will accrue as a result of benefits received from lower tier suppliers' costs because material accounts for more than 70 percent of the THAAD missile's cost. Specifically, Lockheed projects that a multiyear production contract could avoid as much as $58 million when it begins assembling missiles in FY 2002.

Similarly, Lockheed has identified multiyear contract savings for the BM/C^3I, launcher, and missile round pallets. Items exceeding 100 units such as computer terminals, antennas, antenna masts, radios, integrated work stations, global positioning system receivers, telephone interface modules, and fiber optic adapters could also be acquired from subcontractors using multiyear contracts. These savings are possible as a result of longer production runs and reduced order processing and material/production planning costs. Lockheed estimates that the Project Office could save an additional $10 million for these BM/$C^3$I and support items through multiyear contracting.

Conclusion

The THAAD program is an excellent candidate for achieving significant cost savings through implementation of multiyear procurement for THAAD full-rate production systems. The THAAD full-rate production systems are viable multiyear procurement candidates because of the planned stability in need, design, and funding and the low amount of technical risk. The Army should develop a multiyear procurement strategy for the THAAD in advance preparation for the FY 2002 production contract. Prompt management attention is warranted due to the critical nature of the THAAD mission, the potential for significant cost savings, and the time and effort required to plan and implement multiyear procurement as part of the budget.

Recommendations, Management Comments, and Audit Responses

A. We recommend that the Project Manager, Theater High Altitude Area Defense Project Office:

1. Conduct a cost-benefit analysis to determine the extent of potential cost avoidance resulting from a multiyear procurement strategy.

2. Include multiyear contracting for full-rate production systems in the Theater High Altitude Area Defense acquisition strategy if significant savings result from implementing Recommendation A.1.

3. Request congressional authority to implement a multiyear contract for Theater High Altitude Area Defense full-rate production systems if significant savings are available.

Department of the Army Comments. The Army concurred with the recommendations, stating that it will conduct a cost-benefit analysis to determine potential cost avoidance resulting from a multiyear procurement strategy. If the analysis demonstrates benefits, the Army stated that it will include multiyear contracting for production systems in the THAAD acquisition strategy. Further, the Army stated that it will request congressional authority to implement a multiyear contract if its analysis results in a cost-effective acquisition. Because the potential cost avoidance will occur after FY 2000, the Army stated that it was premature to commit to the extent of the cost avoidance resulting from multiyear procurement until the final decision is made on multiyear contracting.

Ballistic Missile Defense Organization Comments. The Ballistic Missile Defense Organization concurred with the finding and recommendations and revised its acquisition strategy report for the engineering and manufacturing development Phase of the THAAD program to include multiyear procurement.

Audit Response. Management's comments are responsive to the audit recommendations. We agree that potential cost avoidance benefits for production systems is uncertain at this time. The report identified the potential cost avoidance to demonstrate the monetary benefits that could result from multiyear contracting for THAAD production systems. The complete text of management comments is in Part III.

Finding B. Component Breakout

The Project Office's acquisition strategy report for the THAAD system did not address the feasibility of component breakout as required by DoD Instruction 5000.2. Component breakout was not considered because the Project Office wanted Lockheed and Raytheon Corporation to be fully responsible for the missile defense system. As a result, the Project Office may miss an opportunity beyond the Future Years Defense Program to better use as much as $7.2 million.

Component Breakout Policy

Component Breakout. Breakout is the process whereby the Government purchases assemblies, subassemblies, and components directly from subcontractors, vendors, or suppliers and furnishes them to prime contractors as Government-furnished equipment. Component breakout eliminates prime contractors' indirect costs and profits, thereby putting Government funds to better use.

DoD Policy. DoD policy is to initiate component breakout of weapons systems whenever practicable. DoD Instruction 5000.2, "Defense Acquisition Management Policies and Procedures," part 5, section A, February 1991, as updated in February 1993, requires that component breakout be:

o considered in every program when significant cost savings are possible and

o accomplished when risks of furnishing Government items to the prime contractor are manageable.

The Instruction further requires that acquisition strategy reports list components considered and the justifications why they were not broken out.

