

109703

REPORT BY THE

# Comptroller General

OF THE UNITED STATES

109703

## Army's FY 1980 Programs For Procuring Conventional Ammunition, Modernization, And Expansion

The Army requested \$974 million for 66 conventional ammunition items and \$257 million for 8 projects for modernizing and expanding the Army's ammunition production base.

GAO concluded that the Army's ammunition request should be reduced by \$153 million for 11 items and increased by \$32.8 million for 9, while the modernization and expansion program should be reduced by \$10.5 million.



LCD 79416  
JUNE 15, 1979



COMPTROLLER GENERAL OF THE UNITED STATES  
WASHINGTON, D.C. 20548

B-172707

The Honorable Jamie L. Whitten  
Chairman, Committee on Appropriations  
House of Representatives

Dear Mr. Chairman:

As requested on January 29, 1979, we reviewed the Army's justification for its fiscal year 1980 appropriation requests for procuring conventional ammunition and for the modernization and expansion program.

On March 19, 1979, we gave your office some fact sheets and questions for use during the appropriation hearings on 25 ammunition line items which we reviewed for you and the 8 modernization and expansion projects for which funds were requested. This report provides additional information on the results of our review.

As arranged with your office, copies of this report are being sent to the Chairmen, House Committees on Armed Services and Government Operations and Senate Committees on Appropriations, Armed Services, and Governmental Affairs. Copies are also being sent to the Director, Office of Management and Budget and the Secretaries of Defense, the Army, and the Navy. Copies will be available to other interested parties upon request.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Thomas B. Atkins".

Comptroller General  
of the United States

D I G E S T

The Army's fiscal year 1980 request for procurement of ammunition was \$1,343 million, of which

--\$974 million was for 66 conventional ammunition items,

--\$257 million was for 8 modernization and expansion projects, and

--\$112 million was for other items not included in this review.

AMMUNITION

GAO reviewed the Army's justifications for its 1980 appropriation request for 25 conventional ammunition items, including large dollar amounts and first time procurements. These represented 78.8 percent of the Army's request or \$768 million out of a total of \$974 million.

For the following reasons, GAO concluded that \$109.6 million requested for three conventional ammunition items should not be appropriated.

--The \$66.3 million for 4,200 Copperhead rounds should not be provided because the system is not ready for procurement. Engineering development tests have not been completed and are not scheduled for completion until December 1979. In addition, operational testing and a critical second cost and operational effectiveness analysis have not been completed. Further, questions remain relative to the degree of usefulness

of weapon systems combinations using laser guidance. (See p. 5.)

--The \$22.4 million for 105-mm high explosive antitank cartridges should not be provided because of continuing delays in testing the full-frontal area impact switch required to increase the round's reliability. The round is scheduled to be type classified in April 1980. It is Army policy to not schedule an item for procurement in a fiscal year unless its type classification is expected by the end of the first quarter of that fiscal year. (See p. 8.)

--The \$20.9 million for the new improved 81-mm high explosive cartridges should not be provided because recent test failures have resulted in the Army's decision to suspend further testing indefinitely. (See p. 10.)

The Army recently changed the proportion of high explosive projectiles using various types of fuzes. The requirements for the superquick mechanical time fuzes decreased and, as a result, the Army no longer needs to procure these fuzes in fiscal year 1980.

Requirements for other types of fuzes, including the less expensive point detonating fuze, increased, resulting in larger shortages of these fuzes. The \$13.8 million originally requested for the superquick mechanical time fuzes should be provided for the additional procurements of the point detonating fuzes which are now needed. (See p. 11.)

GAO's review disclosed that 15 additional ammunition items should be funded at different levels than the amounts the Army requested. Since the budget submission, the Army has increased the amounts needed for eight items by \$19 million and decreased the funds needed for five items by \$25.1

million. The items should be funded at the revised amounts. (See p. 13.)

As discussed below, GAO identified two other items which should be funded at lower levels.

--The Army overstated by \$2.6 million its request for components to renovate field stock because of estimating errors and including requests for components which were previously funded. (See p. 12.)

--After the budget was submitted, the Army reduced the quantity of electronic time fuse setters it planned to procure during fiscal year 1980. As a result, the Army no longer needs \$2.4 million requested for them. (See p. 13.)

#### MODERNIZATION AND EXPANSION

After reviewing all eight modernization and expansion projects with estimated costs of \$257.2 million, GAO concluded that all but three projects were adequately justified.

The \$4.2 million requested for a permanent facility for the production of surface launched unit fuel air explosive rocket motors seems premature for the following reasons.

--The facilities funded in fiscal year 1979 will provide adequate capacity to satisfy the current 5-year defense plan buys.

--Uncertainty exists as to whether the system will be procured after 1980.

--No production experience from the initial line can be gained until fiscal year 1981.

--The type classification date for the system has been delayed for about 9 months and is now scheduled for the first quarter of fiscal year 1980. (See p. 17.)

The Army requested \$25.4 million to provide a production base for manufacturing warhead and motor body metal parts for two different rocket assisted projectiles. The project has been redesigned since the budget submission because of decreased procurement requirements for one of the items. The estimated cost for the redesigned project was \$19.1 million or \$6.3 million less than the request. The funding request for this project should be reduced by \$6.3 million. (See p. 19.)

Although GAO agrees with the Army that the production capabilities for the center core propelling charges should be expanded, additional justification for the site is needed before the project is executed. (See p. 20.)

#### RECOMMENDATIONS

GAO recommends that the Committee

- reduce by \$153.5 million the Army's conventional ammunition request for 11 items and increase by \$32.8 million the request for 9 others,
- reduce by \$10.5 million the Army's request for the modernization and expansion program, and
- require the Army to provide additional justification for its selected site for the center core propelling charges before the Army executes the project. (See pp. 14 and 23.)

#### AGENCY COMMENTS

GAO obtained informal comments on this report by discussing the report findings, conclusions, and recommendations with representatives of the Army's Deputy Chief of Staff for Research, Development and Acquisition. Army representatives generally agreed with GAO's findings and conclusions

and with GAO's adjustments to 18 of 20 ammunition items.

