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Report to Congressional Committees

May 1997

ARMY ACQUISITION

Longbow Hellfire Missile Procurement Quantities Significantly Overstated

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National Security and
International Affairs Division

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Congressional Committees

In response to congressional concerns about the increasing cost of weapon systems entering full-rate production, we initiated a review of the Longbow Hellfire missile to assess its acquisition strategy and associated costs. Specifically, our objectives were to determine if (1) the Army had adequately justified the requirement and quantities of the missile and (2) the missile had successfully demonstrated its requirements during initial operational testing and evaluation (IOT&E). We conducted this review under our basic legislative responsibilities and are addressing this report to you because the matters discussed in it fall within your committees' jurisdiction.

Background

Longbow Hellfire is an air-to-ground missile designed to be fired from a modified AH-64D Apache helicopter. The Army plans to convert all of its 758 Apache helicopters so that they can carry a mix of Longbow Hellfire and Hellfire II missiles. Both Longbow Hellfire and Hellfire II missiles are complementary and can be employed singly or as a mixed load on the Apache. Longbow Hellfire is to receive targeting information from a fire control radar mounted on the modified Apache helicopters. However, only 227 of the 758 helicopters are expected to be equipped with the fire control radar. Targeting information will be digitally transmitted from these helicopters to those without the fire control radar.

The Army's current acquisition strategy for the Longbow Hellfire missile is contained in its December 1, 1994, Longbow Hellfire Cost-Reduction Program plan. This strategy was developed in response to the Under Secretary of Defense's November 16, 1994, Acquisition Decision Memorandum, which directed program cost-reduction efforts. The strategy calls for a reduction in the length of the 13,311 Longbow Hellfire missile procurement program from 10 to 8 years in an attempt to reduce program costs by 25 percent or more. The Army plans to accelerate the production schedule, increase production rates, award a multiyear contract, and make numerous missile hardware and process improvements. As a result of this strategy, the Army estimates it can reduce unit costs from $234,000 to $169,000.

Since the Cost-Reduction Program plan was implemented, the Army reduced the quantity of missiles from 13,311 to 12,722 based on

across-the-board funding reductions. Program officials stated that the Cost-Reduction Program plan will not be adversely affected by this reduction. According to the Office of the Secretary of Defense, Program Analysis and Evaluation (OSD PA&E) data, the annual full-production rates will be around 1,900 a year instead of the originally planned 2,200.

The Longbow Hellfire missile is currently in its low-rate initial production phase. The Army plans to award a full-rate production contract in November 1997 and seek congressional approval for a multiyear contract in fiscal year 1999. According to 10 U.S.C. 2306b, a military service can award multiyear contracts for the purchase of weapon systems if certain criteria are met. One criterion is that the minimum need for the weapon system to be purchased is expected to remain substantially unchanged during the contract period in terms of production rate, procurement rate, and total quantities.

Results in Brief

The Apache Longbow weapon system, which includes the Longbow Hellfire missile, completed IOT&E in March 1995. The tests concluded that the system was operationally effective and suitable. However, the Army's current Longbow Hellfire missile requirement of 12,722 may be overstated by over 8,300 missiles. The Army made computational errors and a questionable assumption in calculating missile requirements that resulted in a potential overstatement of 7,145 missiles. In addition, test results indicate that the missile quantity could be reduced by another 1,184 missiles. Moreover, significant cost reductions can be achieved with lower missile quantities. While cost estimates for an 8,300 missile quantity reduction are not yet available, OSD estimates that up to $500 million in program cost savings can be achieved by reducing quantities by approximately 4,000 units.

Table 1: Summary of Longbow Hellfire Requirement Issues

	Number of missiles
Current Army requirement	12,722
Less: computational errors and questionable assumption	(7,145)
Less: test problems	(1,184)
Alternative requirement	4,393

The Army's method of computing the quantities contains three critical errors. The Army used an outdated helicopter carrying capability of 16 missiles instead of the current 12, double counted missiles when

figuring the residual readiness portion of the requirement, and used an unsubstantiated mix ratio between Longbow Hellfire and Hellfire II missiles. Correcting these mistakes would potentially reduce the current 12,722 missile requirement for Longbow Hellfire missiles by 7,145 missiles.

In addition, the Army Material System Analysis Activity's independent evaluation of the Apache Longbow weapon system disclosed that the Apache Longbow system's weight needs to be reduced by almost 600 pounds to achieve its vertical rate of climb specification. According to Army data, the system's current demonstrated capability is calculated using 8 missiles instead of 12. If the Army lowers its missile carrying capability to 8 to meet the Apache Longbow system weight limitation, this would further reduce the missile requirement by 1,184.