The Defense Federal Acquisition Regulation Supplement, Appendix D, "Component Breakout," provides procedures for determining feasibility of component breakout. Appendix D requires program managers to identify potential candidates and determine whether the benefits resulting from breakout outweigh the risks. If the reviews demonstrate that breakout would not significantly affect quality, reliability, performance, or timely deliveries of end items and if significant saving can be achieved, component breakout should be considered.

Acquisition Strategy

The Project Office's acquisition strategy report for the THAAD system did not include plans to perform a component breakout review before the full-rate production contract scheduled for FY 2002. The Project Office stated that component breakout was not considered because it wanted its prime contractors, Lockheed and Raytheon Corporation, to be fully responsible for the missile and radar systems, respectively.

By the full-rate production contract in FY 2002, however, the Army will have demonstrated that the THAAD system meets all operational requirements, is producible within acceptable cost and schedule risks, and is operationally supportable. With program stability, nondevelopmental electronic items and stand-alone equipment are excellent candidates for component breakout.

Nondevelopmental Items. Signal and data processors for the ground-based radar are nondevelopmental (off-the-shelf) items built by Digital Equipment Corporation (Digital). Each electronic equipment van contains four signal processors and two data processors. By the time the full-rate production decision is made, a total of eight THAAD ground-based radar systems will have been built (32 signal processors, 16 data processors). Further, Digital supplies these same processors to other Government customers on a General Services Administration supply contract.

Stand-alone Subsystems. Cooling equipment vans are stand-alone units delivered to Raytheon Corporation by Gichner Shelter Systems (Gichner). The cooling equipment vans provide required radar cooling. Gichner either makes or purchases the components in the cooling equipment van; no additional design or engineering effort is required by Raytheon to make the unit function. Raytheon's efforts are limited to examining and testing the cooling equipment before incorporating it as part of the radar system. Raytheon has not experienced any quality control, reliability, or maintainability problems with the van or the cooling equipment. Eight cooling equipment units will have been produced and operationally tested before the full-rate production decision is made.

Feasibility of Providing Government-Furnished Equipment

The THAAD Project Office has demonstrated the feasibility to provide Raytheon Corporation Government-furnished equipment for the ground-based radar system contract and still hold the contractor responsible for total system integration responsibility. These equipment acquisitions were low-risk for which vendors had demonstrated equipment quality, reliability, performance, and delivery timeliness. Specific Government-furnished equipment were the stand-alone primary power unit van, the global positioning system

receiver, control and display units, and the single-channel ground and airborne radio system. As the system integrator, Raytheon Corporation accepts these delivered components and integrates them into the radar system.

Benefits From Component Breakout

Cost avoidance benefits will result by breaking out signal and data processors and stand-alone cooling equipment vans. Because Raytheon adds approximately * percent to the cost of the processors and cooling equipment for general and administrative expenses, cost of money, and fees, as much as $7.2 million could be put to better use beyond the Future Years Defense Program when the Project Office acquires the final nine full-rate production systems (Appendix E).

Conclusion

Component breakout opportunities exist for the THAAD system. Accordingly, the Project Office should identify potential candidates, weigh cost-to-risk benefits, and determine when to execute the breakout actions early in the acquisition cycle. Since the THAAD full-rate production is not planned until FY 2002, the Project Office has sufficient time to revise the THAAD acquisition strategy, perform a component breakout review, and identify breakout candidates.

Recommendations, Management Comments, and Audit Responses

B. We recommend that the Project Manager, Theater High Altitude Area Defense Project Office:

1. List components considered for breakout and justify why they were or were not broken out in the acquisition strategy report.

2. Conduct component breakout reviews before the Theater High Altitude Area Defense full-rate production contract planned for FY 2002.

3. Break out components if reviews show that cost benefits so justify.

*Contractor proprietary data removed.

