# Audit Report

OFFICE OF THE INSPECTOR GENERAL

## ACQUISITION OF THE ADVANCED ANTITANK WEAPON SYSTEM-MEDIUM

Report Number 92-023

December 17, 1991

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**Department of Defense**

The following acronyms are used in this report.

AAWS-M.....Advanced Antitank Weapon System-Medium
GAO .....General Accounting Office

**INSPECTOR GENERAL**
DEPARTMENT OF DEFENSE
400 ARMY NAVY DRIVE
ARLINGTON, VIRGINIA 22202-2884

December 17, 1991

MEMORANDUM FOR UNDER SECRETARY OF DEFENSE FOR ACQUISITION
ASSISTANT SECRETARY OF DEFENSE (FORCE MANAGEMENT AND PERSONNEL)
ASSISTANT SECRETARY OF THE ARMY (FINANCIAL MANAGEMENT)
U.S. ARMY DEPUTY CHIEF OF STAFF FOR PERSONNEL
DIRECTOR, OPERATIONAL TEST AND EVALUATION
DIRECTOR, DEFENSE LOGISTICS AGENCY

SUBJECT: Audit Report on the Acquisition of the Advanced Antitank Weapon System-Medium (Report No.

We are providing this final report for your information and use. Comments on a draft of this report were considered in preparing the final report.

The report addresses matters concerning the cost and schedule of the Advanced Antitank Weapon System-Medium (AAWS-M) Program, the weight of the system, and cost performance data provided to DoD by a subcontractor.

DoD Directive 7650.3 requires that all audit recommendations be resolved promptly. Therefore, the Under Secretary of Defense for Acquisition; Assistant Secretary of Defense (Force Management and Personnel); Director, Operational Test and Evaluation; U.S. Army Deputy Chief of Staff for Personnel; and Project Manager for the AAWS-M must provide final comments on the unresolved recommendations by February 18, 1992. See the "Status of Recommendations" section at the end of each finding for the unresolved recommendations and specific requirements for your comments. We also ask that your comments indicate concurrence or nonconcurrence with the internal control weakness highlighted in Part I.

The courtesies extended to the audit staff are appreciated. If you have any questions on this audit, please contact Mr. Rayburn H. Stricklin at (703) 614-3965 (DSN 224-3965) or

**Internal Controls.** We identified a material internal control weakness in the operation of a subcontractor's cost and schedule control system. This weakness is discussed in Finding C. Our review of internal controls is discussed on page 2 of this report.

**Potential Benefits of Audit.** The principal benefits that will be realized from the audit are reduced uncertainty regarding the Program's estimated cost and schedule and a determination as to whether the AAWS-M can be used by the light infantry and airborne rangers. Also, the Army will receive accurate and complete Cost Performance Reports (Appendix D).

**Summary of Recommendations.** We recommended an evaluation of the basis for the cost estimate in the Army's proposed restructured program, a determination of the cost of various alternatives to the proposed restructured program, and an update of the cost estimate for the proposed restructured program. We also recommended actions to determine whether the AAWS-M could be configured so that it can be effectively used by light infantry and airborne ranger organizations. Last, we recommended that an AAWS-M subcontractor's cost and schedule control system be improved.

**Management Comments.** The Office of the Director for Defense Research and Engineering did not specifically comment on Recommendations A.1., A.2., and A.3., but actions taken or planned were responsive to the recommendations. The Office of the Director nonconcurred with Recommendations B.1.a. and B.1.b. Based on the Office of the Director, Operational Test and Evaluation's, response to Recommendation B.2., we added Recommendation B.3., which was directed to the Secretary of the Army. We have asked OSD to reconsider its nonconcurrences. The Program Executive Officer for Fire Support nonconcurred with Recommendations C.1. and C.2. We asked him to reconsider his nonconcurrences. Management did not specifically concur or nonconcur on the internal control weakness highlighted in Part I, and we requested that they do so in response to this final report. Final comments must be provided by February 18, 1992. The complete texts of the OSD's, Army's, and Defense Logistics Agency's comments are in Part IV of the report.

Office of the Inspector General

**AUDIT REPORT NO.** **December 17, 1991**
(Project No. 0AL-0073)

## ACQUISITION OF THE ADVANCED ANTITANK WEAPON SYSTEM-MEDIUM

## EXECUTIVE SUMMARY

**Introduction.** In 1984, the Army approved the concept of the Advanced Antitank Weapon System-Medium (AAWS-M), which would replace the Dragon Antitank Weapon System, and projected the initial operational capability for the mid-1990's. The AAWS-M was required to be a one-man-portable antiarmor weapon system.

The AAWS-M is managed by the AAWS-M Project Office, under the Program Executive Officer for Fire Support. Total program cost was estimated at $4 billion for 58,000 missiles and 5,000 command launch units.

**Objectives.** The audit's overall objective was to evaluate the acquisition management of the AAWS-M Program regarding program management elements critical to a system in the early full-scale development phase. The audit also included a review of the adequacy and sufficiency of internal controls related to the audit objective.

**Audit Results.** Our audit disclosed three reportable conditions.

o The cost portion of the Army's proposal to restructure the AAWS-M Program was based on a contractor's estimate of $372 million that had not been validated by the Army. Because the contractor's estimate had not been validated, there was uncertainty as to whether the full-scale development contract could be completed for $372 million (Finding A).

o The AAWS-M exceeded the weight that one person can carry for a reasonable distance and period of time. Therefore, the system is not suitable for its planned deployment in light infantry and airborne ranger organizations (Finding B).

o A subcontractor had not structured its cost and schedule control system to provide meaningful cost performance data. Therefore, there was no assurance that Cost Performance Reports provided management with accurate and complete information for the management of the AAWS-M Program (Finding C).

Mr. William D. Van Hoose at (703) 693-0382 (DSN 223-0382). Copies of this report are being provided to the activities listed in Appendix F.

Robert J. Lieberman
Assistant Inspector General
for Auditing

Enclosure

cc:
Secretary of the Army
Chairman, Conventional Systems Committee
Program Executive Officer for Fire Support

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**This report was prepared by the Acquisition Management Directorate, Office of the Assistant Inspector General for Auditing, DoD. Copies of the report can be obtained from the Information Officer, Audit Planning and Technical Support Directorate, (703) 693-0340 (DSN 223-0340).**

# PART I - INTRODUCTION

## Background

The Advanced Antitank Weapon System-Medium (AAWS-M) was required to be a one-man-portable medium antiarmor weapon system, which the Army and Marine Corps plan to use to replace the Dragon Antitank Weapon System. The AAWS-M was to weigh 45 pounds or less, have a more effective range than that of the Dragon, and be effective against the projected armor threat. The AAWS-M was originally scheduled for an initial operational capability during the mid-1990's.

The Army established a major acquisition program for the AAWS-M in 1984. The AAWS-M Project Office manages the AAWS-M Program under the direction of the Program Executive Officer for Fire Support, Department of the Army. Under the Program, the Army plans to procure 58,000 missiles and 5,000 missile launchers. Program costs for the Research, Development, Test and Evaluation and Procurement Appropriations were estimated at $4 billion.

The acquisition strategy that the Army established for the AAWS-M Program provided for two contractors to jointly develop the missile system and then compete for production contracts upon completion of low-rate initial production. In June 1989, the Army awarded a full-scale development, cost-plus-incentive-fee contract to TI/Martin AAWS-M Joint Venture (the Joint Venture) to develop the AAWS-M. The contract provided for a 36-month, $169.7 million full-scale development program. The Joint Venture was formed by Texas Instruments, Incorporated, and Martin Marietta Corporation.

In July 1990, as a result of contract cost overruns, the full-scale development contract was rebaselined to $236 million. The contract cost overruns continued into 1991, resulting in a proposed restructure of the AAWS-M Program. The Army proposed a restructured development program with a revised contract cost baseline of $372 million and a period of contract performance of 48 months. The Conventional Systems Committee met on May 20 and 29, 1991, and the Defense Acquisition Board met on June 6, 1991, to consider the proposed restructured AAWS-M Program. On September 27, 1991, the Under Secretary of Defense for Acquisition issued an Acquisition Decision Memorandum that directed a 54-month program. The contract cost was being negotiated as of November 1, 1991. This restructured program will extend the initial operational capability to the late 1990's.

## Objectives

The overall audit objective was to evaluate the program management of the AAWS-M Program to determine the adequacy of efforts for development of an economical and efficient system and for the system's production and deployment. We performed the audit in accordance with our critical program management elements approach. Under this approach, we focused our audit on a review of 11 program management elements that were critical to the AAWS-M Program in its early full-scale development phase. Our review of contracting, force structure integration, manufacturing, detailed test planning, schedule adequacy, cost realism versus budget, mission critical computer resources, and program stability contributed to three findings presented in Part II of this report. The results of our review of integrated logistics, program management organization, and review and audit open items did not disclose any major weaknesses, as discussed in Appendix A.

## Scope

This performance audit was conducted from June 1990 to April 1991 in accordance with auditing standards issued by the Comptroller General of the United States as implemented by the Inspector General, DoD, and accordingly included such tests of internal controls as were deemed necessary. We obtained and reviewed data and information, dated from September 1984 through April 1991, to accomplish our objective in each of the 11 program management elements. We interviewed personnel involved in the acquisition of the AAWS-M and other cognizant personnel. A list of the activities visited or contacted during the audit is in Appendix E.

## Internal Controls

We reviewed the internal controls applicable to the critical program management elements of the AAWS-M Program. In assessing the internal controls, we evaluated internal control techniques, such as management plans, written policies and procedures, and management initiated reviews. The audit identified a material internal control weakness, as defined by Public Law 97-255, Office of Management and Budget Circular A-123, and DoD Directive 5010.38. Controls were not in place to ensure the effectiveness of a subcontractor's cost and schedule control system (Finding C). Recommendations C.1. and C.2. in this report, if implemented, will correct the weakness. Recommendations C.1. and C.2. will not result in quantifiable monetary benefits. However, implementation of the recommendations will result in more accurate and complete Cost Performance Reports,

which the AAWS-M Project Office used to monitor the cost and schedule of the AAWS-M Program.

## Prior Audits and Other Reviews

There have been four previous audits concerning the AAWS-M. The four audits focused on the budget requirements, the joint acquisition process, the acquisition status of selected systems, and the collection of information on joint major programs. Synopses of these four audit reports are in Appendix B.

## PART II - FINDINGS AND RECOMMENDATIONS

### A. PROPOSED RESTRUCTURED PROGRAM

The Army's proposal to restructure the AAWS-M Program was based on a contractor's estimate of $372 million, which the Army had not validated. The Army did not validate the contractor's estimate because the contractor had not developed cost data to support its estimate when the Army was developing its proposal to restructure the AAWS-M Program. Furthermore, there was not sufficient time for the contractor to develop detailed support for its estimate before the next scheduled review of the AAWS-M Program by the Army Acquisition Executive. Since the contractor's estimate had not been validated, it is uncertain as to whether the full-scale development contract for the AAWS-M Program can be completed for $372 million.

### DISCUSSION OF DETAILS

#### Background

The Army has experienced substantial contract cost growth in developing the AAWS-M. In June 1989, the Army awarded a contract to the Joint Venture for a 36-month, $169.7 million full-scale development program. Cost and schedule overruns during the first 12 months of the contract resulted in a rebaselining of the contract cost in July 1990. In July 1990, the Army established an over target baseline cost of $236 million, but the program schedule remained at 36 months. During the Defense Acquisition Board Program review on December 5, 1990, the Army reported that contract costs could grow to $263 million, but the Army considered the 36-month schedule executable. Less than 6 weeks later on January 14, 1991, the Joint Venture reported that the 36-month program was no longer executable. The Joint Venture assessed the Program as executable at 40 months and $329 million, if no funding constraints were applied during FY 1991. However, FY 1991 funding was limited to $240 million. As a result, the Joint Venture revised its estimate to 48 months and $362 million. The Joint Venture later increased its estimate to $372 million over a 48-month period.