Although they agreed with GAO's findings on Copperhead rounds and 105-mm high explosive antitank cartridges, they did not agree that funds should not be provided for these two items. Army representatives generally agreed with GAO's recommendations relating to the modernization and expansion projects. (See pp. 14 and 23.)

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**ABBREVIATIONS**

**GAO**      **General Accounting Office**

**SLUFAE**    **surface launched unit fuel air explosive**

## CHAPTER 1

### INTRODUCTION

The Army's fiscal year 1980 request for procurement of ammunition was \$1,343.4 million, consisting of \$1,000.2 million for procuring ammunition and \$343.2 million for the related production base support.

The ammunition hardware request is planned to provide for annual peacetime training needs for U.S. Active and Reserve Forces and the acquisition of U.S. war reserve stocks for use during a war. The request included 61 conventional ammunition items for \$916.9 million, 5 miscellaneous conventional ammunition items for \$57.5 million, and 2 atomic materiel items for \$25.8 million. The amounts requested ranged from a low of \$0.2 million for ammunition spares and repair parts to a high of \$119.5 million for 280,000 155-mm high explosive improved conventional munition projectiles.

The ammunition production base support request consisted of the following.

<u>Purpose</u>	<u>Amount requested</u> (millions)
Modernization and expansion	\$271.1
Production support and equipment replacement	30.0
Manufacturing methods and technology	27.4
Layaway of industrial facilities	<u>14.7</u>
Total	<u>\$343.2</u>

As shown above, most of the funds requested for the production base support was for the modernization and expansion program. The program is a long-range, multibillion dollar capital investment program to (1) modernize the Army's existing ammunition production facilities and (2) expand the ammunition production base, where required, to provide the production capability to produce new ammunition items.

The fiscal year 1980 program included \$257.2 million for eight projects and \$13.9 million for omnibus engineering. The projects ranged from a low of \$1 million to a high of \$113 million each. Since 1970, about \$1.8 billion has been provided for 333 projects which are in various stages of completion. Also, the Army has 78 modernization and expansion projects estimated at about \$1 billion in its fiscal years 1981-84 plans.

#### SCOPE OF REVIEW

As requested by the Chairman of the House Appropriations Committee, we directed our review primarily towards evaluating the Army's fiscal year 1980 requests for (1) conventional ammunition end-items involving the largest dollar amounts, (2) conventional ammunition end-items being bought for the first time during fiscal year 1980, and (3) projects for establishing, modernizing, and expanding the ammunition production base.

We interviewed and obtained documents from officials at the Departments of Defense, the Army, and the Navy at the following locations.

Office of the Under Secretary of Defense for Research and Engineering, Washington, D.C.

Headquarters, Department of the Army, Washington, D.C.

Office of the Project Manager for Munitions Production Base Modernization and Expansion, Dover, New Jersey

U.S. Army Armament Materiel Readiness Command, Rock Island, Illinois

U.S. Army Armament Research and Development Command, Dover, New Jersey

U.S. Naval Ordnance Station, Indian Head, Maryland

Indiana Army Ammunition Plant, Charlestown, Indiana

Radford Army Ammunition Plant, Radford, Virginia

Because of time constraints, we limited our review primarily to the justifications for the selected items and the status and results of the testing programs for the newer items. As in the past, we did not review and validate the Army's computations of the requirements for the specific items, but did ascertain whether the latest computations were used.

## CHAPTER 2

### AMMUNITION HARDWARE

The Army's fiscal year 1980 appropriation request for procuring conventional ammunition was \$974.4 million, consisting of 61 conventional ammunition items and 5 miscellaneous categories. We examined the Army's justifications for 24 items and 1 miscellaneous category (components for renovation of field stock), representing \$708 million or 78.8 percent of the conventional ammunition request. (See app. I.)

We believe the Army's fiscal year 1980 ammunition program should be reduced by \$120.7 million because:

--It is premature for the Congress to provide the \$109.6 million requested for three items until various issues are resolved or better justifications are obtained.

--The Army has overstated its funding requirements by \$5 million for two items.

--The Army revised its cost estimates for 13 additional items; resulting in increases of \$19 million for 8 items and decreases of \$25.1 million for 5 items, or a net reduction of \$6.1 million.

We also believe that the \$13.8 million requested for superquick mechanical time fuzes should be used to procure point detonating fuzes.

#### PREMATURE PROCUREMENTS

The Army's fiscal year 1980 ammunition program included requests for the following three items which we believe are premature to fund