Department of the Army Comments. The Army concurred with the recommendations, stating that it will include a list of potential breakout components in a revised acquisition strategy for the Engineering and Manufacturing Development phase of the program. The Army stated that it will also prepare a component breakout review after contractors submit proposals for production THAAD systems. As part of their proposals, contractors will be require to submit lists of possible component breakout candidates. Where justified, the Army stated that candidates for breakout will be identified as Government-furnished equipment in the full-rate production contract. Because the potential cost avoidance will occur after FY 2000, the Army stated that it was premature to commit to the extent of the cost avoidance resulting from component breakout until the final decision is made on component breakout.

Ballistic Missile Defense Organization Comments. The Ballistic Missile Defense Organization concurred with the finding and recommendations.

Audit Response. Management's comments are responsive to the audit recommendations. We agree that potential cost avoidance benefits for the production systems are uncertain at this time. We identified the potential cost avoidance to demonstrate the monetary benefit that could result from breaking out components in the acquisition strategy for THAAD production systems. The complete text of management comments is in Part III.

Part II - Additional Information

Appendix A. Scope and Methodology

Scope

We performed this program audit from November 1994 through June 1995 in accordance with auditing standards issued by the Comptroller General of the United States as implemented by the Inspector General, DoD. Accordingly, we included tests of management controls as considered necessary. We reviewed the THAAD demonstration and validation and UOES acquisition data from September 1992 through June 1995 to accomplish our audit objectives. We analyzed the potential for multiyear contracting and for component breakout of the THAAD system. To accomplish these analyses and other reviews, we visited the BMDO Office, the Project Office, contractors, and other offices. Appendix G provides a complete listing of the organizations visited or contacted.

Methodology

The audit was made in accordance with the Inspector General's critical program management element approach. Accordingly, we reviewed requirements' evolution and affordability, acquisition planning and risk management, engineering and manufacturing, logistics and other infrastructure, test and evaluation, contract performance measurement, contracting, and related management controls.

Data reviewed included mission need and operating requirements documents, threat assessments, cost analyses and budget submissions, integrated program summaries, program decision memorandums and deviation reports, theater missile defense master plans, program management and logistics support plans and design reviews, configuration management and software development plans and audits, transportability plans, test and test simulation plans, contracts and cost performance reports, management control plans, and other documents as deemed appropriate.

The Technical Assessment Division of the Audit Planning and Technical Support Directorate reviewed software engineering for the THAAD system.

We were also assisted by personnel at the BMDO Office, the THAAD Project Office, Defense Plant Representative Offices, Defense Contract Management Area Operations Offices, and contractors. We did not apply statistical sampling or rely on computer-processed data to support the findings and recommendations in this audit report.

Management Control Program

DoD Directive 5010.38, "Internal Management Control Program," April 14, 1987, requires DoD organizations to implement a comprehensive system of management controls that provides reasonable assurance that programs are operating as intended and to evaluate the adequacy of the controls.

We assessed management controls related to the critical program management elements of the THAAD acquisition. We relied on the results of DoD Inspector General Audit Project No. 5AE-0009, "Audit of the Implementation of the DoD Management Control Program for Major Defense Acquisition Programs," concerning the adequacy of the Military Departments' implementation of their internal management control programs. We did not identify any material management control weaknesses as defined by DoD Directive 5010.38.

Appendix B. Summary of Prior Audits and Other Reviews

During the past 5 years, the General Accounting Office (GAO) and the Office of the Inspector General, DoD, issued five reports that discussed the THAAD System.

General Accounting Office

GAO Report No. NSIAD-94-255BR (OSD [Office of the Secretary of Defense] Case No. 9785), "1995 Defense Budget: Potential Reductions and Rescissions in RDT&E [Research, Development, Testing, and Evaluation] and Procurement Programs," September 8, 1994, identified potential budget reductions of $843.7 million to the FY 1995 research, development, test, and evaluation budget request and potential rescissions of approximately $114.8 million to prior years' appropriations.

The report proposed that $30 million needed to incrementally fund 40 THAAD UOES missiles should not be obligated until the Anti-Ballistic Missile Treaty (ABM Treaty) issue was resolved and OSD testing criteria were demonstrated. The THAAD project officials concurred with the proposed funds restrictions.