Because of continued cost growth, the Army Acquisition Executive in January 1991 directed the Program Executive Officer for Fire Support to lay out a program that would have a high probability of success and would not force the Program's schedule. Also, DoD Directive 5000.1,[1/] "Major and Non-Major Defense Acquisition

1/ DoD Directive 5000.1 was updated and republished February 23, 1991.

Programs," September 1, 1987, required that DoD Components conduct meaningful and realistic long-range planning and realistically estimate, program, budget, and fund acquisition programs. In turn, the Program Executive Officer directed that a "Red Team" be formed to assess the cost and technical status of the AAWS-M Program. To perform the assessment, the "Red Team" visited the contractor's site at Denton, Texas, from February 6 through February 8, 1991, and again on February 23, 1991.

Initially, the "Red Team" concluded that the AAWS-M full-scale development program could extend up to 60 months and cost $520 million (later refined to $423.8 million), which was higher than the Joint Venture's originally proposed 48-month, $362 million program. However, on February 23, 1991, the Joint Venture presented technical and schedule information on a restructured 48-month program to the "Red Team" in response to the "Red Team's" findings. After considering the Joint Venture's presentation, the "Red Team" revised its conclusions and accepted the technical and schedule aspects of the Joint Venture's proposed restructured 48-month program. This program added $10 million for risk abatement efforts directed by the Program Executive Officer, along with contractor steps for risk abatement, resulting in a total contractor proposed cost of $372 million.

Although the "Red Team" accepted the Joint Venture's proposed program, the "Red Team's" acceptance was based on the Joint Venture's plan to incorporate and execute risk mitigation factors in the development of several components of the AAWS-M System. Furthermore, the "Red Team" recommended that performance milestones be incorporated into the restructured program on the components for which risk mitigation factors were applied and that the AAWS-M Project Manager establish a formal Government Action Team to monitor performance in each risk mitigation area. The recommendations, if adopted, should provide oversight of areas with development risk.

**Proposed Restructured Program**

The Program Executive Officer also accepted the Joint Venture's program and presented it to the Army Acquisition Executive on March 4, 1991. The Army Acquisition Executive also accepted the program, as stated in a decision memorandum dated March 6, 1991, and directed that the program be presented to the Conventional Systems Committee and the Defense Acquisition Board. Presentations to the Conventional Systems Committee were made on May 20 and 29, 1991, and to the Defense Acquisition Board on June 6, 1991.

The Army did not validate the basis for the Joint Venture's $372 million estimate to complete the full-scale development contract. One of the objectives of the Army's "Red Team" was to determine the adequacy of the Joint Venture's estimate through a detailed review of the estimated cost by work breakdown structure, cost accounts, and work packages. When the "Red Team" made its review, details of the Joint Venture's $372 million estimate were not available for review. Furthermore, there was not sufficient time for the Joint Venture to develop the details supporting the estimate before the next scheduled program review. Therefore, the Army accepted the Joint Venture's estimate based on the "Red Team's" conclusion.

In the absence of any Army analyses of the Joint Venture's estimate, we questioned the reasonableness of the Joint Venture's estimate and the Army's use of the estimate as the cost necessary to complete the full-scale development phase of the AAWS-M Program.

We were not the first to question the reasonableness of the Joint Venture's estimate. In a February 12, 1991, memorandum, the Deputy Commander, Defense Plant Representative Office, Texas Instruments, advised the Commander, U.S. Army Missile Command, that the Joint Venture had historically reported inaccurate estimates for the AAWS-M Program. The Deputy Commander further stated that without in-depth reviews of the support behind the estimate, it would seem inappropriate to place much confidence in the validity of the estimate.

**Need for Analyses of the Joint Venture's Estimate**

Because of the absence of an Army analysis of the Joint Venture's estimate, we performed a limited review of the Joint Venture's estimate, which was reported on the Cost Performance Report, as of March 31, 1991. Our limited review at Texas Instruments covered Cost Account 11242M (Focal Plane Array Deliveries), which showed an estimate of * . The Cost Account reflected the cost of the delivery of 177 focal plane arrays.

Our review of the Cost Account indicated that the Joint Venture's estimate of * was too low. Texas Instruments had manufactured 48 focal plane arrays. Of the 48 focal plane arrays, 17 were manufactured at a cost of * under Cost Account 11242M. As such, the 17 focal plane arrays cost about * each. The Cost Account also showed that an additional 160 focal plane arrays would be produced for * or about * each. Since the first 17 focal plane arrays cost about * each, we questioned the reasonableness of the Joint Venture's estimate to produce the other 160 focal

* Company confidential or proprietary information deleted.

plane arrays at a cost of about * each. Another reason for questioning the reasonableness of the Joint Venture's estimate for the other 160 focal plane arrays was that none of the 17 focal plane arrays that were produced met specifications. Other factors indicating needs for an Army analysis of the Joint Venture's estimate involved the producibility of a key part of the AAWS-M and the flexibility in the schedule on which the Joint Venture based its cost estimate.

**Producibility of the focal plane array.** The Joint Venture's estimate of the cost to complete the full-scale development was based on personal judgment rather than cost and schedule experience because major subcontractors had not yet demonstrated that the focal plane array, a key component of the AAWS-M's seeker, can be produced in mass quantities and at a reasonable cost. The Army required 258 focal plane arrays for the full-scale development program. The Joint Venture awarded a subcontract to Texas Instruments to develop and manufacture the 258 focal plane arrays. The Joint Venture also awarded a subcontract to Martin Marietta Corporation for five focal plane arrays. The contract for the five focal plane arrays was not awarded to support the full-scale development program but to establish a second source that could be used for competition when the AAWS-M entered the production phase. Martin Marietta Corporation awarded a third tier subcontract to the Santa Barbara Research Center of the Hughes Aircraft Company for the five focal plane arrays. As of March 31, 1991, Texas Instruments had manufactured 48 focal plane arrays, but none of the focal plane arrays were of the required quality. As of March 31, 1991, Hughes Aircraft Company had manufactured one focal plane array, but problems existed with it. As a risk abatement procedure, the Joint Venture modified the contract with Martin Marietta Corporation to obtain 60 more focal plane arrays from the Hughes Aircraft Company.

Until the Joint Venture demonstrates that it can produce quality, affordable focal plane arrays in quantities to satisfy production, there is no basis for establishing a reliable estimate, based on cost, to complete the full-scale development contract. We recognize that our review covered only 4 percent of the estimated contract cost. However, the cost reviewed was for the manufacture of focal plane arrays, which represents a high risk component and potential schedule slippages.

**Flexibility of schedule.** The Joint Venture's estimate of the cost to complete the full-scale development contract was based on a success oriented schedule that provided for little slippage. However, we believe there is high potential for schedule slippage for the following reasons.

* Company confidential or proprietary information deleted.

**Schedule for testing.** It is questionable as to whether the contractor can manufacture enough focal plane arrays to meet the schedule for Production Proveout Testing and Preproduction Qualification Testing. A total of 258 focal plane arrays was required for missiles that will be used for Production Proveout Testing and Preproduction Qualification Testing. Texas Instruments has manufactured 48 focal plane arrays, which can be used for testing even though they do not meet required specifications. As a risk abatement, Martin Marietta Corporation awarded Hughes Aircraft Company a letter contract for 60 focal plane arrays. However, 150 more focal plane arrays will be required for the test schedule. Texas Instruments will not produce focal plane arrays in any significant quantities from April 1, 1991, to September 30, 1991, because it will be improving its focal plane array manufacturing process and not producing. Texas Instruments planned to restart its focal plane array manufacturing facility in October 1991, if required improvements are made. On the other hand, if Texas Instruments is unable to make the improvements, we question whether Texas Instruments will be able to restart production in October 1991 and manufacture the required 150 focal plane arrays that meet specifications. Army officials told us that if Texas Instruments cannot produce the remaining 150 focal plane arrays, they will be obtained from Hughes Aircraft Company or an additional source. These risk abatement procedures may result in obtaining the required focal plane arrays. However, we believe that the time required to initiate necessary procurement actions would cause slippage in the already tight schedule.

**Array processor redesign.** The Joint Venture stated that a complete redesign of the array processor may be needed. If additional redesign is needed, the redesign would not be completed in time to support Preproduction Qualification Testing, which is scheduled to begin in March 1992, because the schedule did not provide for additional redesign.

**Propulsion system redesign.** The Joint Venture also stated that the propulsion system may require a complete redesign. If additional redesign is required, it would not be completed in time to support Preproduction Qualification Testing because the schedule did not provide for additional redesign.

**Flight schedule.** The Preproduction Qualification Test schedule, consisting of 195 flight and sled tests, was very optimistic. Even if the focal plane arrays, array processors, and propulsion systems are available to support the building of the test missiles, the number of flight and sled tests scheduled could be difficult to achieve because of potential inclement

weather during testing. The schedule provided for 105 tests from October 1992 through March 1993, when weather could delay scheduled testing. The Program Executive Officer stated that if the weather delayed scheduled testing, the testing would be moved to the White Sands Missile Range. We agree that this action could be taken; however, the change in test location would take time and would delay the test schedule.

## Potential Effects of the Proposed Restructured Program

If the AAWS-M Program is restructured based on the Joint Venture's estimate for completing the full-scale development contract, it is likely that the program will again experience cost overruns. Additionally, the uncertainty in the cost estimate for completing the full-scale development contract complicates the development of a realistic cost estimate for the total AAWS-M Program.

## Actions Taken by Management

On March 11, 1991, the Army Acquisition Executive directed the establishment of a "Blue Team" to identify the problems, as well as the consequences of problems, with the seeker focal plane array, command launch unit, and tracker. The "Blue Team" completed its assessment of the AAWS-M Program on April 20, 1991. Overall, the "Blue Team" concluded that, with the risk reducers in place the Army's restructured 48-month program was achievable but could cost $433 million. One of the main reasons for the "Blue Team" concluding that the program could be completed in 48 months was that the perceived progress that the Santa Barbara Research Center of the Hughes Aircraft Company had made in developing a critical component of the AAWS-M's seeker--the focal plane array. As previously discussed, the Joint Venture was having much difficulty in developing focal plane arrays that met performance requirements. The "Blue Team" concluded that there was evidence that the Santa Barbara Research Center had progressed to a point where it would be able to develop enough focal plane arrays to provide 75 percent of the focal plane arrays needed during full-scale development. The "Blue Team" also suggested that the Army accept the focal plane array at 80 percent of the performance requirements specified in the contract.

On April 30, 1991, the Acting Under Secretary of Defense for Acquisition issued a memorandum to the Assistant Secretary of the Army (Research, Development and Acquisition) stating that there was a need to explore programming alternatives in addition to the

Army's proposed 48-month program. The alternatives that the Under Secretary suggested ranged from terminating full-scale development of the AAWS-M Program to returning the Program to technology development. Further, the memorandum stated that there was a need to revisit the Cost and Operational Effectiveness Analysis, which was used during Milestone II in light of uncertainties about overall program cost.

**Additional Actions Needed on the Part of Management**

The actions initiated by management should be helpful to Defense mangers in deciding the most beneficial course of action for DoD on the AAWS-M Program. However, we believe additional actions are needed in order for managers to have the information to select the most beneficial course of action. Specifically, rather than considering alternatives to the proposed restructured program as suggested by the Acting Under Secretary of Defense for Acquisition, the Army needs to determine the cost of each program alternative so that acquisition decisionmakers can determine the cost consequences and benefits of their decisions. The Army also needs to obtain from the appropriate Defense Plant Representative Offices detailed analyses of the Joint Venture's estimate and determine the reasonableness of the Joint Venture's estimate of $372 million to complete the full-scale development contract. Last, we believe it would be beneficial for the Army to present to the Defense Acquisition Board an updated estimate of the cost to complete the full-scale development of the AAWS-M before DoD releases FY 1992 funds for the AAWS-M. Providing such an update should not require a great deal of effort if the Army adopts the "Red Team's" recommendation that provided for the AAWS-M Project Manager to monitor risk mitigation areas, and the update would enable management to determine whether the risk mitigation was effective before releasing FY 1992 funds.