Current Longbow Missile Quantities Are Significantly Overstated

According to OSD PA&E and our calculations, the current Longbow Hellfire missile procurement quantity of 12,722 missiles could be overstated by 7,145 missiles. Our work shows that the current Longbow Hellfire missile requirement contained an outdated helicopter missile-carrying capability and double counted missiles. In addition, the Army used an unsubstantiated higher ratio of Longbow Hellfire to Hellfire II missiles than previously used when determining the appropriate mix between these complementary systems.

Department of Defense (DOD) instruction 4100.41 establishes the capabilities based munitions requirement process as the method DOD and the military departments are to use to compute requirements. According to officials in the Office of the Deputy Chief of Staff for Operations and Plans, the capabilities based munitions requirement process was used to determine the requirement for both Longbow Hellfire and Hellfire II. The Army then applied a ratio to the total combined requirement to determine the appropriate number of each type missile.

According to data supplied by the Army, the combined requirement for Hellfire II and Longbow Hellfire missiles for use on the AH-64D Apache as of November 1996 was just over 19,700 missiles, excluding training and testing requirements.[1] Our review of this data showed that the Army used a helicopter carrying capability of 16 missiles instead of the current 12 and double counted missiles when it calculated the residual readiness element of the requirement. The residual readiness requirement is the munitions

[1]The total Hellfire II missile requirement is greater than the Longbow missile requirement because in addition to being launched from the Apache, it is also launched from Army Kiowa Warrior and Marine Corps Cobra helicopters. The Army is to finish procuring Hellfire II missiles in fiscal year 1997.

necessary to provide a combat capability beyond that required for the two major regional contingencies. We determined that adjusting for these corrections would reduce the combined total requirement for both missiles to 11,153.

The Army representative who is responsible for developing munition requirements confirmed that our adjustments were appropriate. He stated that the Army's current requirement was based on a helicopter carrying capability of 16 missiles and that double counting did occur in the residual readiness calculation. He explained that the double counting was caused by the Army not applying the missiles designated as combat supply toward its residual readiness calculation. Forty-three days of combat supply is included in requirements to give operational flexibility during a conflict. According to the residual readiness definition, these missiles should be used to offset the residual readiness requirement. Failure to count the supply missiles in the Army's residual readiness calculation doubles this quantity. He also stated that additional changes need to be made in how residual readiness is calculated because expected aircraft attrition was not factored in and it should be. He did not have the aircraft attrition numbers available for us to calculate the impact this correction would have on the requirement. However, he agreed this would further lower the recalculated requirement of 11,153.

To determine the Longbow Hellfire and Hellfire II individual requirements, the Army applied a ratio factor to the total requirement. The Army used a three-to-one mix of Longbow Hellfire to Hellfire II missiles in determining the appropriate requirement for each weapon. However, according to agency officials, up until last year, the Army had used a one-to-one ratio to calculate the requirement. Army and DOD representatives stated that there is no support to justify either ratio and could offer no explanations for why they changed the ratio. According to the Army officials, they used their best judgment to determine the appropriate mix.

While there is no justification for either ratio, preliminary results from the ongoing Deep Attack Weapons Mix study suggest that a one-to-one ratio may be more appropriate than Army's current three-to-one ratio. In response to our 1995 report that raised questions concerning the number of missiles required,[2] DOD stated that the calculations were made prior to the capabilities based munitions requirement process being included in the Defense Planning Guidance and agreed to review the requirement in

[2]Longbow Apache Helicopter: System Procurement Issues Need to Be Resolved (GAO/NSIAD-95-159, Aug. 24, 1995).

accordance with direction from the Secretary of Defense. Army officials confirmed that the requirement is being reviewed. However, one study that may change the requirements—the Deep Attack Weapons Mix study—is not yet complete. Army and DOD representatives told us that preliminary study results favor the use of the Hellfire II over the Longbow Hellfire. These preliminary results suggest that the one-to-one ratio is more appropriate than the three-to-one ratio. Applying the one-to-one ratio to the recalculated combined requirement of 11,153 missiles for use on Apache helicopters would result in a 5,577 Longbow Hellfire requirement and a 5,577 Hellfire II requirement. Therefore, the current Longbow Hellfire requirement of 12,722 could be reduced by 7,145 missiles.

In July 1996, OSD PA&E took an official position that the current Longbow Hellfire missile requirement should not exceed 8,880 missiles. The OSD PA&E official responsible for this analysis agreed with our calculation of a combined Hellfire requirement of 11,153 missiles. The 8,880 recommended quantity would still give the Army the three-to-one mix it desires using the newly recalculated total requirement. According to this official, 8,880 Longbow Hellfire missiles are more than adequate for Army needs. He stated that his office was not willing to take a position on the mix ratio question since there was no support for either mix ratio figure. He stated that OSD PA&E's bottom line was to recommend a 30-percent cut in the Longbow Hellfire missile program quantity.