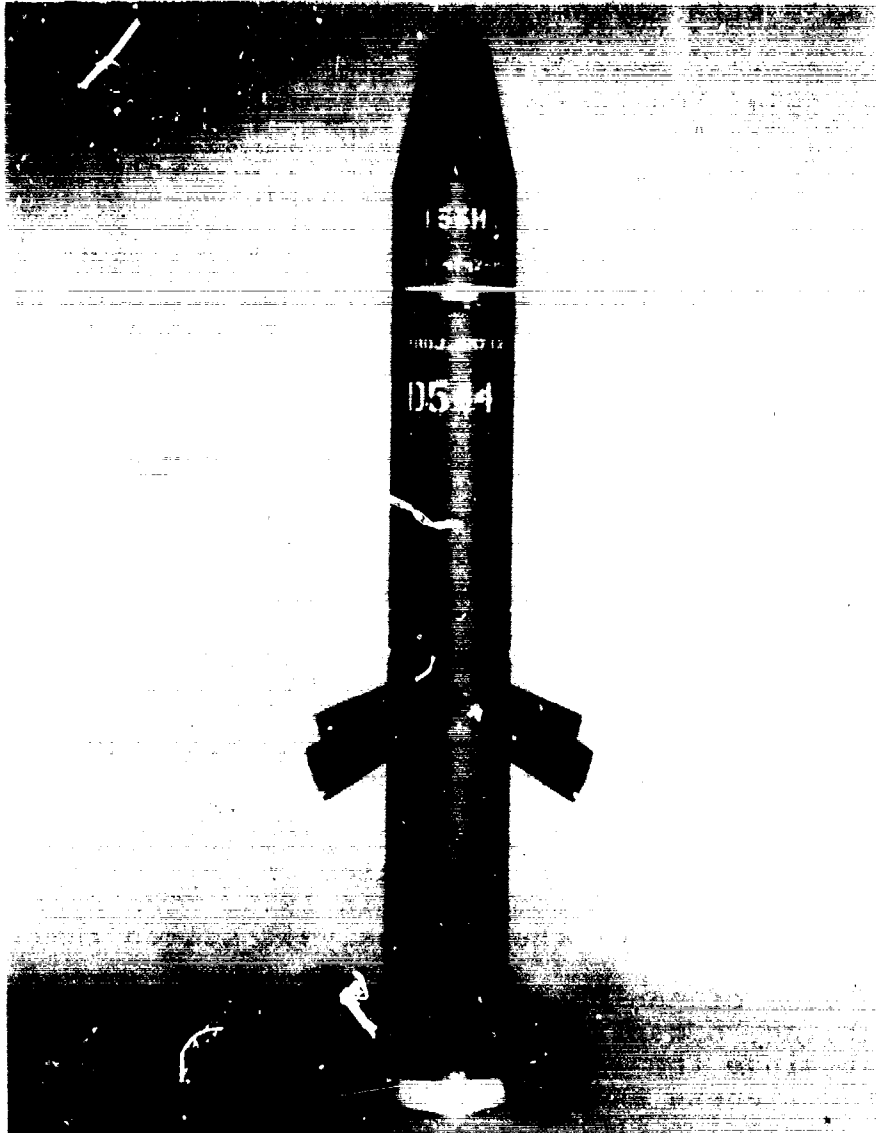
--\$66.3 million for Copperhead rounds,

--\$22.4 million for 105-mm high explosive antitank cartridges, and

--\$20.9 million for improved 81-mm high explosive cartridges.

## Copperhead

The Copperhead is a precision guided munition designed to home in on reflected energy of a laser beam focused on the target by a laser designator. It is being developed for use in standard 155-mm howitzers currently in the Army's inventory. Its targets will be armored vehicles, field artillery, air defense systems, field fortifications, and other moving or stationary targets.



**XM712 155-MM PROJECTILE (COPPERHEAD)--COURTESY OF THE ARMY**

This is our second review of the Army's request to procure Copperhead. In 1979 the Army requested \$43.1 million to procure 2,500 rounds. In our report (LCD-78-419, May 15, 1978), we recommended that the funds not be provided because numerous operational issues had not been resolved and various testing milestones had slipped.

The Army requested \$66.3 million to procure 4,200 Copperhead rounds prior to (1) completing engineering development testing, (2) making any live firings under the operational testing phase, and (3) resolving or arriving at final assessments on numerous issues which can degrade or negate Copperhead's effectiveness.

A production decision for Copperhead is scheduled in September 1979. Currently the projectile is undergoing engineering development tests which are scheduled for completion in December 1979. These tests are intended to demonstrate whether engineering is reasonably complete and whether solutions to all important design problems have been resolved. The tests performed included live firings of the Copperhead. As of March 1979, 63 rounds had been fired, with a success rate of about 66 percent. An additional 115 rounds are scheduled to be fired before the testing phase is completed.

Operational testing, which will include 80 live firings, is scheduled for completion in June 1979. This testing is intended to provide data on the system's military utility, operational effectiveness, and operational suitability in a simulated battlefield environment.

In addition to the overall objectives of operational testing, this test phase will help resolve such things as projectile effectiveness, basic projectile durability, reliability of payload, and compatibility with the howitzers designated for use with this round.

A second Copperhead cost and operational effectiveness analysis is scheduled for completion in July or August 1979. The first analysis was completed in 1975. The Department of the Army directive for the new analysis stated that:

"In view of the changes which have occurred in doctrine, organization, system performance, and cost since the last COEA [cost and operational effectiveness analysis], there is a requirement to re-examine CLGP's [cannon launched guided projectile's] cost and operational effectiveness

compared to other feasible alternatives in order to determine if it continues to be the preferred candidate system."

Further, the directive lists issues pertaining to Copperhead that have been identified by the Department of the Army staff, the Office of the Secretary of Defense, and ourselves. It states that:

"Questions relating to survivability of the FO [forward observer] and [laser] designator; the effects of adverse weather, terrain and countermeasures; and trade-offs in other munitions resulting from the employment of Copperhead must be adequately answered to support a production decision and full funding of the program."

We have also reviewed this system for the past several years as part of our major acquisition review process. Our latest report on the Army's Copperhead and the Navy's laser-guided projectile programs was issued February 20, 1979 (PSAD-79-34). The report identified several unresolved critical operational issues that could negate or degrade Copperhead's effectiveness. These issues included system vulnerability to enemy countermeasures, the effects of weather and terrain and cost-effectiveness. No new information about these issues was provided by the Army during this review of the Army's request for funds to procure Copperhead. To avoid classifying this report, we are not presenting the details on the unresolved issues.

In addition to our congressional reports, we issued a report to the Secretary of Defense in March 1979 following a review of natural and induced operational constraints which could degrade the effectiveness of all laser weapons. 1/ In the report, we discussed the various constraints and stated that three programs using laser technology merit immediate attention. The programs included the ground laser locator designator which is the primary designator for Copperhead. In this report, we recommended that before authorization or commitment of additional funds to these programs, appropriate testing be required to measure the degree of usefulness of those weapon systems combinations that depend upon laser guidance.

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1/"Need for a Reassessment of DOD's Laser Guided Weapons Programs" (PSAD-79-56, Mar. 8, 1979).



In authorizing the fiscal year 1978 research and development funds, Public Law 95-79, as amended, the Congress stipulated that the Copperhead must achieve an initial operational capability by July 1, 1981. To meet the mandated date, the Army estimated that 1,300 projectiles and 11 designators would be required.

We believe that the request for funds to procure 4,200 Copperheads at this time is premature. First, engineering development tests are not scheduled for completion until December 1979. Second, operational testing and a critical second cost and operational effectiveness analysis are not scheduled for completion until August 1979. Third, questions remain relative to the degree of usefulness of weapons, weapon systems, and combinations using laser guidance.