## RECOMMENDATIONS, MANAGEMENT COMMENTS, AND AUDIT RESPONSE

**We recommend that the Under Secretary of Defense for Acquisition require that the Assistant Secretary of the Army (Research, Development and Acquisition):**

**1. Identify the cost of the program alternatives identified in the Under Secretary's April 30, 1991, memorandum, Subject: "Advanced Antitank Weapon System-Medium," and present the costs of the alternatives to the Defense Acquisition Board.**

OSD comments. The Deputy Director (Tactical Warfare Programs), Office of the Director of Defense Research and Engineering, partially concurred with the finding but did not specifically comment on Recommendation A.1. The full text of the Deputy Director's comments is in Part IV of the report.

**Audit response.** Although the Deputy Director did not specifically comment on Recommendation A.1., our review of documentation that Army officials used to brief the Conventional Systems Committee on May 20 and May 29, 1991, showed that the Army presented to the Conventional Systems Committee the costs of returning the program to advanced development and termination. Also, the officials presented the results of their analyses of the cost-effectiveness of the fire and forget approach. In addition, OSD officials presented Recommendation A.1. to the Conventional Systems Committee on May 29, 1991, and stated that the cost of program alternatives had been determined. These presentations satisfied the intent of our recommendation. As such, no further comments are required on Recommendation A.1.

**2. Obtain analyses of the Joint Venture's estimate from appropriate Defense Plant Representative Offices and use the results of those analyses to determine the reasonableness of the Joint Venture's estimate of $372 million.**

**OSD comments.** The Deputy Director did not express concurrence or nonconcurrence with Recommendation A.2. However, he stated that the Army's "Red Team" conducted an extensive assessment of the proposed 48-month restructured program. This assessment is documented in Volumes I and II of, "AAWS-M Cost Growth Red Team Final Report," March 30, 1991. The Deputy Director further stated that after the "Red Team's" assessment and publication of its final report, and as a result of Conventional Systems Committee reviews on May 20 and May 29, 1991, the funding profile of $372 million for the AAWS-M Program may no longer be valid. Additional work and a schedule extension are under consideration as a result of the June 6, 1991, Defense Acquisition Board meeting. Among the alternatives under consideration is a program based on a 56-month Engineering and Manufacturing Development phase at a total program cost of $596.2 million.

**Audit response.** Although not mentioned in the Deputy Director's comments, a "Blue Team" was established to review the cost and schedule of the proposed restructured AAWS-M Program. The actions that the "Blue Team," Conventional Systems Committee, and Defense Acquisition Board took to assess the reasonableness of the Army's proposed 48-month, $372 million program were responsive to the intent of Recommendation A.2. Therefore, no further comments are required on Recommendation A.2.

**3. Present an updated estimate of the cost to complete the full-scale development of the Advanced Antitank Weapon System-Medium.**

**OSD comments.** The Deputy Director also did not express concurrence or nonconcurrence with Recommendation A.3. However, he stated that among the alternatives under consideration is a program based on a 56-month Engineering and Manufacturing Development phase at a total program cost of $596.2 million. The program will be reviewed by the Cost Analysis Improvement Group before the Defense Acquisition Board reconvenes.

**Audit response.** The actions planned on this recommendation were responsive. As such, we revised Recommendation A.3. to delete that portion relating to the release of FY 1992 funds. The Defense Acquisition Executive issued an Acquisition Decision Memorandum on September 27, 1991, directing a 54-month Engineering and Manufacturing Development Program (Appendix C). The contract cost was being negotiated as of November 1, 1991.

## B. SYSTEM WEIGHT

The AAWS-M was too heavy to be one-man-portable. The AAWS-M was too heavy because the original weight limitation for the system was established at too high a level, and the contractor was unable to stay within the weight limitation prescribed for the AAWS-M. As a result, the AAWS-M was not operationally suitable for planned deployment with light infantry and airborne rangers.

## DISCUSSION OF DETAILS

### Background

The AAWS-M is a medium range, one-man-portable, shoulder fired, antitank weapon system, which is planned to replace the Dragon Weapon System. The AAWS-M will be an essential part of the rifle squads in Infantry and Combat Engineer units. The AAWS-M is a squad weapon that is carried by a gunner who must be able to keep up with the rest of the squad and negotiate distances up to 10 kilometers and obstacles encountered by other squad members, that is, riflemen or automatic weapon gunners.

According to Military Standard 1472D, "Human Engineering Design Criteria for Military Systems, Equipment and Facilities," March 14, 1989, "the total load carried by an individual, including clothing, weapons and equipment for close combat operations should not exceed 30 percent of body weight, and for marching 45 percent of body weight." Additionally, Field Manual 7-10, "The Infantry Rifle Company," chapter 8, "Combat Service Support," December 14, 1990, states that the amount of weight that a soldier must carry has the greatest impact on the ability of a rifle company to perform its tactical operations.

### Combat Load

The total weight of the AAWS-M and other equipment (combat load) that a soldier must carry in combat exceeded the recommended weight that all soldiers could carry in combat and be effective. We determined the weight of the AAWS-M to be 49.25 pounds by reviewing the Joint Venture Monthly Progress Report for December 1990.

| Component | Pounds |
|---|---|
| Missile | 26.50 |
| Command Launch Unit | 13.91 |
| Launch Tube Assembly | 8.84 |
| Total System | 49.25 |

However, the 49.25 pounds did not include the weight of replacement batteries for the Command Launch Unit (2.25 pounds) or Launch Tube Assembly (1.06 pounds). The batteries provide the energy to operate the cooling subsystem for the AAWS-M system, and if the batteries are not available, the AAWS-M system becomes inoperable. If the weight of the batteries is added to the projected weight of the system, the system would weigh 52.56 pounds. However, we excluded the weight of the batteries from our analyses because the batteries could be carried by the assistant gunner, not by the primary gunner.

We determined the weight of the other equipment that a soldier would carry in combat by using Military Standard 1472D, table XXVI, "Human Engineering Design Criteria for Military Systems, Equipment and Facilities." We found that the weight of the typical combat load (temperate zone) consisted of clothing and equipment at 53.19 pounds. The AAWS-M gunner would carry the combat load as well as the 49.25 pounds for a total of 102.44 pounds. This weight does not include 31.24 pounds of subsistence that a soldier would be required to carry in instances where mechanized support cannot be provided.

## Soldiers' Abilities to Carry Combat Loads

To determine how much a soldier could carry, we used the most recent "Anthropometric Survey of the U.S. Army Personnel, Methods and Summary Statistics," September 1989, and Military Standard 1472D. The Anthropometric Survey shows that male soldiers in the 5th percentile weighed about 136 pounds, 50th percentile weighed about 171 pounds, and 95th percentile weighed about 216 pounds. Military Standard 1472D states that soldiers should not carry more than 30 percent of their body weight when in contact with the enemy or 45 percent in field marches. Further, Field Manual 7-10 states that for each pound over 30 percent, the soldier loses a proportional amount of his functional ability. The Joint Service Operational Requirement for the AAWS-M was that male soldiers in the 5th to 95th percentile be able to carry the AAWS-M.

By comparing the total equipment weight to various body weights of soldiers, we concluded that the AAWS-M could be carried by only 5 percent of the soldiers if the system's weight was 35 to 42 pounds and could not be carried by a soldier without risk of injury to the soldier or degradation of the soldier's mission if the system's weight exceeded 45 pounds, as shown on the following schedule.

Soldiers' Ability to Carry Combat Loads

| SOLDIERS BODY WEIGHT | | POUNDS SOLDIER CAN CARRY | | CAN SOLDIER CARRY A COMBAT LOAD AND THE AAWS-M? | | | |
|---|---|---|---|---|---|---|---|
| PERCENTILE | POUNDS | MARCHING | COMBAT | 88.19 1/ | 95.19 2/ | 98.19 3/ | 102.44 4/ |
| 5 | 135.78 | | 40.73 | NO | NO | NO | NO |
| | | 61.10 | | NO | NO | NO | NO |
| 50 | 171.27 | | 51.38 | NO | NO | NO | NO |
| | | 77.07 | | NO | NO | NO | NO |
| 95 | 216.21 | | 64.86 | NO | NO | NO | NO |
| | | 97.29 | | YES | YES | NO | NO |

1/ Combat load soldier would be carrying: clothing 19.47 pounds, equipment 33.72 pounds, AAWS-M system at 35 pounds.

2/ Combat load soldier would be carrying: clothing 19.47 pounds, equipment 33.72 pounds, AAWS-M system at 42 pounds.

3/ Combat load soldier would be carrying: clothing 19.47 pounds, equipment 33.72 pounds, AAWS-M system at 45 pounds.

4/ Combat load soldier would be carrying: clothing 19.47 pounds, equipment 33.72 pounds, AAWS-M system at 49.25 pounds.

The combat load does not include the 31.24 pound subsistence load the soldier would be required to carry when mechanized support is not available.

## Reasons for Excess Weight

The AAWS-M was too heavy for two reasons. First, the original weight requirement for the AAWS-M was too high. The Joint Service Operational Requirement, April 4, 1986, required "the weight of one complete system (includes command launch unit, one round, consumable and carrying equipment for at least four hours of operation) shall be no greater than 45 pounds (35 desired)." The AAWS-M Acquisition Decision Memorandum, December 7, 1990, approved a baseline threshold change in the weight to 49.5 pounds. The Assistant Secretary of Defense (Force Management and Personnel), who is responsible for personnel safety issues, and the U.S. Army Deputy Chief of Staff for Personnel, who is responsible for issues related to soldiers' combat loads, were not aware that weight issues were being addressed during the Defense Acquisition Board review. Second, the contractor was

unable to maintain the maximum weight of 45 pounds. The weight of the AAWS-M had grown to 49.25 pounds, as shown in the December 1990 Joint Venture progress report.

**Results of Excess Weight**

The soldier's load is a crucial concern in deciding if the AAWS-M system will be operationally suitable for planned deployment. A typical soldier cannot be expected to carry an amount exceeding 30 percent of his body weight and still retain a high percentage of his agility, stamina, alertness, and mobility. For each pound over 30 percent, the soldier loses a proportional amount of his functional ability. Therefore, the success and survival of the gunner depends largely on his ability to carry the system. The system at 49.25 pounds fails to meet the Joint Service Operational Requirement that male soldiers in the 5th to 95th percentile be able to carry the system. As such, we question whether the AAWS-M is operationally effective and operationally suitable for use by light infantry and airborne rangers.

## RECOMMENDATIONS, MANAGEMENT COMMENTS, AND AUDIT RESPONSE

**1. We recommend that the Under Secretary of Defense for Acquisition, in conjunction with Assistant Secretary of Defense (Force Management and Personnel) and the U.S. Army Deputy Chief of Staff for Personnel:**

**a. Revise the requirements documentation to show that the Advanced Antitank Weapon System-Medium at 49.25 pounds is not one-man-portable.**

**OSD comments.** The Deputy Director (Tactical Warfare Programs), Office of the Director of Defense Research and Engineering, nonconcurred with the finding, upon which we based Recommendation B.1.a. He stated that on December 5, 1990, the Defense Acquisition Board reviewed and approved a weight of 49.5 pounds for the AAWS-M. He further stated that any weight growth beyond 49.5 pounds will result in program termination.

The Deputy Assistant Secretary of Defense (Requirements and Resources), Office of the Assistant Secretary of Defense (Force Management and Personnel), also commented on the proposed actions and stated that some OSD offices share our opinion. He further stated that he has been informed that the term "one-man-portable" now refers to single man operation, not to how the weapon is to be transported. Also, the Deputy Assistant Secretary stated that the AAWS-M Project Manager suggested that he expects the AAWS-M

to be disassembled and divided among the soldiers during transit. He encouraged Army efforts to clarify portability terminology and/or doctrine regarding distribution or balance of soldiers' loads. The full text of the Deputy Assistant Secretary's comments is in Part IV of the report.

**Audit response.** We disagree with the Deputy Director's position on Recommendation B.1.a. The weight that an individual can carry is constrained by physiological factors that cannot be changed by the Defense Acquisition Board. As discussed on pages 16 and 17 of this report, the weight of the AAWS-M, when combined with a soldier's combat load, exceeds the weight that soldiers in the 5th to 95th percentile can carry.