GAO Report No. T-NSIAD-94-167 (OSD Case No. 9601-A), "Ballistic Missile Defense: Information on Theater High Altitude Area Defense and Other Theater Missile Defense Systems," May 3, 1994, summarized GAO testimony before the Senate Committee on Foreign Relations on the THAAD system and other theater missile defense systems. The testimony focused on status and cost of the theater missile defense concepts and compliance with the 1972 ABM Treaty.

The report stated the executive branch had made treaty proposals that would allow THAAD to be developed and deployed for theater missile defense. The ABM Treaty prohibits mobile land-based systems that counter strategic ballistic missiles, but does not define strategic or theater missiles. If THAAD has some capability against strategic ballistic missiles, THAAD would have serious implications concerning the ABM Treaty. No recommendations were made.

GAO Report No. NSIAD-93293BR (OSD Case No. 9538), "1994 Defense Budget: Potential Reductions, Rescissions, and Restrictions to RDT&E Programs," September 30, 1993, identified potential FY 1994 budget reductions, rescissions to prior years' appropriations, and restrictions on RDT&E obligation authority. GAO stated Congress could restrict $718.4 million of the $1.6 billion FY 1994 request until it determined whether the area defense missile and radar complied with the ABM Treaty. Program slippage may be preferred to developing a system that is not treaty compliant. No recommendations were made.

GAO Report No. NSIAD-93-229 (OSD Case No. 9428), "Ballistic Missile Defense: Evolution and Current Issues," July 16, 1993, identified major challenges that the THAAD development must overcome. The reported challenges were "productability" of the solid state radar antenna modules for the ground-based radar, integration of missile and radar, THAAD missile lethality against warheads with submunitions, THAAD kill vehicle integration, and THAAD kill vehicle software development.

The report also stated that the BMDO must satisfy the Under Secretary of Defense for Acquisition and Technology requirement that the THAAD system complies with the ABM Treaty. No recommendations were made.

Inspector General, DoD

Inspector General Report No. 94-101, "Program Management Organization for the Upper Tier Theater Missile Defense System," May 16, 1994, stated that DoD and contractor organizations could be more effectively organized to reduce Upper Tier Theater Missile Defense program developmental and systems integration risk. The report also stated that the continued development of the THAAD missile system and the ground-based radar under separate contracts could lead to increased program risk because of integration difficulties, duplication of work, and split responsibilities for system performance.

The report recommended that the Director, BMDO, consolidate all THAAD and ground-based radar program management under a single program integrator. The report also recommended that the Army Program Executive Office for Missile Defense merge the THAAD and Ground-Based Radar Project Offices and develop an Engineering and Manufacturing Development contract acquisition strategy for a single prime contractor.

The BMDO concurred with the recommendations and explained that it had reorganized the Project Office since audit completion. The Army also concurred with the recommendations and merged the THAAD and Ground-Based Radar Project Offices into a single project office effective June 30, 1995.

Appendix C. Other Matters of Interest and Areas Not Requiring Further Review

Other Matters of Interest

During the audit, we identified two areas of concern relating to logistics and other infrastructure and acquisition planning and risk management.

Logistics and Other Infrastructure. The Joint Staff had fully addressed airlift needs for THAAD production systems. However, deployment planning documents did not exist for deploying the UOES because it is not in the DoD weapons inventory. Consequently, theater commanders were not aware of the significant airlift requirements for the UOES. The UOES may require as many as 40 C-141s for strategic (inter-theater) deployment or 94 aircraft for tactical (intra-theater) deployment. Absent advance deployment planning documentation, delays for planned airlift payloads could occur if otherwise dedicated airlift is used for the UOES.

Acquisition Planning and Risk Management. The Project Office had not initiated a design-to-cost program at DAB Milestone I as required by DoD Instruction 5000.2. During our audit, the Project Office initiated a program to ensure design-to-cost objectives will be met.

We also identified administrative deficiencies in risk management and in technical information crossflow that required attention. The Project Office designated a central point of contact to coordinate cost, schedule, and performance risk management issues. Further, the Project Office enhanced the crossflow of technical information through revised administrative procedures between the Project Office, Defense Plant Representative Office Lockheed, the Defense Contract Management Area Operation Van Nuys, and the independent verification and validation contractor for THAAD software.