Also, because of unresolved issues, incomplete testing, and analysis relative to both the Copperhead and its primary designator, the mandated initial operational capability date may not be met.

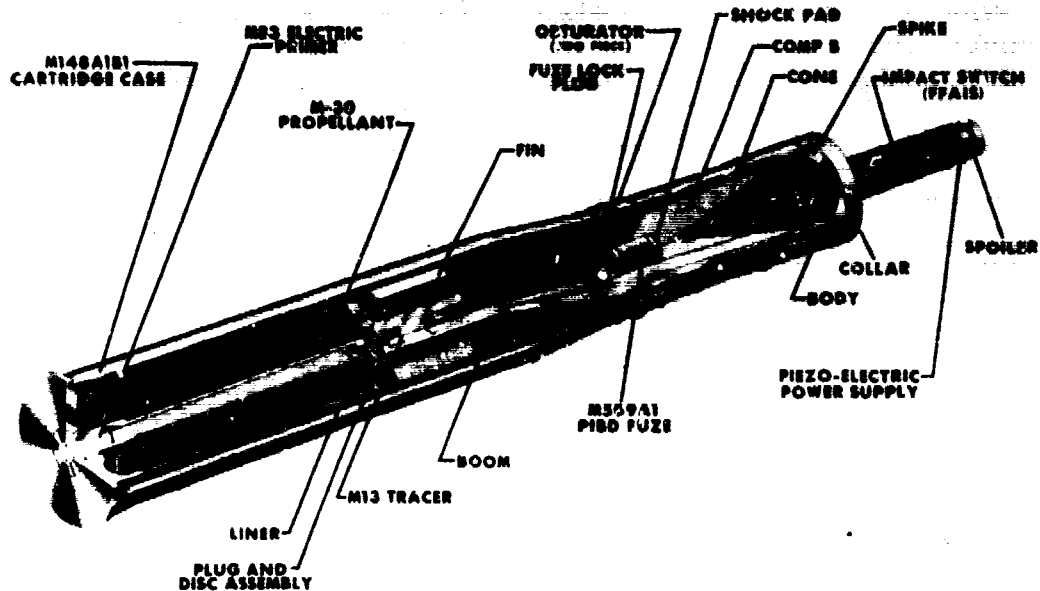
#### 105-mm high explosive antitank cartridge

The Army originally requested \$22.4 million for 96,000 of the improved M456 antitank cartridges. However, because of a cost increase, the U.S. Army Armament Materiel Readiness Command reduced this request to 54,000 rounds. The Army's budget request was based on an estimated unit cost of \$233 per round, but the unit cost is currently estimated at \$415.

A major cause of this cost increase was the full-frontal area impact switch which is being developed to increase the round's current reliability of 48 percent so that it will be 95 percent reliable. This switch and an improved fuze will designate this round the M456A2, once it is type classified. Procurement of this round was approved by the Congress in fiscal year 1979, and the Army requested it in fiscal year 1980.

Delays in testing the new switch have occurred, and the scheduled type classification date has slipped since the fiscal year 1979 appropriation hearings, from June 1978 to April 1980. The Army's procurement policy states that, generally, an item will not be scheduled for procurement in a fiscal year unless it is scheduled for type classification by the end of the first quarter of the same fiscal year. Based on this policy, funds should not be appropriated to procure the M456A2 in fiscal year 1980, unless development is accelerated.

## CARTRIDGE 105MM HEAT-T M456A 2



COURTESY OF THE ARMY

The currently stocked round has had other problems besides reliability. Premature detonations within the gun have occurred. Production lots have been suspended because of this problem and are scheduled to be downloaded and used for target practice. Projectile wall thickness has not met minimum standards on some other rounds. These production lots will be X-rayed and those which do not meet standards will also be downloaded and used for target practice.

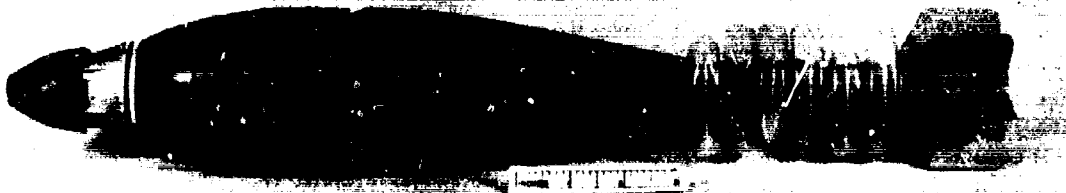
The overall effectiveness of this type of antitank round against future armored threats has also been questioned in several studies. According to the Army, the modifications in the round will improve its performance. However, the Army is also developing a new antitank round, the XM815, which will replace the M456A2. This round, according to the Army, will eliminate the deficiencies and limitations in the present design. It is scheduled to be type classified in the fourth quarter of fiscal year 1982.

## Improved 81-mm high explosive cartridge

The Army's budget included \$20.9 million for 164,000 improved XM821 mortar rounds manufactured in the United Kingdom. This would be the first procurement of this item, since a \$13-million fiscal year 1979 request for 150,000 rounds had been canceled.

Although generally similiar to the Army's current cartridge, the United Kingdom mortar round offers increased fragmentation and range. The Army plans to improve it with a fuze that provides a choice of near-surface, impact, or delayed detonation.

This item was scheduled to be type classified in the fourth quarter of fiscal year 1979, in time for 1980 procurement. Because of test round failures, however, testing had been indefinitely suspended at the time of our review. Short rounds had been fired in cold temperatures, while hot-temperature tests resulted in hangfires and misfires. These safety problems were serious enough for the Army to postpone shipment of additional rounds to the test site.



**XM821 81- MM MORTAR -- COURTESY OF THE ARMY**

We believe procurement of the "improved" United Kingdom round is premature because the type classification date is no longer scheduled by the first quarter of fiscal year 1980. The importance of standard ammunition among the North Atlantic Treaty Organization countries, however dictates that the Army continue testing and evaluating the United Kingdom mortar round.