Other officials have also questioned the weight of the AAWS-M. The Deputy Assistant Secretary of Defense (Requirements and Resources), in a May 28, 1991, memorandum to the Chairman, Conventional Systems Committee, stated that the AAWS-M's weight posed a risk to system performance and soldier safety. The Deputy Assistant Secretary referred to Military Standard 1472 weight data developed by the Army Human Engineering Laboratory and the Early User Test and Evaluation of the AAWS-M to support his position. We have not been made aware of any data presented to the Defense Acquisition Board that would refute our or the Deputy Assistant Secretary's position. Also, the Commander, I Corps, stated in a July 1991 message to the Commander in Chief, U.S. Army Forces Command, and the Commanding General, Training and Doctrine Command, that "Light divisions must have a truly airlifted anti-armor system that can defeat every armor vehicle. AAWS-M may be too heavy for our light infantry." Therefore, we believe that our recommendation is still valid and ask that the Under Secretary of Defense for Acquisition comment again on the recommendation. Also, we request that the Assistant Secretary of Defense (Force Management and Personnel) and the U.S. Army Deputy Chief of Staff for Personnel comment on the proposed action.

**b. Reduce the impact of the weight of the Advanced Antitank Weapon System-Medium on individual soldiers to an allowable level either by making the system crew-portable rather than one-man-portable or by developing a means for transporting the system rather than carrying the system.**

**OSD comments.** The Deputy Director nonconcurred with the finding, upon which we based the recommendation. He stated that there is no intention to reconfigure the Army's force structure to make AAWS-M a crew-served weapon.

The Deputy Assistant Secretary of Defense (Requirements and Resources) stated that his office has urged the adoption of a formal weight reduction effort. He further stated that he has learned that the other factors contributing to the weight issue, such as the contents and weight of the soldier's combat and sustainment loads, are being explored for possible reduction.

**Audit response.** The Deputy Director's comments to Recommendation B.1.b. indicated that he did not fully understand the intent of the recommendation. The intent of the recommendation was to add reality to the system being portable, not to change the Army's force structure, as interpreted by the Deputy Director. As such, we ask the Deputy Director to reconsider his position on the recommendation. We also ask the Deputy Director to consider other officials' comments on the recommendations when reconsidering his position. The Deputy Assistant Secretary (Requirements and Resources) stated that he encouraged Army efforts to clarify portability terminology and/or doctrine regarding distribution of soldiers loads. The Staff Assistant for Army Aviation Programs, Office of the Director, Operational Test and Evaluation, stated that very few soldiers are heavy enough to carry 49.5 pounds or even 45 pounds. In view of the Deputy Assistant Secretary's and Staff Assistant's position, we have difficulty understanding why the Deputy Director would nonconcur with Recommendations B.1.a. and B.1.b. We also request responses on the proposed action from the Assistant Secretary of Defense (Force Management and Personnel) and the U.S. Army Deputy Chief of Staff for Personnel. The responses should cover the areas specified in the "Status of Recommendations" section at the end of the finding.

**2. We recommend that the Director, Operational Test and Evaluation, require that the Army fully test, before approval of Milestone III, the operational effectiveness and operational suitability of the method or procedure established as a result of actions taken on Recommendation B.1.b. Furthermore, the test should be conducted with soldiers ranging in the 5th to 95th percentile size and transporting the AAWS-M for 10 kilometers over all types of terrains.**

**OSD comments.** The Staff Assistant for Army Aviation Programs, Office of the Director, Operational Test and Evaluation, generally concurred with the recommendation. He stated that the Director, Operational Test and Evaluation, planned a thorough evaluation of the portability issues

associated with the AAWS-M, as proposed in the draft audit report. However, he further stated that, under current weight restriction policies, it will be extremely difficult to fully evaluate the portability of the AAWS-M because the current policy restricts soldiers participating in tests to carrying no more than 45 percent of their body weight. Very few soldiers are heavy enough to carry 49.5 pounds or even 45 pounds. An exception to this policy can only be granted from a personal request by the Service Secretary to OSD. Even with the exemption, severe restrictions still exist. The full text of the Staff Assistant's comments is in Part IV of the report.

**Audit response.** We consider the Staff Assistant's comments to be generally responsive to the finding and recommendation. The fact that the AAWS-M is too heavy for adequate operational testing indicates that there is a serious problem with the system's weight. We have added a recommendation that the Secretary of the Army request an exemption from the weight restrictions so that the AAWS-M can be tested realistically. Therefore, we request that the Director, Operational Test and Evaluation, provide a response to this final report that covers the areas specified in the "Status of Recommendations" section at the end of this finding.

**3. We recommend that the Secretary of the Army request an exemption to the weight restriction policies for the operational testing of the Advanced Antitank Weapon System-Medium.**

## STATUS OF RECOMMENDATIONS

| Number | Addressee | Response Should Cover: Concur/ Nonconcur | Proposed Action | Completion Date |
|---|---|---|---|---|
| 1.a. | Under Secretary of Defense for Acquisition | X | X | X |
| | Assistant Secretary of Defense (Force Management and Personnel) | | X | |
| | U.S. Army Deputy Chief of Staff for Personnel | | X | |
| 1.b. | Under Secretary of Defense for Acquisition | X | X | X |
| | Assistant Secretary of Defense (Force Management and Personnel) | | X | |
| | U.S. Army Deputy Chief of Staff for Personnel | | X | |
| 2. | Director, Operational Test and Evaluation | X | X | X |
| 3. | Secretary of the Army | X | X | X |

## C. COST AND SCHEDULE CONTROL SYSTEM

Texas Instruments' cost and schedule control system was not structured to provide meaningful cost performance data on the development of focal plane arrays. This condition was caused by a lack of monitoring of the cost and schedule control system. Until corrections are made to Texas Instruments' cost and schedule control system, the Army will not be able to monitor and assess the cost and schedule for focal plane arrays.

## DISCUSSION OF DETAILS

### Background

The full-scale development contract for the AAWS-M required that the prime contractor, the Joint Venture, as well as two major subcontractors, Texas Instruments and Martin Marietta Corporation, have cost and schedule control systems that satisfied the requirements of DoD Instruction 7000.2,[2/] "Performance Measurement for Selected Acquisition Systems," June 10, 1977. According to DoD Instruction 7000.2, the contractors' system should be designed to provide the information necessary to facilitate the objective measurement of work. In this regard, the Instruction specifies that the contractors' systems should identify budgeted cost of work scheduled, budgeted cost of work performed, and actual cost of work performed at the cost account level on a monthly basis. Further, the Instruction requires that work packages be limited to relatively short time spans assignable to a single organizational element, or subdivided by discrete value milestones, to facilitate the objective measurement of work performed.

The full-scale development contract for the AAWS-M also requires that the contractors provide monthly cost reports on performance. Separate Cost Performance Reports were prepared by the Joint Venture, Texas Instruments, and Martin Marietta Corporation; these reports were consolidated into an overall Cost Performance Report by the Joint Venture.

### Operations of Texas Instruments' System

Texas Instruments' cost and schedule control system was not operating in accordance with the Cost Schedule Control System Criteria set forth in DoD Instruction 7000.2.

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2/ As of February 23, 1991, DoD Instruction 7000.2 was incorporated into DoD Instruction 5000.2, part 11, section B.

During the initial period of contract performance, the subcontractor had established cost accounts for the manufacture of focal plane arrays that met the requirements of the Instruction. These cost accounts related to the processes of focal plane array manufacturing, that is * . However, during our review, we found that the subcontractor's work packages for Work Breakdown Structure 11242, Seeker, Cost Account 11242M, Focal Plane Array Deliveries, did not meet the requirements of DoD Instruction 7000.2. The manufacturing process involved * for each focal plane array; however, the subcontractor established work packages within Cost Account 11242M for monthly deliveries of focal plane arrays. There was a work package for each month's delivery through April 1991 and a planning package for the remaining deliveries. The Budgeted Cost of Work Scheduled for each work package was the estimated manufacturing cost of the focal plane arrays to be delivered during the month covered by the work package. Therefore, the work packages did not meet the work package requirement that they be limited to relatively short time spans assignable to a single organizational element, or subdivided by discrete value milestones to facilitate the objective measurement of work performed.

In addition, actual cost of work performed and budgeted cost of work performed for focal plane array manufacturing were not reported monthly. Manufacturing costs for focal plane arrays were initially entered into a holding account. These costs remained in the holding account until the focal plane array was delivered, when an amount calculated to be the actual cost related to the delivery was allocated to actual cost of work performed. Also, budgeted cost of work performed was entered into the system when the actual cost of work performed entry was made. However, deliveries of focal plane arrays were not made as scheduled, which resulted in Cost Performance Reports reflecting budgeted cost of work scheduled with no entry for budgeted cost of work performed or actual cost of work performed. As of December 31, 1990, approximately * was in the holding account and had not been reflected as actual cost of work performed in the Cost Performance Report. As of March 22, 1991, Texas Instruments developed a procedure to allocate actual cost of work performed on a monthly basis; however, it had not developed a procedure for calculating budgeted cost of work performed on a monthly basis.

Cost Performance Reports submitted by the Joint Venture were inaccurate and incomplete because the Army did not adequately

* Company confidential or proprietary information deleted.

monitor Texas Instruments' system. Until corrections are made to Texas Instruments' system, the Army will not be able to monitor and assess the cost and schedule system for the focal plane array.

## RECOMMENDATIONS, MANAGEMENT COMMENTS, AND AUDIT RESPONSE

**We recommend that the Project Manager for the Advanced Antitank Weapon System-Medium require that:**

**1. Texas Instruments properly establish and report costs in Cost Account 11242M.**

**Army comments.** The Program Executive Officer for Fire Support responded for the Project Manager for the AAWS-M and nonconcurred. He stated that work packages met the requirements in DoD Instruction 7000.2. He further stated that it is true that Texas Instruments, Incorporated, has not come up with a procedure to calculate Budgeted Cost of Work Performed that is acceptable to the Government, but that the problem should be solved before the focal plane array manufacturing facility is restarted in October 1991. Also, he stated that during January 1991, the Project Manager directed Texas Instruments, Incorporated, to change its reporting on cost of focal plane arrays. Texas Instruments, Incorporated, immediately took action to include all work-in-process incurred from the focal plane array holding account and include those costs in the Cost Performance Report. The full text of the Program Executive Officer for Fire Support's comments is in Part IV of the report.

**Audit response.** The Program Executive Officer's comments regarding Recommendation C.1. were not responsive. Work packages and cost reporting procedures did not meet the requirements of DoD Instruction 7000.2, as was discussed in the finding. We agree that corrective actions were initiated during January 1991; however, as stated by the Program Executive Officer, an acceptable procedure for the calculation of Budgeted Cost of Work Performed for Cost Account 11242M had not been established as of the date of the Program Executive Officer's comments. In addition, when the draft audit report was issued, not all costs in the focal plane array holding account had been included in the Cost Performance Report. As such, we ask the Program Executive Officer to reconsider his position on Recommendation C.1. Also, we ask the Program Executive Officer to consider other officials' comments on the recommendation when reconsidering his position. Management's response should cover the areas specified in

the "Status of Recommendations" section at the end of the finding.

**OSD comments.** Although the recommendation was not directed to OSD, the Deputy Director (Tactical Warfare Programs), Office of the Director of Defense Research and Engineering, concurred with the finding. He stated that the weakness in the cost and schedule control system was identified before the release of the draft report. He further stated that during January 1991, the Project Manager directed Texas Instruments, Incorporated, to change its reporting on cost of focal plane arrays, and Texas Instruments, Incorporated, took action to include all work-in-process incurred for the focal plane array holding account and include these costs in the Cost Performance Report. Also, the Project Manager instituted monthly cost account reviews, and in May 1991, the Project Manager/Program Executive Officer established designated people at each contractor site to monitor contractor performance. The Deputy Director stated that current indications are that cost and schedule data being provided to the Army are more accurate and timely, and the focal plane array holding account has been dissolved. The full text of the Deputy Director's comments is in Part IV of the report.