Areas Not Requiring Further Review

At the completion of the audit survey, we determined that additional audit work was not warranted for the following program management elements.

Requirements' Evolution and Affordability. The Project Office was adequately managing requirements' evolution and affordability issues. The Project Office, BMDO, and Army users had actively participated in defining system requirements for the THAAD development program. In addition, the BMDO, the Project Office, and independent agencies had prepared estimates to project system acquisition costs.

Engineering and Manufacturing. The Project Office had established and implemented an effective engineering and manufacturing program as required by DoD Instruction 5000.2. It prepared or revised documents to ensure a smooth transition from THAAD Phase I demonstration and validation to Phase II engineering and manufacturing development. Among the documents was a technical assessment report "NBC [Nuclear, Biological, and Chemical] Contamination and Nuclear Survivability Assessment for Selected Government Furnished and Commercial Off-the-Shelf Equipment" that an Army contractor issued in September 1994. The report concluded that the generator trailered behind the radar's operator control unit was not in compliance with Army Regulation 70-71, "Nuclear, Biological, and Chemical Contamination Survivability of Army Materiel." The Project Office is addressing this issue and will resolve it before production systems are delivered to the Army.

The Project Office was adequately planning and managing THAAD software development in accordance with specified military standards. In this respect, the Project Office was correcting deficiencies and modifying development plans to prepare the THAAD for the Phase II engineering and manufacturing development phase based on reports submitted by independent verification and validation contractors, prime contractors, subcontractors, and administrative contracting officers.

Logistics and Other Infrastructure. The Project Office had prepared logistics and other infrastructure plans in compliance with Defense and Army directives and regulations. An integrated logistics support plan was prepared. Military standards and handbooks were used where appropriate and a technical data management program was established. Even though Lockheed is responsible for configuration management during Phase I demonstration and validation, the Project Office had identified configuration management issues at Lockheed that required correction. At our suggestion, the Project Office planned a follow-up evaluation of configuration management before the Phase II engineering and manufacturing development decision point.

Test and Evaluation. The Project Office had implemented a comprehensive test and evaluation program in accordance with DoD Instruction 5000.2. In addition, the DoD Director, Operational Test and Evaluation, and the Army testing agencies participated in working groups and provided assistance when needed. Because of live fire test limitations, system effectiveness will be evaluated using accredited computer simulations. This evaluation will be done before the Phase II engineering and manufacturing development decision point. All major DoD and Army test organizations recognized the inability to fully test the THAAD at available DoD test ranges and were actively involved with the computer-simulated tests.

Contract Performance Measurement. The Project Office had developed a performance measurement system in accordance with contract requirements and specified military standards. This system consisted of cost and schedule checks and balances and included oversight by the Defense Plant Representative Offices and the Defense Contract Management Area Offices. In response to our concerns over the cost performance reports from the Lockheed's BM/C^3I subcontractor, the Defense Contract Management Area Office, Van Nuys, modified its surveillance plan. It now verifies earned value claimed and reconciles it to work claimed in the software metrics report.

Contracting. The Project Office adequately managed the THAAD Phase I contracts. The source-selection committee approved the Source Selection Evaluation Board decision, its justification, and the use of full and open competition for the two prime contracts. During the audit, we noted a lack of spare parts to maintain the ground-based radar. As a result of our review, the Project Office initiated a contract modification to obtain system maintenance support for all UOES radar system deployments and initiated a follow-on contract to provide 5 years' radar system maintenance for the UOES.

Appendix D. Theater High Altitude Area Defense Funding

FY 1997 Program Objective Memorandum

(Then-Year $ in Millions)

Fiscal Years	Development	Production	Military Construction	Total
Prior years	$ *	$ *	$ *	$ *
1995	*	*	*	*
1996	*	*	*	*
1997	*	*	*	*
1998	*	*	*	*
1999	*	*	*	*
2000	*	*	*	*
2001	*	*	*	*
2002	*	*	*	*
Out years	*	*	*	*
Total	**$ ***	**$ ***	**$ ***	**$ ***

*DoD Planning, Programming and Budget System Information Removed.