#### CHANGES IN REQUIREMENTS

The Army has recomputed its fuze requirements since the fiscal year 1980 budget submission and, as a result, no longer needs to procure additional superquick mechanical time fuzes. However, requirements for other fuzes have increased, and the \$13.8 million originally requested for these time fuzes should be provided so that the Army can buy more of another type of fuze which is needed.

In addition, the Army overstated by \$5 million the amount of funds needed for the following two items

- \$2.6 million for components to renovate field stocks and
- \$2.4 million for electronic time fuze setters.

#### Superquick mechanical time fuze

The Army requested \$13.8 million for 328,000 M564 superquick mechanical time fuzes. The Army, however, planned no purchases of this item beyond fiscal year 1980 because its requirements had dropped. The Army estimated an excess of 145,000 time fuzes in fiscal year 1985, even without the fiscal year 1980 procurement.

Fuze requirements are determined by matching fuzes to available projectiles. The superquick mechanical time, point detonating, and proximity fuzes are used interchangeably with several high explosive artillery projectiles. Since the budget submission, the Army has changed the proportion of projectiles using these various types of fuzes, resulting in a decrease in the requirements for the superquick mechanical time fuzes and an increase in the requirements for the other two types.

In total, the Army does not have enough of the three types of fuzes for available projectiles. However, as

indicated above, the present inventory of the superquick mechanical time fuzes far exceeds the Army's estimate of the number of time fuzes needed to supply projectiles currently onhand or planned for procurement through fiscal year 1985. As a result, the Army no longer needs to procure the additional 328,000 superquick mechanical time fuzes which were requested in the fiscal year 1980 ammunition program, but the funds are needed to procure additional quantities of other needed fuzes.

The Army estimated that it could procure an additional 713,000 M739 point detonating fuzes in fiscal year 1980 if the \$13.8 million requested was used to increase the planned fiscal year 1980 program for point detonating fuzes. The Army's current fiscal year 1980 procurement program for the M739 fuze is 688,000 fuzes at \$13.3 million.

The Army has determined that the metal parts producers and the load, assemble, and pack plant have the capacity and capability to produce this additional quantity in fiscal year 1980 on a one-shift basis. This alternative would benefit the Army by procuring the type of fuze which the Army currently estimates is needed and at the same time would help reduce the Army's total shortfall of fuzes for high explosive projectiles.

#### Components for field stock renovation

The Army's budget request included \$40.2 million for components needed to renovate field stock. These components will be used to renovate 22 unserviceable ammunition inventory items. More than half of this request, \$20.3 of the \$40.2 million, was to renovate the 105-mm nerve gas cartridge (GBM360) inventory.

The Army's fiscal year 1980 request for components was overstated by \$2.6 million as explained below.

- The Army had incorrectly estimated the amount of packing material and fuzes needed. This error, combined with mathematical errors in its computations, overstated the request by \$1.15 million.
- The Army overstated its request by \$970,000 by unnecessarily adding a safety factor for a number of components, primarily packing materials. This safety factor ranged from 44 to 119 percent of the basic

component estimate. We requested support for including a safety factor, but the Army was unable to provide it.

--The request included \$460,000 for 155-mm M483 expulsion charges. However, the Army had already funded these components using fiscal year 1977 funds, and did not need this amount.

Consequently, we believe the Army's request to procure components for renovation should be reduced by \$2.6 million.

#### Electronic time fuze setter

The Army's fiscal year 1980 procurement request included \$4.1 million for 1,000 fuze setters designed for use with the new M587 and M724 electronic time fuzes. The Army also requested \$15.2 million to procure 127,000 electronic time fuzes.

The Army is currently developing an improved fuze setter that will be less costly and easier for field troops to use. In light of this program, the fiscal years 1979 and 1980 procurement of fuze setters has been restricted to no more than 600. The fiscal year 1979 procurement plan calls for 215 fuzes costing \$1.9 million. The Army is limited to the procurement of 385 fuze setters for fiscal year 1980 which the Army estimates will cost \$1.7 million.

We believe that the Army effectively responded to the program to improve the fuze setter by restricting the quantity to be procured for fiscal year 1980. However, we also believe that the requested funds for this item should be reduced by \$2.4 million (the amount the Army currently estimates is needed) or to \$1.7 million.

#### REVISED COST ESTIMATES

During our review the Army revised its cost estimates for several ammunition items, using more recent contract data. Also, the Army (1) decreased its estimates for the 105-mm DS-TP cartridge and the 4.2-inch illuminating cartridge because of plans to use onhand components rather than procuring additional components and (2) increased its estimates for the remote activated antiarmor mine system and the electronic time fuzes to the amounts needed to procure the quantities shown in the budget.

In total, the estimated amounts were increased by \$19 million for eight items and decreased by \$25.1 million for five items, or a total decrease of \$6.1 million. The specific items and the amounts of increases or decreases are shown in appendix I.

### CONCLUSION

We believe that (1) it is premature for the Congress to provide funds for three ammunition items, (2) the funds no longer needed for superquick mechanical time fuzes could be used to procure the needed point detonating fuzes, and (3) the funds needed for several other items is different than the amounts requested. (See app. I.)

### RECOMMENDATION

We recommend that the Committee reduce the Army's ammunition appropriation request by \$153.5 million for 11 items and increase the amounts by \$32.8 million for 9 other items as shown in appendix I.

### ARMY COMMENTS AND OUR EVALUATION

In early May 1979 we met with Army representatives from the Office of the Deputy Chief of Staff for Research, Development, and Acquisition on several occasions to discuss the contents of this report. The Army representatives generally agreed with our findings and with our adjustments to 18 of the 20 ammunition items.

Although the Army representatives agreed with our findings on the Copperhead rounds and the 105-mm M456 high explosive antitank cartridges, they did not agree with our recommended reductions of \$86.5 million for these two items.

The Army representatives acknowledged our concerns about Copperhead, but believed the requested \$66.3 million should be provided so that the Army could begin procuring this item in fiscal year 1980 if the decision currently scheduled for September 1979 is made to begin production. They said that failure to provide the funds (1) would preempt the decision process and (2) could delay the initial procurement and fielding of this new capability by 1 year.