**Defense Logistics Agency comments.** Although the recommendation was not directed to the Defense Logistics Agency, the Deputy Comptroller responded and concurred. He stated that Texas Instruments, Incorporated, is in the midst of establishing a method to report costs in Cost Account 11242M. He further stated that the Defense Plant Representative Office and the Defense Contract Audit Agency have had numerous meetings since the audit to correct the reporting problem, and revised procedures should be in place by the end of July 1991. The full text of the Deputy Comptroller's comments is in Part IV of the report.

**2. The Defense Plant Representative Office at Texas Instruments periodically review the reestablished cost account and ensure that the cost account accurately reflects the cost and schedule for focal plane arrays.**

**Army comments.** The Program Executive Officer for Fire Support responded for the Project Manager for the AAWS-M and nonconcurred. He stated that the Defense Plant Representative Office and the Defense Contract Audit Agency are responsible for periodically reviewing all cost accounts. The recommendation is not changing the way business is normally conducted. He further stated that, in May 1991, the Project Manager/Program Executive Officer designated personnel at each contractor site to monitor contractor performance.

**Audit response.** We believe this recommendation is still valid because revised procedures for Cost Account 11242M have not been implemented to correct the deficiencies described in the finding. As such, we ask the Program Executive Officer to reconsider his position on Recommendation C.2. While reconsidering his position, we also ask the Program Executive Officer to consider the Defense Logistics Agency's comments on the recommendation. Management's response should cover the areas specified in the "Status of Recommendations" section at the end of the finding.

**Defense Logistics Agency comments.** Although the recommendation was not directed to the Defense Logistics Agency, the Deputy Comptroller responded and concurred. He stated that the Defense Plant Representative Office will continue to provide monthly cost/schedule surveillance in the focal plane array manufacturing area as well as in all other aspects of the AAWS-M Program.

STATUS OF RECOMMENDATIONS

| | | Response should cover: | | |
|---|---|---|---|---|
| Number | Addressee | Concur/ Nonconcur | Proposed Action | Completion Date |
| 1. | Project Manager for the Advanced Antitank Weapon System-Medium | X | X | X |
| 2. | Project Manager for the Advanced Antitank Weapon System-Medium | X | X | X |

## PART III - ADDITIONAL INFORMATION

Appendix A - Audit Conclusions

Appendix B - Prior Audits and Other Reviews

Appendix C - Acquisition Decision Memorandum for Advanced Antitank Weapon System-Medium

Appendix D - Summary of Benefits Resulting from Audit

Appendix E - Activities Visited or Contracted

Appendix F - Report Distribution

## APPENDIX A: AUDIT CONCLUSIONS

We did not identify any significant problems during our review of the critical program management elements of integrated logistics, program management organization, and review and audit open items. A discussion of these areas follows.

**Integrated logistics.** We reviewed the AAWS-M Program Office's draft Integrated Logistics Support Plan, dated December 1990. We concluded that the draft plan adequately addressed logistics issues, such as reliability, availability, and maintainability.

**Program management organization.** We reviewed the AAWS-M Program Office charter and organizational structure. The charter delegated the Program Executive Officer's full line of authority to the Project Manager to provide stable and adequate management. The AAWS-M Program Office was staffed with specialists, such as contracting and engineering personnel, needed for the management of the Program. In addition, the AAWS-M Program Office was supported by elements of the U.S. Army Missile Command, such as the Procurement Directorate, Missile Logistics Center, Product Assurance Directorate, and Research and Engineering Directorate. Also, the AAWS-M Program office had a low rate of personnel turnover.

**Review and audit open items.** We reviewed documents that the AAWS-M Program Office used to control open issues and monitor major areas of concern. We used these documents to determine whether problem areas were identified and how often reviews were being accomplished. These reviews included the Program Executive Review, Product Assurance Review, Design Reviews, and system engineering working group meetings. We concluded that program reviews were being accomplished and adequate actions were being taken to track and follow-up on open issues.

## APPENDIX B: PRIOR AUDITS AND OTHER REVIEWS

Department of Defense Inspector General Audit Report No. 88-109, "DoD Joint Acquisition Programs," March 21, 1989. The audit objective was to identify impediments that hindered the Services from achieving successful acquisition of joint programs or caused duplicate research and development efforts. The audit found that although the program had been a joint development, the Services had not established a program charter, a memorandum of agreement, or joint operating procedures. The report noted that the Marine Corps had requested $32 million for research and development for the program. Because of a lack of a formal agreement between the Marine Corps and the Army, the funding would be subjected to redirection within the Marine Corps, which could have an impact on the program's success. The audit acknowledged that the Assistant Secretary of the Army (Research, Development and Acquisition) initiated actions to establish joint Service agreements for the AAWS-M Program. The Army considered this action responsive. We noted in our survey that charters have been established among the AAWS-M project managers, and that a memorandum of agreement had been established between the Army and the Marine Corps.

Department of Defense Inspector General Audit Report No. 86-119, "Report on the Audit of the Army Advanced Antitank Weapon System-Medium as Part of the Audit of the Effectiveness of the Defense Systems Acquisition Review Council Process-FY 1986," August 20, 1986. The audit objective was to evaluate the effectiveness of the Defense Systems Acquisition Review Council as it related to the Advanced Medium System through a review of key program documents for the Milestone I review. The audit focused on the adequacy of the Advanced Medium System documentation prepared for Defense Systems Acquisition Review Council purposes. In addition, the audit examined how various elements of the OSD staff performed their oversight of the system. The audit found that budgetary requirements to develop the Advanced Medium and Heavy Systems did not agree with key acquisition documents. Recommendations were made to bring into agreement key acquisition and budget documents for the Medium System and the Justification for Major System New Start budget documents for the Heavy System. Also, a recommendation was made to delete all work from the request for proposals for the Advanced Antitank Weapon System-Heavy. Another recommendation required, after the Milestone I meeting on the Advanced Medium System, that the Army submit documentation to show that funding and acquisition strategy issues were resolved. The Army concurred with the recommendations and resolved budget issues by

issuing an errata sheet relating to program documentation and the Congressional Descriptive Summary. The Advanced Antitank Weapon System-Heavy was deleted from the request for proposals. No further action was considered necessary.

General Accounting Office Audit Report No. GAO/NSIAD 88-160 (OSD Case No. 7590), "DoD Acquisition Programs Status of Selected Systems," June 1988. The General Accounting Office (GAO) audit report was accomplished to provide current information on each program's requirements, schedule, performance, cost, and funding support. The audit reviewed 23 programs with a main focus on programs approaching full-scale development or a production decision. There were no findings in the report, which pertained to AAWS-M, although GAO did observe that the AAWS-M Program included cost uncertainties. GAO estimated that the combined Army and Marine Corps requirement would cost $5.5 billion. At the time of the audit, the Army was investigating three system technologies. GAO noted that critical tests remained for the demonstration phase; however, through January 1988, there were no significant schedule changes or technical problems. The report stated that DoD considered the program a high priority and that it would offer significant improvements over the Dragon.

General Accounting Office Audit Report No. GAO/NSIAD 89-158 (OSD Case No. 7918), "DoD Acquisition Information on Joint Major Programs," July 1989. The objectives of the GAO audit were to collect descriptive data on joint major programs, address specific questions concerning memorandums of agreement, and review OSD's role as well as the roles of other DoD organizations in joint major programs. GAO reviewed 34 joint major programs, which met the dollar threshold as defined in DoD Directive 5000.1. The GAO audit observed that the only agreement between the joint Services was the Joint Services' Operational Requirement. Also, the Army and the Marine Corps established a Joint Test and Evaluation Master Plan. When the report was issued, the AAWS-M Program was in the technology demonstration phase in which three concepts were under consideration. The Army estimated the AAWS-M cost to be about $5.5 billion with $535 million for research and development and $4.9 billion for procurement.

# Appendix C: Acquisition Decision Memorandum for Advanced Antitank Weapons System-Medium

THE UNDER SECRETARY OF DEFENSE

WASHINGTON, DC 20301

ACQUISITION

27 SEP 1991

MEMORANDUM FOR SECRETARY OF THE ARMY

SUBJECT: Acquisition Decision Memorandum for Advanced Anti-tank Weapons System-Medium (AAWS-M)

On June 6, 1991, the Defense Acquisition Board met at the request of the Army Acquisition Executive to review the Army's proposal to restructure the AAWS-M development program. AAWS-M has experienced cost and schedule growth in the Engineering and Manufacturing Development (EMD) contract. No decision was reached at the DAB; but I asked the Joint Requirements Oversight Council (JROC) to review the AAWS-M requirement and determine if "A" level focal plane arrays (FPAs) are required. I also tasked the Chairman, Conventional Systems Committee (CSC) to work with the Army to define an EMD program with reduced risk that would also assure producibility of affordable FPAs. The JROC confirmed the requirement for AAWS-M but concluded that a capability less than the objective is a satisfactory near term solution if affordability and/or producibility dictate.

I approve the Army's restructured 54-month EMD program which includes an initial risk reduction phase and delays the initiation of pre-production qualification test (PPQT) by six months. Satisfactory completion of each successive milestone event identified in the attached charts -- with their attendant exit criteria -- will be required prior to continuing toward the next milestone event. DDDR&E(TWP) with DASD(PR) will review the AAWS-M program at each event to insure that adequate progress is being made in FPA producibility and performance. A principal item of interest will be the progress that is being made toward insuring the average unit production cost for the tactical FPA/DEWAR assembly is well below $12,500 in FY92 dollars.

The Army shall also provide the following items within 90 days: a revised Test and Evaluation Master Plan; an updated program baseline; an updated plan that specifically identifies cost reduction initiatives for the FPA for the selected process and establishes a learning curve objective; and a plan of action which minimizes transition time to an alternative system concept if cost goals are not met. The Army will provide to DDDR&E(TWP), prior to the initial milestone event mentioned above, a complete technical statement of the characteristics required for the focal plane array that meets the potentially reduced performance requirements validated by the JROC.

On the issue of system weight, the December 5, 1990, DAB decision of 49.5 pounds remains the firm threshold. Any breach of the weight threshold will trigger a review by the JROC and DAB and may result in program termination.

Don Yockey

Attachments

## APPENDIX D: SUMMARY OF BENEFITS RESULTING FROM AUDIT

| Recommendation Reference | Description of Benefit | Type of Benefit |
|---|---|---|
| A.1. | Program Results. Will provide acquisition decisionmakers costs related to alternatives for the system. | Nonmonetary. |
| A.2. | Program Results. Will provide acquisition decisionmakers realistic cost data. | Nonmonetary. |
| A.3. | Program Results. Will provide realistic cost to Defense Acquisition Board. | Nonmonetary. |
| B.1.a. | Economy and Efficiency. Will protect personnel resources. | Nonmonetary. |
| B.1.b. | Economy and Efficiency. Will protect personnel resources. | Nonmonetary. |
| B.2. | Economy and Efficiency. Will protect personnel resources. | Nonmonetary. |
| B.3. | Economy and Efficiency. Will provide for improved operational test and evaluation. | Nonmonetary. |
| C.1. | Program Results. Will establish accurate cost reporting. | Nonmonetary. |
| C.2. | Program Results. Will ensure accurate cost and schedule reporting. | Nonmonetary. |

## APPENDIX E: ACTIVITIES VISITED OR CONTACTED

### Office of the Secretary of Defense

Office of the Under Secretary of Defense for Acquisition, Washington, DC
Office of the Assistant Secretary of Defense (Force Management and Personnel), Washington, DC
Office of the Director, Operational Test and Evaluation, Washington, DC
Office of the Deputy Assistant Secretary of Defense (Resource Analysis), Washington, DC

### Department of the Army

Office of the Secretary of the Army (Chief of Legislative Liaison), Washington, DC
Office of the Assistant Secretary of the Army (Research, Development and Acquisition), Washington, DC
U.S. Army Deputy Chief of Staff for Operations and Plans, Washington, DC
U.S. Army Deputy Chief of Staff for Personnel, Washington, DC
U.S. Army Missile Command, Redstone Arsenal, AL
U.S. Army Infantry School, Fort Benning, GA
U.S. Army Missile and Space Intelligence Center, Redstone Arsenal, AL
U.S. Army Cost and Economic Analysis Center, Washington, DC
U.S. Army Materiel Systems Analysis Activity, Aberdeen Proving Ground, MD
U.S. Army Ballistics Research Laboratory, Aberdeen Proving Ground, MD
U.S. Army Operational Test and Evaluation Command, Alexandria, VA
Program Executive Office for Fire Support, Redstone Arsenal, AL
U.S. Army Program Manager for Training Devices, Orlando, FL