Test Results and Army Study Show Potential Exists for Further Quantity Reductions

Operational testing results and an Army study raise issues that should further reduce the number of Longbow Hellfire missiles that need to be bought. Although the Longbow Apache equipped with the fire control radar successfully demonstrated its effectiveness and suitability in operational testing, the tests raised serious concerns regarding the effectiveness of Longbow Hellfire missiles on Apaches without the fire control radar. Current Army plans call for each Apache company to receive three fire control radar helicopters and five non-fire control radar helicopters. The aircraft with radars are to locate and classify targets, then digitally hand over some of the targets to the non-fire control radar helicopters for engagement. According to the Director of Operational Test and Evaluation's October 1995 report, the handoff procedure had significant problems during the test. Most of the crews in the radar aircraft chose not to hand off targets because the one-at-a-time handoff process was time-consuming and unreliable. Consequently, the non-fire control helicopters did not expend their missiles. As a result, the report found a

lethality difference between fire control and non-fire control radar helicopters that was so great that the report recommended the Army review its helicopter mix. These hand-off deficiencies raise questions about the rationale for buying Longbow Hellfire missiles for use on non-fire control radar helicopters.

The Army Material System Analysis Activity's (AMSAA) independent evaluation of the Longbow Apache helicopter weapon system revealed that neither version of the airframe is meeting its vertical rate of climb requirement. The report states that to meet this requirement, weight needs to be reduced further. For example, AMSAA estimates that the Longbow Apache without the fire-control radar would need to lose almost 600 pounds to achieve its goals. In addition, the December 1995 Selected Acquisition Report for the Longbow Apache system reported that the system's demonstrated capability was only eight missiles. If the Army has to reduce requirements from 12 to 8 missiles to reduce weight, the combined total Longbow Hellfire and Hellfire II missile requirement would decline from the recalculated 11,153 missiles to 8,785. Using the one-to-one ratio between the 2 missiles, the Longbow Hellfire missile requirement would be lowered by an additional 1,184 missiles to 4,393; a reduction of over 8,300 missiles from the existing 12,722 requirement.

Current Acquisition Plans Overstate Program Costs

OSD PA&E estimates that procuring its recommended reduced quantity of 8,880 missiles will generate possible program savings ranging from $100 to $500 million (see table 1.1). The variability in savings results from using different missile production rates. The most favorable cost-reduction scenario assumes an annual multiyear production rate of 1,400 missiles, only 500 fewer than currently planned. Although the average missile unit cost would increase from $152,000 to $176,000, total program costs would decrease from $2.1 billion to $1.6 billion, according to OSD PA&E's estimates.

Table 2: Alternative Longbow Hellfire Program and Unit Cost Estimates

Total buy	Production rate per year	Buy period	Total cost (billions of then-year dollars)	Savings (millions of then-year dollars)	Unit cost (thousands of fiscal year 1997 dollars)
Current Army requirement of 12,722	1,900	Fiscal years 1996-2003	2.1	0	152
PA&E's recommended quantity of 8,880	1,400	Fiscal years 1996-2003	1.6	500	176
PA&E's recommended quantity of 8,880	700	Fiscal years 1996-2008	2.0	100	208

Source: Data provided by OSD PA&E.

The Longbow Program Office cost analyst stated he was unable to provide a revised cost estimate for procuring 8,880 missiles or any significant quantity revision. He stated that if the program quantity is reduced to 8,880 or below, the Cost-Reduction Program plan would have to be totally revised and many of the agreements made with the contractor to reduce costs would have to be renegotiated.

Recommendations

We recommend that the Secretary of Defense direct the Secretary of the Army to (1) reduce Longbow Hellfire missile procurement requirements to reflect the current information on the number of missiles that the Apache can carry, the correct residual readiness computational procedures, and the appropriate Hellfire II to Longbow Hellfire mix ratio and (2) prepare a new procurement strategy that reflects the reduced requirement and recomputed expected cost.

Agency Comments

In commenting on a draft of this report, DOD partially concurred and acknowledged that we had highlighted significant issues regarding (1) how the current Longbow Hellfire and Hellfire II requirements were determined, (2) the Apache helicopter's problem in achieving its vertical rate of climb requirement, and (3) the time-consuming and unreliable handoff process between radar and non-radar helicopters. Concerning our recommendations, DOD commented that it would consider an updated acquisition strategy for the Longbow Hellfire and the Hellfire II missiles after the receipt and analysis of the results of the ongoing joint Deep Attack/Weapons Mix study and the Quadrennial Defense Review Study. DOD indicated that it does not expect to finalize its position on Hellfire

missile quantities until the fiscal year 1999 budget submission. The DOD response is included in appendix I.