As indicated in this report, we have reviewed this system for several years, and several unresolved critical operational issues could negate or degrade Copperhead's effectiveness. We believe that these issues should be resolved before any procurement funds are provided for this system.

With respect to the 105-mm high explosive antitank cartridge, Army representatives said that because of the increased costs of this round with the full-frontal area impact switch, the Army now plans to procure 96,000 rounds without the switch at an estimated cost of \$20.2 million. They believed that they could develop a program for procuring the improved round, to be designated M456A1, by mid-June 1979 and that the round could be type classified in time for the fiscal year 1980 procurement. Since the decision was made recently, we were unable to review the Army's decision.

We believe that the unresolved technical, operational, and related problems will impede the Army's procurement of these items in fiscal year 1980. If the funds are provided as requested, this could result in obligations (contracts) and outlay levels lower than those projected in the Department of Defense's budget plans and estimates.

Previous problems leading to direct obligations "shortfalls"--i.e. cases where Department of Defense actual obligations were less than the amounts projected in the budget submissions to the Congress--were discussed in our report, "Analysis of Department of Defense Unobligated Budget Authority" (PAD-78-34, Jan. 13, 1978).



### CHAPTER 3

#### AMMUNITION PLANT MODERNIZATION

#### AND EXPANSION PROGRAM

The Army's fiscal year 1980 request for modernizing and expanding the ammunition production base included \$257.2 million for eight facility projects. The projects were similar to previous projects except that, due to funding constraints and current Secretary of Defense guidance, the modernization program was deemphasized. The 1980 program included only one modernization project. This project would allow the Army to ship and receive ammunition in containers at the Lone Star Army Ammunition Plant and was estimated to cost \$930,000 or less than 1 percent of the total program. In 1978 about 29 percent and in 1979 about 24 percent of the total programs were planned for modernizing the base.

In addition to the containerization project, the Army's plans for fiscal year 1980 called for

- initial production facilities for the L8A1 red phosphorous grenade and the M650 projectile metal parts;
- expanding production capabilities for 60/81-mm propellant charge assemblies; loading, assembling, and packing 155-mm/8-inch center core propellant charges; manufacturing multibase propellant; and surface launched unit fuel air explosive (SLUFAE) rocket motors; and
- the fourth increment of a multiyear funded project to construct the new Mississippi plant.

See appendix II for a detailed list of the projects.

We reviewed the eight facility projects in the fiscal year 1980 request and generally found them to be fully justified. Our discussions in the report are limited to the following project, for the reasons stated.

<u>Project number</u>	<u>Description</u>	<u>Amount</u>	<u>Remarks</u>
		(millions)	
5802003	Expansion project for production of SLUFAE rocket motors	\$ 4.2	Expansion project is premature

5803004	Initial production facility for M650 rocket assisted projectile metal parts	\$25.4	Reduced project scope
5802694	Expansion project for the load, assemble, and pack of center core propelling charges	21.4	Alternatives to this project not fully considered

PROJECT 5802003

This \$4.2-million project provides for a permanent facility for the production of SLUF AE rocket motors at the Longhorn Army Ammunition Plant. This facility will replace a production line at the Indian Head Naval Ordnance Station being established under a 1979 project at an estimated cost of \$583,000. The 1980 project provides for a capacity of 4,300 motors per month which will balance the production capacity of rocket motors with the facilities to (1) load, assemble, and pack, (2) produce metal parts, and (3) produce fuzes, also funded under the 1979 project.

The SLUF AE round provides the Army with a standoff capability to clear mine fields. It is fired from a launcher mounted on an M548 carrier vehicle.

An expansion project for the SLUF AE in 1980 appears premature because:

- The facilities funded in fiscal year 1979 will provide adequate capacity to satisfy the current 5-year defense plan buys (1980-84).
- Uncertainty exists as to whether the SLUF AE system will be procured after 1980. 1/
- No production experience on the first line at Indian Head, which will be duplicated at Longhorn, can be gained until fiscal year 1981.

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1/See footnote on page 18.

--The type classification date for the SLUF AE has slipped about 9 months from the second quarter 1979 to the first quarter 1980.

The fiscal year 1979 project will provide production capacity for 3,200 motors per month or 38,400 annually. The planned defense buys through 1984 do not exceed 18,000. The 1980 request was to procure 2,100 rounds at an estimated cost of \$8.9 million. The expansion project will provide capacity for 4,300 motors per month or 51,600 annually. The initial production facilities were sited at Indian Head because the Navy performed developmental work on the rocket motors and was gaining production experience on an existing hand-line capable of producing 200 motors per month.

Prior to the siting at Indian Head of the rocket motor facility, the Army and Navy signed a formal agreement. The agreement included services to be provided by the Indian Head Station, the Production Base Manager's Office, and the Army agency responsible for developing the SLUF AE system. Indian Head agreed to operate the facility until permanent facilities were established. For this reason, the Army designated this facility as interim and requested funds for the Longhorn facility. The line at Indian Head will be dismantled after the 1980 project is completed. Some equipment will be used for backup or spares at Longhorn.

In February 1979, we contacted officials from the project office for the SLUF AE system at Ft. Belvoir, Virginia. Among other things, we discussed the indecision of the Army relative to procurement of the system. Officials said that a decision regarding procurement in the 1981-85 time frame had not been made. 1/ Also, in February, the Production Base Manager's Office requested a decision from its higher headquarters (U.S. Army Materiel Development and Readiness Command) about the continuing requirement for the SLUF AE. The office's immediate concern was whether the initial production facilities' procurement should continue. The office advised the activities involved to delay procurement of the facilities until further notice.

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1/On May 9, 1979, after completion of our review, the Army advised us that the Army's program for 1981-85 now provides for SLUF AE procurement.

The initial production facilities are scheduled for completion in the first quarter of fiscal year 1981. After completion, production experience can be gained which will enable the Army to incorporate lessons learned from the first facility into the permanent Longhorn facility. The expertise required to operate the rocket motor facility is indicated by the approaches considered to transfer the production technology from Indian Head to Longhorn. One approach was proposed by Longhorn at an estimated cost of \$750,000. It would provide Longhorn with limited quantities of equipment and material to enable Longhorn to gain the experience required to operate the full-scale facility scheduled for completion in July 1982. This approach was rejected in favor of training Longhorn personnel at Indian Head.