Appendix E. Potential Breakout Savings

Component	Unit Price x Quantity	Raytheon's Cost	Raytheon's Price *	Difference
Radar signal processors	$ ** x 4	$ **	$ **	$ **
Radar data processors	** x 2	**	**	**
Cooling equipment units	** x 1	**	**	**
Subtotal		**$ **	**$ **	**$ **
Production radar units				x 9
Total				**$7,184,214**

*Includes ** percent markup for Raytheon's general and administrative expense, cost of money, and fee.

**Contractor proprietary data removed.

Appendix F. Summary of Potential Benefits Resulting From Audit

Recommendation Reference	Description of Benefit	Amount and/or Type of Benefit
A.1., A.2.	Compliance with Regulation. Will ensure that the Project Office considers multiyear contracting in the production acquisition strategy.	Nonmonetary.
A.3.	Compliance with Regulation and Economy and Efficiency. Will ensure that the Project Office uses the results of the cost-benefit studies to evaluate multiyear contracting.	Nonmonetary. Funds of about $110 million could be put to better use beyond the Future Years Defense Program if multiyear contracting is used.
B.1., B.2.	Compliance with Regulation. Will ensure that the Project Office adequately considers component breakout in the THAAD acquisition strategy.	Nonmonetary.
B.3.	Compliance with Regulation and Economy and Efficiency. Will ensure that the Project Office uses the results of the component breakout review for FY 2002 and beyond production buys of the ground-based radar.	Nonmonetary. Funds of about $7.2 million could be put to better use beyond the Future Years Defense Program if components are broken out.

Appendix G. Organizations Visited or Contacted

Office of the Secretary of Defense

Under Secretary of Defense for Acquisition and Technology, Washington, DC
  Director, Ballistic Missile Defense Organization, Washington, DC
Director, Operational Test and Evaluation, Washington, DC
Director, Program Analysis and Evaluation, Washington, DC

Joint Staff

Director for Logistics (J4), Washington, DC
Director for Strategic Plans and Policy (J5), Washington, DC
Director for Operational Plans and Interoperability (J7), Washington, DC
Director for Force Structure and Resources (J8), Washington, DC

Department of the Army

Assistant Secretary of the Army (Research, Development and Acquisition), Washington, DC
Commander, Army Missile Command, Huntsville, AL
  Software Engineering Directorate, Huntsville, AL
Commander, Army Space and Strategic Defense Command, Huntsville, AL
Program Executive Office, Missile Defense Organization, Arlington, VA
  Theater High Altitude Area Defense Project Office, Huntsville, AL
    White Sands Missile Range Field Office, NM
  Theater Missile Defense, Ground-Based Radar Project Office, Huntsville, AL
Commander, Army Operational Evaluation Command, Alexandria, VA
Commander, Army Nuclear and Chemical Agency, Springfield, VA
Commander, Army Material Systems Analysis Activity, Aberdeen Proving Ground, Aberdeen, MD
Commander, Army Air Defense Artillery School, Fort Bliss, TX

Unified Command

Transportation Command, Scott Air Force Base, IL

Other Defense Organizations

Director, Defense Contract Audit Agency, Cameron Station, VA
- Litton Data Systems, Agoura Hills, CA
- Lockheed Missiles and Space Company, Sunnyvale, CA
- Raytheon Equipment Division, Marlborough, MA

Director, Defense Logistics Agency, Alexandria, VA
- Defense Contract Management Area Operations Reading, PA
- Defense Contract Management Area Operations Van Nuys, CA
- Defense Plant Representative Office Lockheed, Sunnyvale, CA
- Defense Plant Representative Office Raytheon, Burlington, MA

Director, Defense Systems Management College, Fort Belvoir, VA
Director, Military Traffic Management Command, Fort Eustis, VA

Contractors

Coleman Research Corporation, Huntsville, AL
Colsa Incorporated, Huntsville, AL
Gichner Shelter Systems Incorporated, Dallastown, PA
Litton Data Systems, Agoura Hills, CA
Lockheed Missiles and Space Company
- Courtland, AL
- Huntsville, AL
- Sunnyvale, CA