### Department of the Navy

Naval Audit Service, Arlington, VA
Marine Corps Combat Development Command, Quantico, VA
Marine Corps Research Development and Acquisition Command, Quantico, VA

## APPENDIX E: ACTIVITIES VISITED OR CONTACTED (cont'd)

### Defense Agencies

Defense Logistics Agency
Defense Advanced Research Projects Agency, Arlington, VA
Defense Plant Representative Offices:
  Texas Instruments, Incorporated, Dallas, TX
  Martin Marietta Corporation, Orlando, FL
Defense Contract Audit Agency Resident Offices:
  Texas Instruments, Incorporated, Dallas, TX
  Martin Marietta Corporation, Orlando, FL

### Non-Defense Activities

General Accounting Office:
  Headquarters, Washington, DC
  Regional Office, Dallas, TX
  Sublocation, Huntsville, AL

### Non-Government Activities

Martin Marietta Corporation, Orlando, FL
Texas Instruments, Incorporated, Dallas, TX
TI/Martin AAWS-M Joint Venture, Huntsville, AL

## APPENDIX F: REPORT DISTRIBUTION

### Office of the Secretary of Defense

Under Secretary of Defense for Acquisition
Assistant Secretary of Defense (Program Analysis and Evaluation)
Assistant Secretary of Defense (Force Management and Personnel)
Comptroller of the Department of Defense
Chairman, Conventional Systems Committee
Director, Operational Test and Evaluation

### Department of the Army

Secretary of the Army
Assistant Secretary of the Army (Financial Management)
Assistant Secretary of the Army (Research, Development and Acquisition)
U.S. Army Deputy Chief of Staff for Personnel
Commanding General, U.S. Army Missile Command
Commander, U.S. Army Operational Test and Evaluation Agency
Commandant, U.S. Army Infantry School
Program Executive Officer for Fire Support
Project Manager for the Advanced Antitank Weapon System-Medium

### Department of the Navy

Commanding General, Marine Corps Combat Development Command

### Defense Agencies

Director, Defense Logistics Agency
Defense Plant Representative Office Texas Instruments

## PART IV - MANAGEMENT COMMENTS

Office of the Secretary of Defense

Department of the Army

Defense Logistics Agency

# MANAGEMENT COMMENTS FROM OFFICE OF THE SECRETARY OF DEFENSE

OFFICE OF THE DIRECTOR OF
DEFENSE RESEARCH AND ENGINEERING

WASHINGTON, DC 20301

24 JUL 1991

Mr. Donald E. Reed
Director, Acquisition Management Directorate
Inspector General
400 Army Navy Drive
Arlington, Virginia 22202-2884

Dear Mr. Reed:

In accordance with your request of May 16, 1991, regarding the draft report on the audit of the acquisition of the Advanced Anti-Tank Weapon System--Medium, project OAL-0073, attached are my organization's comments on your report. Please be aware that the AAWS-M program has changed significantly since your staff performed their audit in the spring time-frame. My staff will continue to interact with yours in order to insure the appropriate flow of information.

Sincerely,

Frank Kendall
Deputy Director
(Tactical Warfare Programs)

Attach
a/s

FINDING A: Proposed Restructured Program.

The Army's proposal to restructure the AAWS-M Program was based on a contractor's estimate of $372.0 million, which had not been validated by the Army. The Army did not validate the contractor's estimate because the contractor had not developed cost data to support its estimate at the time that the Army was developing its proposal to restructure the AAWS-M Program. Furthermore, there was not sufficient time for the contractor to develop detailed support for its estimate before the next scheduled review of the AAWS-M Program by the Army Acquisition Executive. Since the contractor's estimate had not been validated, there is uncertainty as to whether the full-scale development contract for the AAWS-M Program can be completed for $372.0 million.

DOD POSITION. The DoD partially concurs with the IG's finding relative to the restructured program. The Army's Red Team conducted an extensive assessment of the proposed 48-month restructured program. This assessment is documented in Volumes I and II, "AAWS-M Cost Growth Red Team Final Report", 30 March 1991. However, subsequent to the Army's Red Team assessment and the publication of their final report, and as a result of Conventional Systems Committee (CSC) reviews on 20 and 29 May 1991 and a Defense Acquisition Board (DAB) review on 6 June 1991, the AAWS-M program based on a funding profile of $372.0M may no longer be valid. Additional scope of work and an extension in schedule are under consideration as a result of the 6 June 1991 DAB. An updated cost estimate to complete the extended program was provided on 11 July 1991. Among the alternatives under consideration is a program based on a 56-month Engineering Manufacturing Development phase at a total program cost of $596.2M. The program will be reviewed by the Cost Analysis Improvement Group prior to the DAB's reconvening. The DAB is currently scheduled for 19 August 1991.

FINDING B: SYSTEM WEIGHT.

The AAWS-M was too heavy to be one-man-portable. The AAWS-M was too heavy because the original weight limitation for the system was established at too high a level, and the contractor was unable to stay within the weight limitation prescribed for the AAWS-M. As a result, the AAWS-M was not operationally suitable for planned deployment with light infantry and airborne rangers.

DOD POSITION. The DoD does not concur with the IG's finding relative to system weight. The Joint Service Operational Requirement Document specified the maximum weight for a full-up AAWS-M as 45 pounds. However, when it became obvious that the

maximum weight requirement was going to be exceeded, the Army obtained the necessary approval for an increase in system weight to 49.5 pounds. The new weight of 49.5 pounds was reviewed and approved by the DAB on 5 December 1990. The Army has stated at both the 20 and 29 May 1991 CSC reviews that any weight growth beyond 49.5 pounds will result in program termination. There is no intention to reconfigure the Army's force structure to make AAWS-M a crew-served weapon.

FINDING C: COST AND SCHEDULE CONTROL SYSTEM

Texas Instruments' cost and schedule control system was not structured to provide meaningful cost performance data on the development of focal plane arrays. This condition was caused by a lack of monitoring of the cost and schedule control system. Until corrections are made to Texas Instruments' cost and schedule control system, the Army will not be able to monitor and assess the cost and schedule for focal plane arrays.

DOD POSITION. The DoD concurs with the IG's finding relative to the cost and schedule control system. The weakness in the cost and schedule control system, however, was identified prior to the release of the draft report. The actions taken by the Project Manager were as follows:

- The Project Manager, in January 1991, directed Texas Instruments (TI) to change their reporting on costs of focal plane arrays (FPA). TI immediately took action to include all work in process costs incurred from the FPA holding account and included these costs in the Cost Performance Report.

- The Project Office instituted monthly cost account reviews.

- In May 1991, the Project Manager/Program Executive Officer established designated people at each contractor site to monitor contractor performance.

Current indications are that the cost and schedule data being provided to the Army are more accurate and timely. The focal plane array holding account has been dissolved.

THE OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE

WASHINGTON, D.C. 20301-4000

ORCE MANAGEMENT
AND PERSONNEL

29 AUG 1991

Mr. Donald E. Reed
Director, Acquisition Management Directorate
Inspector General
400 Army Navy Drive
Arlington, Virginia 22202-2884

Dear Mr. Reed:

Mr. William D. Van Hoose, of your office, verbally requested that we respond directly to you on specific findings and corrective actions contained in your draft report on the audit of the acquisition of the Advanced Anti-Tank Weapon System - Medium, project OAL-0073. Mr. Van Hoose requested that an FM&P input be furnished on "Finding B: System Weight".

Your finding that AAWS-M is too heavy to be one-man portable, and may not be operationally suitable for planned deployment to light infantry and airborne rangers, is shared by some offices within the Army and OSD. Assessments performed by the Army Manpower and Personnel Integration (MANPRINT) Directorate, and my Human Systems Integration Division in support of Army Systems Acquisition Review Council (ASARC), OSD Conventional Systems Committee (CSC) and Defense Acquisition Board (DAB) deliberations concluded that AAWS-M weight constitutes a moderate risk to soldier safety and total system performance. The ASD(FM&P) input to the DAB is enclosed.

Your first recommendation for corrective action concerns revising the AAWS-M one-man portability requirement. According to representatives from the TRADOC System Manager's Office, the term "one-man portable" now refers to AAWS-M's single man operation, not to how the weapon is to be transported. This interpretation was also provided to representatives from GAO during their recent visit to the Infantry School. The AAWS-M Program Manager has also suggested that he expects AAWS-M to be broken into pieces during transit. These remarks suggest some operational flexibility at the unit level to allow distribution or rotation of the weapon between soldiers. We encourage Army efforts to clarify portability terminology and/or doctrine regarding distribution or balance of soldier loads.

Your second recommendation for corrective action concerns reducing the impact of the weight to an allowable level. Our inputs to the decision review process urged the adoption of a formal weight reduction effort. While AAWS-M program representatives continue to discuss weight reduction pre-planned product improvements (P3I), no such efforts have been formalized. We have also learned that the other factors contributing to the AAWS-M weight issue - such as the contents and weight of soldier combat and sustainment loads - are being explored for possible reduction. Implementation of either of these efforts would help reduce the weight to an allowable level.

If additional information is needed, please contact Ms. Nina Richman-Loo, of my Human Systems Integration Division, at 697-9380.

Sincerely,

Carl J. Dahlman
Deputy Assistant Secretary of Defense
(Requirements and Resources)

Enclosure

ASSISTANT SECRETARY OF DEFENSE

WASHINGTON, D.C. 20301-4000

JUN 18 1991

FORCE MANAGEMENT AND PERSONNEL

MEMORANDUM FOR UNDER SECRETARY OF DEFENSE (ACQUISITION)

SUBJECT: AAWS-M Defense Acquisition Board Deliberations

During two recent AAWS-M Conventional Systems Committee (CSC) meetings, FM&P concerns regarding system weight were discussed. Risks associated with fielding a 49.5 pound anti-tank system to infantry squad soldiers were similarly echoed in the draft DoD IG report on the AAWS-M acquisition which was provided to your office for review and comment.

During CSC discussions about the weight issue, MG Beltson, Deputy for Systems Management, Office of the Assistant Secretary of the Army, Research, Development and Acquisition, advised Frank Kendall that the Army will terminate AAWS-M if it grows beyond its current 49.5 pound requirement. We applaud this commitment. Further, MG Beltson invited my DASD for Requirements and Resources, Carl Dahlman, to monitor Army progress in investigating and implementing AAWS-M weight reduction efforts. Dr. Dahlman and his staff welcome the opportunity to monitor the management of AAWS-M weight and are working on a plan to quantify experimentally the relationships and trade-offs between weight, soldier limitations, and system performance.

In your deliberations concerning termination, restructure, or continuation of AAWS-M full scale development, please consider the contribution of system weight to the overall desirability of the system. While I agree with Frank Kendall's assessment that AAWS-M weight is not a "show-stopper", it should be regarded as another area of moderate program risk.

Christopher John

Christopher John

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, DC 20301-1700

OPERATIONAL TEST
AND EVALUATION

MEMORANDUM FOR INSPECTOR GENERAL, DEPARTMENT OF DEFENSE,
(ATTN: MR. WILLIAM VAN HOOSE)

SUBJECT: AAWS-M System Weight DOD IG Report

Reference Draft DOD IG Report Finding B.- The AAWS-M is not operationally suitable for planned deployment with light infantry, airborne and ranger units.