The type classification date for SLUFAE was the second quarter of fiscal year 1979 when funds for the initial facilities were requested. Due to delays in starting operation test II, the type classification date slipped to the first quarter of fiscal year 1980. The test is scheduled for completion in mid-June 1979.

#### PROJECT 5803004

Due to reduced funding, project 5803004 was changed several times in the past year. In July 1978, this project was designed to produce warhead and motor body metal parts for both the M549 and M650 projectiles at a cost of \$37 million. In December 1978, the Production Base Manager's Office reduced the project cost to \$25.4 million, requiring a reevaluation of project design. The budget submitted to the Congress in January 1979 was for the \$25.4 million.

Due to decreased procurement requirements, the Production Base Manager's Office eliminated the M549 portion of the project in February 1979. Redesign efforts resulted in reducing the estimated project cost to \$19.1 million or about \$6.3 million less than requested. The redesigned project will provide a production base for manufacturing 5,000 warhead and motor body metal parts per month for the M650 rocket assisted projectile. Currently, capacity exists to produce 1,000 warhead and motor body metal parts per month for this projectile. The U.S. Army Armament Materiel Readiness Command approved the redesign of this project to eliminate the M549 portion.

PROJECT 5802694

This \$21.4-million project will provide a new building at an estimated construction cost of \$9.9 million and production equipment to load, assemble, and pack center core propellant charges at the Indiana Army Ammunition Plant. The completed facility will produce the 155-mm M203 and M119 and the 8-inch M188 charges. The equipment procured for this facility will be identical to prototype equipment developed under the Army's Manufacturing Methods and Technology Program at an estimated cost of \$3.1 million. The prototype equipment will be installed in an existing building at the Crane Army Ammunition Activity under a fiscal year 1979 \$1.02 million initial production facility project.

The only existing capacity for production of center core propellant charges is the labor intensive hand-lines at Indiana. The hand-lines, according to an official at the plant, can be expanded to produce up to 40,000 charges per month on a one-shift basis.

We believe an adequate, modern facility to load, assemble, and pack center core propellant charges is justified. However, this project should not be executed until the Army further evaluates

--the feasibility of expanding the Crane production capacity in lieu of building a new facility at Indiana and

--the equipment requirements planned for the Indiana facility.

The initial production facility at Crane will enable the Army to produce 42,000 155-mm or 17,000 8-inch propellant charges per month on a one-shift basis. However, a one-shift operation will not satisfy the planned fiscal year 1980 procurement. Production on a multishift basis could meet the requirement for fiscal year 1980 but would be inadequate for the 5-year defense plan buys through 1984. This facility is scheduled for completion in January 1980, about 2-1/2 years prior to completion of the Indiana expansion project. It will enable the Army to use automated equipment to produce propellant charges at an estimated savings of \$8 each, while the expansion project is being constructed.

The Indiana facility will be capable of producing 84,000 155-mm or 17,000 8-inch charges per month on a one-shift basis. The capacity of this facility when operated on a two-shift basis, would be adequate to meet 5-year defense plan buys through 1984.

The U.S. Army Armament Materiel Readiness Command completed a site selection study in May 1977. Based on the study, the Army selected Crane for the initial production facility and Indiana for the expansion project. Crane was chosen because (1) a building was readily available, resulting in an early automated production capability and (2) of a savings in labor costs over the existing hand-lines and assistance in meeting heavy procurement requirements. Indiana was chosen for the expansion project because the plant had production facilities for propellant charge components, such as cloth bags and black powder, plus favorable labor rates.

We discussed the feasibility of expanding Crane with Production Base Manager officials. The officials said that Indiana was always the preferred location for the initial production facility because of the associated production facilities at Indiana and a favorable labor rate. They also said that no further inquiries were made for expanding Crane because of the preference for Indiana. In addition, a review of the safety constraints revealed that the Crane facility probably could not be further expanded. These constraints included

- the employee change house location in respect to the operating facility,
- proximity of the main road to the operating facility, and
- modification of the Crane facility cannot occur concurrently with production.

Our inquiries relative to the site selection revealed that a formal safety study of the Crane facility had not been made and the costs to overcome the safety constraints were not known.

If the safety constraints at Crane could be overcome, the Army could realize additional benefits, such as

- elimination of maintenance requirements for a second facility,
- a possible reduction in prove-out costs estimated at \$2.1 million for this project because experience gained on the initial facility can be fully utilized, and
- reduction of equipment costs through full use of the equipment installed at Crane under the 1979 project.

Disadvantages included transportation cost of the necessary propellant charge components to Crane and a break in production during the period it is being expanded.

The automated production facility, as planned for Indiana, will require several major equipment modules and other miscellaneous items, such as a conveyor system. The major equipment will consist of five load modules (load propellant into a cloth bag), two assembly modules (insert center core igniter, add flash reducer and close bag), and one pack-out module (quality assurance testing and final packing). After further evaluation of the equipment requirements, the Army tentatively concluded that two load modules could be replaced with less expensive equipment for \$200,000. In addition, a third load module which was designated as a spare may not be required. The cost of the three load modules plus installation was over \$1.6 million.

To formally address the safety constraints at Crane and evaluate the equipment requirements for Crane and Indiana, the Production Base Manager planned to contract with an architect-engineering firm to (1) make a concept design study showing a full complement of equipment at Crane and (2) evaluate the equipment planned for Indiana. The design study, scheduled for completion prior to October 1, 1979, will be submitted to the U.S. Army Armament Materiel Readiness Command for a formal safety study.

We believe that an adequate, modern facility to load, assemble, and pack center core propellant charges is justified. However, we also believe that the Army did not adequately evaluate the Crane facility for this expansion project. The Army should (1) continue with the current plans to conduct a formal safety study on the Crane facility, (2) further evaluate equipment requirements for this project, and (3) execute the fiscal year 1979 funded project as

planned and begin production when the facility is available to take advantage of anticipated cost savings.