Raytheon Company, Advanced Technology
- Advanced Device Center, Andover, MA

Raytheon Company, Equipment Division
- Burlington, MA
- Waltham, MA
- Wayland, MA

Tech-Masters Incorporated, Huntsville, AL

Appendix H. Report Distribution

Office of the Secretary of Defense

Under Secretary of Defense for Acquisition and Technology
  Director, Ballistic Missile Defense Organization
  Director, Defense Logistics Studies Information Exchange
Under Secretary of Defense (Comptroller)
  Deputy Chief Financial Officer
  Deputy Comptroller (Program/Budget)
Assistant to the Secretary of Defense (Public Affairs)

Department of the Army

Auditor General, Department of the Army
Program Executive Office, Missile Defense

Department of the Navy

Assistant Secretary of the Navy (Financial Management and Comptroller)
Auditor General, Department of the Navy

Department of the Air Force

Assistant Secretary of the Air Force (Financial Management and Comptroller)
Auditor General, Air Force Audit Agency

Other Defense Organizations

Director, Defense Contract Audit Agency
Director, Defense Logistics Agency
Director, National Security Agency
  Inspector General, National Security Agency

Non-Defense Federal Organizations

Office of Management and Budget
Technical Information Center, National Security and International Affairs Division, General Accounting Office
Chairman and ranking minority member of the following congressional committees and subcommittees:
- Senate Committee on Appropriations
- Senate Subcommittee on Defense, Committee on Appropriations
- Senate Committee on Armed Services
- Senate Committee on Governmental Affairs
- House Committee on Appropriations
- House Subcommittee on National Security, Committee on Appropriations
- House Committee on Government Reform and Oversight
- House Subcommittee on National Security, International Affairs and Criminal Justice, Committee on Government Reform and Oversight
- House Committee on National Security

Part III - Management Comments

Department of the Army Comments

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
RESEARCH DEVELOPMENT AND ACQUISITION
103 ARMY PENTAGON
WASHINGTON DC 20310-0103

REPLY TO
ATTENTION OF

2 October 1995

SARD-SM

MEMORANDUM FOR INSPECTOR GENERAL, DEPARTMENT OF DEFENSE (AUDITING)

SUBJECT: Audit Report on the Acquisition of the Theater High Altitude Area Defense Program (Project No. 5AE-0006)

The subject report was reviewed by the Theater High Altitude Area Defense (THAAD) Project Office. Its response was coordinated with the Program Executive Office, Missile Defense and the Army staff. The Army concurs with the report's recommendations and will plan appropriate actions for implementation. Detailed comments are at the enclosure.

Encl

JAN A. VAN PROOYEN
Major General, GS
Deputy for Systems
Management

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Audit Report on the Acquisition of the Theater High Altitude Area Defense Program (Project No. 5AE-0006)

Finding A. Multiyear Contracting

Recommendation A.1. Conduct a cost-benefit analysis to determine the extent of potential cost avoidance resulting from a multiyear procurement strategy.

Action Taken. Concur. The THAAD Project office will conduct a cost-benefit analysis as a part of the acquisition strategy for the full-rate production effort. In accordance with the current schedule, this analysis would be performed in FY00, in time to support the FY02 budget submission.

Recommendation A.2. Include multiyear contracting for full-rate production systems in the Theater High Altitude Area Defense acquisition strategy if significant savings result from implementing Recommendation A.1.

Action Taken. Concur. Consideration of multiyear contracting for full rate production has been included in the current acquisition strategy being submitted for approval. If the results of the cost-benefit analysis in A.1. warrant, and multiyear funding is approved, multiyear contracting will be included in the Theater High Altitude Area Defense full rate production acquisition strategy report.

Recommendation A.3. Request congressional authority to implement a multiyear contract for Theater High Altitude Area Defense full-rate production systems if significant savings are available.

Action Taken. Concur. A request for congressional authority to implement a multiyear contract for THAAD full-rate production will be submitted to support the FY02 budget request if the cost-benefit analysis results in cost effective multiyear contracting.