DOT&E Response. DOT&E plans a thorough evaluation of the portability issues associated with AAWS-M during IOT&E as proposed in paragraph 2 of the DOD IG Draft Audit Report. However, under current weight restriction policies it will be extremely difficult to fully evaluate the portability of AAWS-M using soldiers from the 5th to the 95th percentile to transport the AAWS-M for 10 kilometers as suggested in the DOD Draft Report. Current policy, based on military standard 1472D restricts soldiers participating in tests to carrying no more than 45% of their body weight. Very few soldiers are heavy enough to carry 49.5 lbs or even 45 lbs. Exemptions to this restriction are granted only after a personal written request by the Service Secretary to OSD. Even with the exemption, severe restrictions still exist. As an example, only volunteers could be used in the recently completed SIMATS portability test. After receiving the exemption, severe restriction remained on the rate and distance soldiers were allowed to march while carrying the Dragon or Bofor Bill Anti-tank weapons during the SIMATS test.

The restrictions outlined above do not apply to units in training or on operations, only during testing. If DOT&E is to conduct a realistic evaluation of the portability of AAWS-M and other man-portable systems, the current restrictions will have to be lifted or modified.

Frederick Peters
Staff Asst for Army
Aviation Programs

# MANAGEMENT COMMENTS FROM DEPARTMENT OF THE ARMY

**DEPARTMENT OF THE ARMY**
PROGRAM EXECUTIVE OFFICE, FIRE SUPPORT
REDSTONE ARSENAL, ALABAMA 35898-5000

REPLY TO ATTENTION OF

AMSMI-IR (36-2) 1 July 1991

MEMORANDUM THRU Headquarters, Department of the Army, Office of Assistant Secretary for Research, Development and Acquisition, ATTN: SARD-SF, Washington, D.C. 20310-0103

MEMORANDUM FOR Department of Defense, Office of Inspector General, ATTN: DODIG/AIG(A), 400 Army Navy Drive, Arlington, VA 22202-2884

SUBJECT: DODIG Draft Report, Audit of the Acquisition of the Advanced Antitank Weapon System-Medium (AAWS-M) System Project No. OAL-0073

1. We appreciate the opportunity to review and comment on the subject report. However, it is important to note that AAWS-M program has been changing rapidly and that much of what is covered in this report has already been overcome by events.

2. Based on our review of the draft report, we submit the enclosed comments on the accuracy of several of the findings, facts, conclusions, and recommendations (Encl 1). The AAWS-M Project Office position on Recommendations C-1 and C-2 is at enclosure 2.

3. In addition, the Project Office nonconcurs with the DODIG's finding of an internal control weakness that "identified controls were not in place to ensure the effectiveness of a subcontractor's cost and schedule control system." This nonconcurrence is based on the fact that what the DODIG perceived as a weakness had already been addressed by the Project Office prior to the release of the draft report. The actions taken by the Project Office were as follows:

a. The Project Manager, in January 1991, directed Texas Instruments (TI) to change their reporting on costs of Focal Plane Arrays (FPA). TI immediately took action to include all work in process costs incurred from the FPA holding account and included these costs in the Cost Performance Report.

b. The Project Office instituted monthly cost account reviews.

AN EQUAL OPPORTUNITY EMPLOYER

AMSMI-IR (36-2)
SUBJECT: DODIG Draft Report, Audit of the Acquisition of the Advanced Antitank Weapon System-Medium (AAWS-M) System Project No. OAL-0073

c. In May 1991, the Project Manager/Program Executive Officer established designated people at each contractor site to monitor contractor performance.

4. It is requested that the enclosed comments be considered in preparing the final audit report.

2 Encls

GEORGE G. WILLIAMS
Program Executive Officer
Fire Support

2

DODIG DRAFT REPORT

Audit of the Acquisition of the Advanced Antitank Weapon System - Medium (AAWS-M) System (Project No. 0AL-0073)

The following comments, keyed to specific paragraphs of the draft report, are provided for accuracy and clarification:

1. 3rd para of Executive Summary. Change "cost-type contract" to "cost plus incentive fee contract".

2. 4th para of Executive Summary. Add the following for thorough coverage of what transpired in the way of decision reviews: A Joint Requirements Overview Council convened on 29 Nov 90 and approved a change in the acceptable system weight threshold from 45 to 49.5 lbs. A Defense Acquisition Board was held on 5 Dec 90 to examine program cost growth and technical performance. The Board approved the program baseline change on system weight (via Program Deviation Report), allowed the program to continue along its current 36 month schedule, and planned for a subsequent program review in the May 91 time-frame to again assess FPA producibility and contract cost and schedule performance.

3. 6th para of Executive Summary. The first line belongs up under the introduction section. The Army and OSD initiated actions independently of the DODIG audit. Audit results did not turn up any new issues/areas needing attention.

4. Page ii, para 1 of the Executive Summary. The DODIG may be confusing a number of different cost estimates. The Army BCE is based on an assumption that the contractor's actual portion of program cost will not be below the contractor's estimate of $372 million. The Army's independent "Red Team" Cost Group prepared an independent estimate of the contractor's cost and came up with a figure below $350 million for the contractor's new 48 month program. Based on the Red Team report a figure of $372 million was estimated for a program of 48 months with risk reductions. The PMO chose to accept the $372 million figure as the new contract baseline and presented it to the ASARC on 4 Mar 91. The BCE used the new contract value for each WBS line item as a minimum value for that line item. Adjustments were made to each WBS item as a result of the Red Team estimate and PM analysis. The resulting PM BCE had an estimated contract cost of $420 million. The DODIG was present at the OSD CAIG review 5 Apr 91 when the $420 million figure was shown and also when a copy of the PM BCE was provided.

Reference "validity" of the estimate: The Army took careful steps to evaluate and validate the contractor's bottom's up Latest Revised Estimate both at a review on 14 Jan 91 as well as through subsequent Red Team efforts through 15 Feb 91. The Red

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Team review was conducted by examination of each WBS element. This followed by the Army CEAC's concurrent development of a compatible cost position in Mar 91, leading to the CAIG on 5 April.

5. Page ii, para 2. The Army and the JROC refute this statement. (See comment #2).

6. Page ii, para 3. The Cost, Schedule Control Systems Criteria (C/SCSC) system used was in place and totally sufficient as intended. The system was validated by both the DCAA and DPRO representatives. Additionally, it is significant to emphasize that at the reporting level required, by contract, the Cost Performance Report (CPR) provided management complete and accurate information. Within the Work Breakdown Structure (WBS) reporting levels, the CPR (Level 3) did not provide sufficient visibility into the "FPAM Holding Account". Since this element is at Level 6 within the WBS, the CPR did not explicitly identify the Focal Plane Array (FPA) yield deficiency affecting the "future" deliveries for both cost and schedule. This prevented the magnitude of cost growth from being accurately reflected at Level 3 on the CPR. Once this was discovered, action was taken to liquidate the account. The contractor voluntarily commenced restructuring the method of reporting to assure appropriate visibility was provided in reporting to government management. In the same timeframe, the AAWS-M PM directed a change in reporting of cost on FPAs. Therefore, in no way should it be construed that the entire C/SCSC and Cost Performance Reporting System(s) were insufficient and useless for reflecting current status and determining variances. This total situation was identified and in the process of being rectified before the DODIG audit began.

7. Page ii, para 4, Internal Controls. Your use of the word "identified" should avoid implying discovery. The problem had already been identified by the Army and was being corrected before DODIG began to examine.

8. Page ii, para 5, Potential Benefits of Audit. All findings that we concur with were identified prior to DODIG inspection. Corrective actions were already underway. It is erroneous to attribute benefits to the results of this audit. This audit has not changed the course of the program.

9. Page ii, para 6, Summary of Recommendations. The AAWS-M program is currently scheduled for another DAB review in late July/early August 91. Cost estimates have been deemed acceptable in DOD reviews leading up to the present, and the cost and schedule control system has been improved. System weight below 49.5 lbs is not regarded a Service or OSD issue.

The following are comments to the Draft Report.

5 10. Page 5, Finding A. Again the Army's (PM) BCE was $420 million for the contractor's estimate, not $372. DODIG was

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present when this figure was presented. The Red Team bottoms-up estimate confirmed that the contractor's estimate was reasonable.

In the second sentence the DODIG states that " the contractor had not developed cost data to support it's estimate..." but doesn't mention what type of data the contractor failed to develop. When the Red Team was in Denton on 6-7 Feb the contractor had spreadsheets that laid out the required manpower by the lowest level WBS line items by month for the entire remainder of the program. Also, data on materials, subcontracts, etc., was available and reviewed by the Red Team. The DODIG would be more correct to state that the contractor did not have all the data available and incorporated into their cost/schedule/control systems at the time the Army was developing it's plans to restructure the program. In fact it took the contractor a few months to correctly incorporate all the new data into the reporting system.

However, the contractor's estimate has since been reviewed, evaluated, and confirmed as a result of an independent estimate.

5 11. Page 5, Background. Another line could be added somewhere in the paragraph that states that in August 89,the PM estimate, and budget for, the contract cost was $263 million even though the contract was signed for under $170 million.

6 12. Page 7, first para. The last sentence in the paragraph should convey information that two trips were made by the Red Team to the contractor site. Suggest that this sentence be modified to read: To perform the assessment the "Red Team" visited the contractor's site at Denton, Texas from February 6 through February 8, 1991 and again on February 23, 1991.

6 13. Page 7, middle para. This paragraph infers that the Red Team assessed the $372 million cost of the Joint Venture's 23 February proposed restructured program. The Red Team did assess technical and schedule risk of the contractor-proposed restructured program on 23 February, but the Red Team was not provided cost estimates nor tasked to address cost of the restructured program as presented. Also, the $520 million cost for the 60-month program was a preliminary estimate which was later refined to $423.8 million. Suggested modifications (note relocation of last sentence) to this paragraph are as follows:

Initially, the "Red Team" concluded that the AAWS-M full-scale development program could extend up to 60 months and cost as much as $520.0 million (later refined to $423.8 million), which was higher than the Joint Venture's originally proposed 48-month, $362.0 million program. However, on February 23, 1991, the Joint Venture presented technical and schedule information on a restructured 48-month ~~$372.0 million~~ program to the "Red Team" in response to "Red Team" findings. After considering the Joint Venture's presentation, the "Red Team" revised its conclusion and accepted the technical and schedule aspects of the Joint Venture's proposed restructured 48-month ~~$372.0 million~~ program.

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This program added $10.0 million for risk abatement efforts directed by the Program Executive Officer, along with contractor steps for risk abatement, resulting in a total contractor-proposed cost of $372.0 million.

7 14. Page 8, first para. The Red Team recommendations regarding performance milestones and the establishment of a formal Government Action Team has been initiated.

7 15. Page 8, last para. The first statement has been repeated throughout the report and is refuted by the Army. The DODIG is apparently confusing the contractor's estimate with the contractor's requirements under the cost reporting systems. The Red Team Cost Group did determine the adequacy of the 48 month LRE and did validate the contractor's estimate. The DODIG has a copy of the final Red Team reports which outline what was done.

In the next sentence DODIG added "cost accounts, and work packages" to the end of what was the true Red Team objective. Again, this can be checked by looking back at the Red Team briefings that are contained in volume III of the final Red Team Report. This again illustrates the confusion that the DODIG has between the contractor cost estimate and cost reporting system requirements.

7 16. Page 9, first para. When the Red Team initially conducted its review, it looked at dollars spent, work completed, and work remaining and then made its own estimate. In addition, the last sentence of the paragraph states that "the Army accepted the Joint Venture's ($372.0 million) estimate based on the "Red Team's" conclusion, but the $372.0 million was not a Red Team number.

7 17. Page 9, middle para. Both statements are incorrect. DODIG has the Red Team reports which outline how the Army evaluated or "validated" the contractor's estimate and the PM BCE & CAIG briefing which show that the PM estimate is $420 million.

7 18. Page 9, last para. The second statement mentioned a February 12, 1991, memorandum which is before the Red Team completed its detailed review.

19. Page 10, first para. See comment 4,10, and 14. Both the Red Team and the PM felt that the JV estimate for FPA manufacturing was too low. On 6-8 Feb 91, the Red Team estimate was already higher than the JV estimate. The BCE was even higher than the Red Team estimate in the FPA area.

While true that the TI FPA cost was more than planned and was below the required quality, the government on 15 Jan 91 ceased additional funding for the FPAM facility until the quality was up to a specified level for restarting.