## CONCLUSION

We believe that (1) it is premature for the Congress to provide funds for expanding the production facilities for SLUFAE rocket motors, (2) due to decreased procurement requirements, there is no longer a need to provide the total funds requested for the initial production facilities for rocket assisted projectile metal parts, and (3) the Army did not adequately evaluate the feasibility of expanding the Crane facility to load, assemble, and pack center core propelling charges.

## RECOMMENDATIONS

We recommend that the Committee reduce the Army's request by \$10.5 million for modernizing and expanding the production base as follows:

- Defer the \$4.2-million expansion project for the production of SLUFAE rocket motors because it is premature.
- Reduce the M650 warhead and motor body metal parts project by \$6.3 million to that which is needed for the redesigned project or \$19.1 million.

We also recommend that the Committee approve project 5802694, currently estimated to cost \$21.4 million, with the understanding that before the funds are obligated the Army will advise the Committee of (1) the feasibility of expanding Crane and (2) the funds required to execute the project at the chosen location.

## ARMY COMMENTS

We discussed this report with Army representatives and they generally agreed with our findings, conclusions, and recommendations relating to the modernization and expansion projects.



GAO ADJUSTMENTS TO THE ARMY'S  
AMMUNITION HARDWARE REQUEST

<u>Budget line number</u>	<u>Item nomenclature</u>	<u>Army request</u>	<u>GAO adjustments</u>	<u>Revised estimates</u>	<u>Remarks</u>
		------(millions)-----			
4	Cartridge, 7.62-mm, all types	\$ 10.0	\$ 0.3	\$ 10.3	Army's revised estimate
18	Cartridge, 81-mm, HE, w/fuze	37.2	(2.1)	35.1	Army's revised estimate
21	Cartridge, 81-mm (im- proved), HE, w/fuze	20.9	(20.9)	-	Premature buy
22	Cartridge, 4.2 inch, HE, w/wo fuze	22.1	2.8	24.9	Army's revised estimate
23	Cartridge, 4.2 inch, illum, w/fuze	23.3	(5.2)	18.1	Army's revised estimate
25	Cartridge, 105-mm, HEAT-T, f/tank gun	22.4	(22.4)	-	Premature buy
26	Cartridge, 105-mm, TP-T, f/tank gun	28.0	(3.1)	24.9	Army's revised estimate
27	Cartridge, 105-mm, DS-TP	43.4	(11.4)	32.0	Army's revised estimate
28	Cartridge, 105-mm, APFSDS-T	32.2	-	32.2	N/A
31	Cartridge, 152-mm, practice, TP-T	14.6	1.5	16.1	Army's revised estimate
32	Projectile, 155-mm, HE	18.8	-	18.8	N/A
34	Projectile, 155-mm, HE, ICM(DP)	119.5	-	119.5	N/A
35	Projectile, 153-mm, HE, RAP	44.0	0.2	44.2	Army's revised estimate
37	Projectile, 155-mm, HE, RAAMS	28.2	2.7	30.9	Army's revised estimate
38	Projectile, 155-mm, HE, Copperhead	\$ 66.3	\$ (66.3)	\$ -	Premature buy
39	Charge, propelling, 155-mm, white bag	85.3	4.1	89.4	Army's revised estimate
45	Electronic time fuze setter	4.1	(2.4)	1.7	Exceeds requirement
46	Fuze, electronic, time	15.2	5.1	20.3	Army's revised estimate
47	Fuze, mechanical, time, superquick	13.8	(13.8)	-	Exceeds requirement

## APPENDIX I

## APPENDIX I

<u>Budget line number</u>	<u>Item nomenclature</u>	<u>Army request</u>	<u>GAO adjustments</u>	<u>Revised estimates</u>	<u>Remarks</u>
----- (millions) -----					
48	Fuze, proximity	32.6	-	33.6	N/A
49	Fuze, point detonating	13.3	13.8	27.1	Exceeds requirement
50	Fuze, mechanical, time	13.2	2.3	15.5	Army's revised estimate
53	Nitroguanidine	11.7	(3.3)	8.4	Army's revised estimate
54	Ground emplaced mine scattering system	6.7	-	6.7	N/A
87	Components for renova- tion of field stock	<u>40.2</u>	<u>(2.6)</u>	<u>37.6</u>	Exceeds requirement
	Subtotal	\$ 768.0	\$ (120.7)	\$ 647.3	
	Total for 41 other lines items	<u>206.4</u>	<u>-</u>	<u>206.4</u>	
	Total for all 66 conventional items	\$ <u>974.4</u>	\$ <u>(120.7)</u>	\$ <u>853.7</u>	

GAO ADJUSTMENTS TO THE ARMY'SMODERNIZATION AND EXPANSION PROGRAM REQUEST

<u>Project number</u>	<u>Description</u>	<u>Budget request</u>	<u>GAO adjustment</u>	<u>Remarks</u>
		——(millions)——		
5800037	Initial production facility at Pine Bluff Arsenal for the L8A1 red phosphorus grenade	\$ 2.2	\$ -	-
5803004	Initial production facility for the 8-inch M650 rocket assisted projectile	25.4	\$ (6.3)	Reduced project scope. (See p. 19.)
5802007	Expansion facility at Milan for load, assemble, and pack 60/81-mm propelling charge assemblies	2.0	-	-
5802694	Expansion facility at Indiana for the load, assemble, and pack center core propelling charges	21.4	-	Alternatives to this project not fully considered. (See p. 20.)
5803142	Fourth increment for construction of the Mississippi Plant	102.3	-	-
5802875	Expansion project at Radford to provide automated facilities to produce multibase cannon propellant	98.8	-	-

<u>Project number</u>	<u>Description</u>	<u>Budget request</u>	<u>GAO adjustment</u>	<u>Remarks</u>
		----- (millions) -----		
5802003	Expansion project for the production of SLUFAE rocket motors at Longhorn	4.2	4.2)	Expansion project is premature. (See p. 17.)
5803106	Modernization of facilities at Lone Star to ship and receive ammunition in containers	.9	-	-
		<u>          </u>	<u>          </u>	
Total		\$ <u>257.2</u>	\$ <u>(10.5)</u>	

(947354)