Finding B. Component Breakout

Recommendation B.1. List components considered for breakout and justify why they were or were not broken out in the acquisition strategy report.

Action Taken. Concur. A list of components considered for breakout with justifications will be prepared and included in a revision to the acquisition strategy report for the Engineering and Manufacturing Development phase of the program. This action will be complete by Milestone II.

Recommendation B.2. Conduct component breakout reviews before the Theater High Altitude Area Defense full-rate production contract planned for FY 2002.

Enclosure

Action Taken. Concur. As part of the Request For Proposal for the full rate production contract, the contractors will be required to submit a list of suggested components for breakout consideration. At that time, a report will be prepared identifying components for breakout.

Recommendation B.3. Break out components if reviews show that cost benefits so justify.

Action Taken. Concur. Components justified for breakout will be identified as Government-furnished equipment in the full-rate production contract.

Potential Benefits, Findings A and B and Appendix F. We take exception to quantifying any potential benefits until a complete and comprehensive cost-benefit study can be performed as recommended. We feel that it is premature to make final decisions at this point on multiyear contracting and component breakout for the full-rate production phase of this missile acquisition program. We will continue to consider these and other options as part of each milestone decision review.

Other Comments

In Appendix C, Other Matters of Interest, Logistics and Other Infrastructure, the DODIG states ... planning documents did not exist for deploying the UOES.... We disagree with this statement. The Project Office provided the auditors planning documents for UOES airlift requirements during the audit. If the auditors are referring to the user not having deployment planning documents, they should so indicate.

In the same paragraph, the DODIG states "Absent advance documentation, theater commanders may choose not to deploy the UOES when it becomes operational due to the extensive airlift requirements. Conversely, delays for planned payloads could occur if otherwise dedicated airlift is used for the UOES." We disagree. The THAAD UOES battalion will represent the most effective deterrent to a Ballistic Missile attack available to commanders in the field. Prioritization of limited airlift assets has been and will remain a logistical problem for theater commanders. During the Desert Storm war, commanders made the decision to field Patriot battalions and there is no reason to assume that the same decisions would not be made for a THAAD UOES battalion that would provide protection for a much larger area with less airlift requirements.

Ballistic Missile Defense Organization Comments

DEPARTMENT OF DEFENSE
BALLISTIC MISSILE DEFENSE ORGANIZATION
7100 DEFENSE PENTAGON
WASHINGTON, DC 20301-7100

AQQ

October 10, 1995

MEMORANDUM FOR INSPECTOR GENERAL, DEPARTMENT OF DEFENSE

SUBJECT: Comments on Audit Report "Acquisition of the THAAD Program" (Project No. 5AE-0006)

After reviewing the draft audit report, I concur with the findings and recommendations. The Project Manager for the Theater High Altitude Area Defense (THAAD) System will conduct a cost-benefit analysis to determine the extent of cost avoidance resulting from both a multiyear procurement strategy and component breakout. If multiyear procurement results in significant cost avoidance or savings, this approach will be pursued. The revised Acquisition Strategy Report (ASR) for the Engineering, Manufacturing, and Development (EMD) phase of the THAAD program indicates that multiyear procurement will be one of several procurement options evaluated. Some component breakout is already anticipated and planned, especially for the launcher and the BM/C3I vehicles. Based on the audit report, other candidate items will be reviewed and a determination made of further breakout opportunities.

In addition to the THAAD Project Manager conducting a cost-benefit analysis, my Deputy for Acquisition/Theater Missile Defense, supported by my Program Operations Directorate, will also conduct independent analyses to validate the determinations from the THAAD Project Office.

Mr. David Wyte, Audit Program Director, and his audit team were perhaps the most open, candid and professional group of Department of Defense Inspector General auditors who have been involved in the audit or inspection of any of my Theater Missile Defense, National Missile Defense, or Technology Readiness programs. They were courteous, attentive, and helpful throughout the entire audit.

Any further questions concerning this audit report should be directed to Lieutenant Colonel Michael T. Perrin, Assistant Director for the THAAD System, at (703) 693-1780 (DSN 223-1780).

MALCOLM R. O'NEILL
Lieutenant General, USA
Director

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