8 20. Page 12, first para. The first statement that, "As a risk abatement procedure, the Joint Venture modified the contract with

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Martin Marietta Corporation to obtain an additional 60 focal plane arrays from the Hughes Aircraft Company" was done as a government requirement. The Santa Barbara Research Corporation (SBRC) has since built an array having sensitivity significantly greater than requirements with no problems.

8 21. Page 12, second para. DODIG states "Until the JV demonstrates that it can produce focal plane arrays in quantities to satisfy production, there is no basis for establishing a reliable estimate, based on cost, to complete FSD contract." This might be true were it not for the second source, SBRC.

22. Page 13, first para. The statement that "Texas Instruments has delivered 48 focal plane arrays, which can be used in 48 test missiles even though they do not meet required specifications" is incorrect. TI delivered 42 focal plane arrays but only 32 are flight worthy. The remaining arrays will be used for captive flight seekers and lab test results. In addition, regarding TI and their focal plane array manufacturing facility, SBRC has been made the primary source for focal plane arrays. Finally, the DODIG states that "the time required to initiate necessary procurement actions would cause slippage in the already tight schedule." Hughes is already under contract with MM. The current contract contains options to produce the total required FSD quantity.

9 23. Page 13, second para. The Joint Venture never stated that a complete redesign of the array processor may be needed. The Army wants more margin, and has directed a parallel development effort.

9 24. Page 14, Propulsion system redesign. The DODIG statement that "The Joint Venture also stated that the propulsion system may require a complete redesign" is not true. The propulsion system will not require a complete redesign.

10 25. Page 15, Potential Effects of the Proposed Restructured Program. The Project Office questions the rationale for the statement, "If the AAWS-M Program is restructured based on the Joint Venture's estimate for completing the full-scale development contract, it is likely that the program will again experience cost overruns."

10 26. Page 15, Actions Taken by Management. The Blue Team did not state that the contract cost would be $433 million but rather added $13 million to the Army Cost Position (ACP). The ACP contained an additional $60 million above the $433 million in TRACE funding to cover the contract up to 60 months. In addition the $433 million contained $24 million of the contractor's funding for cost sharing.

11 27. Page 17, Additional Actions Needed on the Part of Management. First, the DODIG states that the Army should cost out each program alternative. This was already completed by the PM under Army direction. Also, the JV estimate is considered valid as a

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result of the Red Team and PM estimates/reviews. Finally, an updated estimate for the cost to complete FSD was presented at the Defense Acquisition Board (DAB), 6 June 1991.

11 28. Page 18, Recommendations for Corrective Action.

(1) The Army complied with guidance from OSD and presented same at CSC 29 May 91 and DAB 6 Jun 91.

(2) The JV estimate has been extensively reviewed to the satisfaction of DA and OSD. The PM also now has a dedicated government AAWS-M representative at both the Orlando and Denton contractor sites to provide a better level of oversight.

(3) FSD estimates have been updated. Additionally, there is already a vehicle in place that also implements the 3rd DODIG recommendation. The Army requires that the PM/PEO prepare a monthly Defense Acquisition Executive Summary (DAES) report each month. Both the contractor's own estimate and the PM's estimate of total contract cost is entered monthly.

None of the DODIG recommendations require any additional corrective actions.

15 29. Pages 22-23, Combat Load. Error in first paragraph. Wording on pages 22 and 23 needs to state that the report context involves only "replacement" batteries. The weight of the system does in fact include battery weight for 4 hours of operating which is the system operational requirement. It is only true that "replacement" batteries are not included in the system weight.

18 30. Page 27, Recommendations for Corrective Action. These concerns were addressed as outlined above in comment 2 by two separate OSD-level committees.

23 31. Page 29, Finding C. TI's cost and schedule control system is structured to provide meaningful data but in the case of AAWS-M it was not implemented in a manner which provided total visibility of all elements. The use of the holding account was approved by the government and had been used by TI on other programs. In retrospect, this practice was a major factor in the lack of visibility of contract cost growth and has been discontinued.

23 32. Page 30, Operation of Texas Instruments' System. DODIG states that "Texas Instruments' cost and schedule control system was not operating in accordance with the Cost Schedule Control System Criteria set forth in DoD Instruction 7000.2." The TI system has been reviewed by MICOM, AMC, DPRO and DCAA and found to be operating in accordance with the criteria. Also TI has successfully passed over nine subsequent application reviews.

24 33. Page 32, last para. The first statement in the paragraph is completely false. The PM/PEO, DPRO, DCAA and Cost Analysis have all been heavily involved in monitoring and analyzing the Texas

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Instruments' system. The second sentence is also false. DCAA and DPRO have been providing data separate from the CPR on the FPA holding account by conducting audits of all the internal TI cost accounts that are being used in the account.

25 34. Page 33, Recommendations for Corrective Action. The PM has already directed TI to change their reporting of the cost of FPAs. TI immediately included all the previously incurred FPA holding account costs in the narrative section of the CPR. In addition, they are doing away with the holding account.

The PM/PEO have established designated people at each contractor site to monitor contractor performance.

37 35. Appendix C, page 41. The title of the page is misleading, "...And Other Benefits Resulting From Audit". All recommendations under A. or C. were already in place or in the process of being implemented without the DODIG audit. DODIG is claiming a recommendation under A that was sent to the PM by the DAE as program direction. You should reconsider claiming benefits resulting from the audit if the same actions would/already have occurred.

7

Comments on Recommendations

DODIG Draft Report, Audit of the Acquisition of the Advanced Antitank Weapon System - Medium (AAWS-M) System (Project No. OAL-0073)

FINDING: "Texas Instruments' cost and schedule control system was not operating in accordance with the Cost Schedule Control System Criteria set forth in DOD Instructions 7000.2."

"During the initial period of contract performance, the subcontractor had established cost accounts for the manufacture of focal plane arrays that met the requirements of the Instruction. These cost accounts related to the processes for focal plane array manufacturing, that is, sideboard electronics, front-end processes, and management. However, during our review, we found that the subcontractor's work packages for Work Breakdown Structure 11242, Seeker, Cost Account 11242M, Focal Plane Array Deliveries, did not meet the requirements of DOD Instruction 7000.2. The manufacturing process involved various organizational elements and required approximately 9 months for each focal plane array; however, the subcontractor established work packages within Cost Account 11242M for monthly deliveries of focal plane arrays. There was a work package for each month's delivery through April 1991 and a planning package for the remaining deliveries. The Budgeted Cost of Work Scheduled for each work package was the estimated manufacturing cost of the focal plane arrays to be delivered during the month covered by the work package. Therefore, the work packages did not meet the work package requirement that they be limited to relatively short time spans assignable to a single organizational element, or subdivided by discrete value milestones to facilitate the objective measurement of work performed."

"In addition, actual cost of work performed and budgeted cost of work performed for focal plane array manufacturing were not reported monthly. Manufacturing costs for focal plane arrays were initially entered in a holding account. These costs remained in the holding account until the delivery of a focal plane array, when an amount calculated to be the actual cost related to the delivery was allocated to actual cost of work performed. Also, budgeted cost of work performed was entered into the system when the actual cost of work performed entry was made. However, deliveries of focal plane array were not made as schedule, which resulted in Cost Performance Reports reflecting budgeted cost of work scheduled with no entry for budgeted cost of work performed or actual cost of work performed. As of December 31, 1990, approximately $14.8 million was in the holding account and had not been reflected as actual cost of work performed in the Cost Performance Report. As of March 22, 1991, Texas Instruments developed a procedure to allocate actual cost of work performed on a monthly basis; however, it had not developed a procedure for calculating budgeted cost of work performed on a monthly basis."

RECOMMENDATION C-1: "We recommend that the Project Manager for the Advanced Antitank Weapon System-Medium require Texas Instruments to properly establish and report costs in Cost Account 11242M."

Encl 2

ACTION TAKEN: Nonconcur. Work packages did meet requirements of DODI 7000.2. Milestones for deliveries were entered into the system on a monthly basis which met the short time span requirement.

Also, while it is true that TI has not come up with a procedure to calculate BCWP that is acceptable to the government, TI will not be restarting the FPAM facility with government funding until October. The problem is being worked now and should be solved by the October date.

In addition, the Project Manager, in January, directed Texas Instruments (TI) to change their reporting on costs of Focal Plane Arrays (FPA). TI immediately took action to include all work in process costs incurred from the FPA holding account and included these costs in the Cost Performance Report (CPR). This account has been liquidated.

FINDING: "Cost Performance Reports submitted by the Joint Venture were inaccurate and incomplete because of a lack of monitoring Texas Instruments' system. Until corrections are made to Texas Instruments' system, the Army will not be able to monitor and assess the cost and schedule for the focal plane array."

RECOMMENDATION C-2: "We recommend that the Project Manager for the Advanced Antitank Weapon System-Medium require Defense Plant Representative Office at Texas Instruments to periodically review the reestablished cost account and ensure that the cost account accurately reflects the cost and schedule for focal plane arrays."

ACTION TAKEN: Nonconcur. DPRO and DCAA have responsibility to periodically review all cost accounts. The recommendation is not changing the way business normally is conducted.

However, in May, the PM/PEO also established designated people at each contractor site to monitor contractor performance.

# MANAGEMENT COMMENTS FROM DEFENSE LOGISTICS AGENCY

DEFENSE LOGISTICS AGENCY
HEADQUARTERS
CAMERON STATION
ALEXANDRIA, VIRGINIA 22304-6100

IN REPLY REFER TO DLA-CI

05 JUL 1991

MEMORANDUM FOR UNDER SECRETARY OF DEFENSE (ACQUISITION)

SUBJECT: Draft Report on the Acquisition of the Advanced Antitank Weapon System-Medium (Project No. 0AL-0073)

In response to DoD IG's memorandum dated 16 May 1991, attached are our comments to Recommendation A.2. The only other recommendations that have any impact on DLA are Recommendations C.1 and C.2. We concur with both recommendations and provide the following general comments:

a. Recommendation C.1: Texas Instruments is in the midst of establishing a method to report costs in Cost Account 11242M. The Defense Plant Representative Office, DCAA and Texas Instruments have had numerous meetings since the DoD IG audit to correct the reporting problem. The revised reporting procedures should be in place by the end of July 1991.

b. Recommendation C.2: The Defense Plant Representative Office will continue to provide monthly cost/schedule surveillance in the focal plan array manufacturing area as well as in all other aspects of the Advanced Antitank Weapon System-Medium (AAWS-M) program.

1 Encl

HELEN T. McCOY
Deputy Comptroller
Defense Logistics Agency

.PE OF REPORT: AUDIT DATE OF POSITION: 1 Jul 91

PURPOSE OF INPUT: INITIAL POSITION

AUDIT TITLE AND NO.: Acquisition of the Advanced Antitank Weapon System-Medium (Project No. 0AL-0073)

RECOMMENDATION NUMBER A.2: We recommend that the Under Secretary of Defense for Acquisition require that the Assistant Secretary of the Army (Research, Development, and Acquisition) obtain analyses of the Joint Venture's estimate from appropriate Defense Plant Representative Offices and use the results of those analyses to determine the reasonableness of the Joint Venture's estimate of $372.0 million.

DLA COMMENTS: Concur. Analyses of the Joint Venture's estimate at completion of $372 million may be premature at this point. The Defense Acquisition Board (DAB) has given guidance since the DoD IG report was written to take actions to correct focal plane array problems associated with the Advanced Antitank Weapon System-Medium (AAWS-M). Since this action could effect program schedules and cost, it would be prudent to allow the contractor to re-evaluate the Estimate at Completion (EAC) in concert with recent DAB decisions and then have the Defense Plant Representative Office determine the reasonableness of the EAC.

DISPOSITION:
( ) Action is ongoing; Final Estimated Completion Date:
(X) Action is considered complete.

MONETARY BENEFITS: None.
DLA COMMENTS:
ESTIMATED REALIZATION DATE:
AMOUNT REALIZED:
DATE BENEFITS REALIZED:

ACTION OFFICER: Roger Nelson, DLA-EP, 77200
PSE REVIEW/APPROVAL: RADM Hickman, Executive Director, Directorate of Program and Technical Support, 27 Jun 91

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