Matters for Congressional Consideration

With the questions we have raised on the current Longbow Hellfire requirement and the uncertain impact of the Weapons Mix study and the Quadrennial Defense Review, every effort should be made to avoid committing to the production of an excessive quantity of Longbow Hellfire missiles. Congress may wish to consider limiting the fiscal year 1998 procurement quantities request to fiscal year 1997 production levels until the Secretary of the Army recalculates the required quantities of Longbow Hellfire and Hellfire II missiles and updates the acquisition strategy for these missiles.

Scope and Methodology

To determine if the Army had adequately justified its Longbow Hellfire missile requirement and quantities, we reviewed the Army's Cost-Reduction Plan and the models used to determine the quantities of missiles with officials in the Army's Air to Ground Project Office, Redstone Arsenal, Alabama. We also obtained information on the models and data used by the Army Office of the Deputy Chief of Staff for Operations and Plans, Washington, D. C., for calculating the quantities of missile. In addition, we obtained models and data from the Office of the Secretary of Defense, Program Analysis and Evaluation Office.

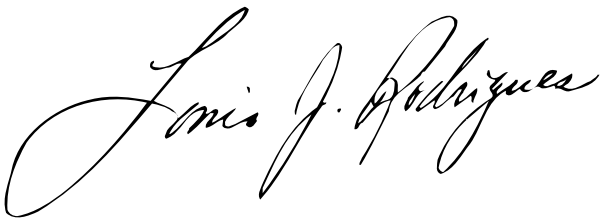
To determine if the Army had successfully demonstrated the Longbow Hellfire missile's requirements during IOT&E, we reviewed operational test reports and Army studies. We discussed these documents with officials in the Longbow Missile Program Office, the Longbow Radar Project Office in St. Louis, Missouri, and with representatives from the Office of the Director, Operational Test and Evaluation, Washington, D. C.

To determine if the missile was on schedule to achieve its planned cost reduction, we reviewed the Army's Cost Reduction Plan, current estimates, and projected costs for reduced quantities with officials in the Army's Air to Ground Project Office, Redstone Arsenal, Alabama; the Army's Office of the Deputy Chief of Staff for Operations and Plans, Washington, D. C.; and the Office of the Secretary of Defense, Program Analysis and Evaluation Office.

We conducted our review from October 1996 to February 1997 in accordance with generally accepted government auditing standards.

We are sending copies of this report to the Secretaries of Defense and the Army and the Director of the Office of Management and Budget. Copies will also be made available to others upon request.

If you or your staff have questions concerning this report, please contact me at (202) 512-4841. The major contributors to this report were Lee Edwards, Laura Durland, and John Randall.



Louis J. Rodrigues
Director, Defense Acquisitions Issues

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Comments From the Department of Defense

OFFICE OF THE UNDER SECRETARY OF DEFENSE

3000 DEFENSE PENTAGON
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ACQUISITION AND TECHNOLOGY

April 22, 1997

Mr. Louis J. Rodrigues
Director, Defense Acquisitions Issues
National Security and International
Affairs Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Rodrigues:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "ARMY ACQUISITION: Longbow Hellfire Missile Procurement Quantities Significantly Overstated," dated March 13, 1997 (GAO Code 707203/OSD Case 1312). DoD partially concurs with the draft report.

The GAO recommendations in the March 13, 1997, draft report request that the Secretary of Defense direct the Army to: (1) reduce Longbow Hellfire missile procurement requirements to reflect the current information on the number of missiles that the Army intends for the Apache to carry, (2) correct the residual missile readiness computational procedures, (3) correct the Hellfire II to Longbow Hellfire mix ratios; and (4) prepare a new procurement strategy that reflects the reduced requirement and recomputes expected cost.

The Longbow Apache/Longbow Hellfire Acquisition Decision Memorandum (ADM), dated October 18, 1995, states the Army requirement of 14,208 missiles. The ADM also requires OSD to evaluate the Army's requirement in the context of the ongoing joint Deep Attack/Weapons Mix Study. DoD is also currently conducting a Quadrennial Defense Review which will consider the results of several ongoing studies, to include a DoD Anti-Armor Study and the Deep Attack/Weapons Mix Study, and may impact the quantity of Longbow Hellfires and Hellfire IIs that DoD will buy in the future.

After receipt and analysis of the results of these studies and the QDR, DoD will consider an updated acquisition strategy for the Longbow Hellfire and the Hellfire II, if required. The Department position on Hellfire missile quantities is not expected to be finalized until the FY99 Budget is submitted.

DoD appreciates the opportunity to comment on this draft report.

Sincerely,

George R. Schneiter
Director
Strategic & Tactical Systems

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