United States General Accounting Office 131322

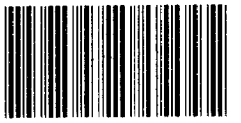
GAO

Report to the Chairmen,
Subcommittees on Defense,
House and Senate Committees on
Appropriations

September 1986

DEFENSE BUDGET

Potential Reductions to DOD's Ammunition Budget



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GAO/NSIAD-86-188

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United States
General Accounting Office
Washington, D.C. 20548

National Security and
International Affairs Division

B-216058

September 30, 1986

The Honorable Bill Chappell, Jr.
Chairman, Subcommittee on Defense
Committee on Appropriations
House of Representatives

The Honorable Ted Stevens
Chairman, Subcommittee on Defense
Committee on Appropriations
United States Senate

As requested, we reviewed the military services' justification for their fiscal year 1987 appropriation requests for ammunition items and the Army's request for the ammunition production base. In March 1986 we provided your staffs some observations and questions on various ammunition line items and production base support projects for which fiscal year 1987 funds were requested. In addition, in May 1986 we briefed your staffs on the results of our review. The May 1986 briefings met your staffs' immediate needs for information for use during initial deliberations on the Defense Appropriation Bill. This report documents the information provided at the May 1986 briefing and provides final information on the results of our review.

The President's fiscal year 1987 defense budget request totals about $4.9 billion for ammunition items and $353.9 million for enhancing ammunition production facilities. In our opinion, about $1.6 billion of the ammunition requests and $177.6 million of the Army's production base request are inadequately justified and should not be funded. This letter provides an overview of our findings and appendixes II through XI provide supporting details.

Army Ammunition Program

The Army's $1.9 billion request for ammunition is, in our opinion, overstated by $624.7 million for the following reasons:

- $70.7 million for five items because the proposed procurements would cause inventories to exceed requirements.
- $31.7 million for three items because program quantities would exceed those stipulated in Army guidance.
- $379.2 million for 11 items because total program requests will not be needed to meet fiscal year 1987 delivery schedules.

- $41 million for two items because they have unresolved component problems.
- $33.5 million for two items because of problems revealed during testing inconclusive test results, and uncertainty about the need for one of the items.
- $7.5 million for one training item because the item does not meet Army training needs.
- $61.1 million for one item because the large program quantity would require an unnecessarily large increase in production in fiscal year 198 followed by a sharp decrease in subsequent years, which may not be cost effective.

Navy Ammunition Program

The Navy's $905 million request for ammunition is, in our opinion, over stated by $248.3 million for the following reasons:

- $107.5 million for seven items because program delays have made planned fiscal year 1987 procurements premature.
- $54.7 million for one item because the request is based on an overstated unit cost estimate.
- $33.1 million for three items because additional procurement would cause inventories to exceed requirements.
- $18 million for two items because production problems have delayed deliveries of prior program quantities.
- $18 million for one item because the program quantity will not be needed to meet fiscal year 1987 delivery schedules.
- $17 million for one item because the initial procurement quantity is excessive.

Marine Corps Ammunition Program

The Marine Corps' $608.3 million request is, in our opinion, overstated by $151.1 million for the following reasons:

- $127.7 million for three items because the program quantities are not needed to meet fiscal year 1987 delivery schedules.
- $23.4 million for one item because the large program quantity would require an unnecessarily large increase in production in fiscal year 198 followed by a sharp decrease in subsequent years, which may not be cost effective.

Air Force Ammunition Program

The Air Force's $1.5 billion request for ammunition is, in our opinion, overstated by $621.6 million for the following reasons:

- $98.2 million for two items because deliveries cannot be made during the fiscal year 1987 funded delivery period and new containers are not needed for one of the items.
- $8.1 million for one item because sufficient quantities of a substitute item are available to satisfy fiscal year 1987 program requirements.
- $19 million for one item because the Air Force overstated its fiscal year 1987 requirements and can obtain what it needs from the Army.
- $7.7 million for one item because the technical data package required to produce it had not been developed.
- $233.2 million for one item because dual production sources are unnecessary. In addition, this reduction would eliminate the need for at least $20.8 million in prior year funding for production facilities.
- $138.9 million for one item because the weapon is still being developed and required operational testing will not be completed until April 1987.
- $88.1 million for one item because it is not operationally suitable or effective and is planned to be replaced by another weapon.
- $28.4 million for one item because of uncertainties about the availability of production facilities, unit costs, and operational test results.

Army's Ammunition Production Base Program

The Army's $353.9 million request for its ammunition production base program is, in our opinion, overstated by $177.6 million for the following reasons:

- $133.4 million for seven projects is premature because, contrary to congressional guidance, final designs were not completed before budget submission.
- $15.4 million for a second facility to produce metal parts for one item is premature because tests to demonstrate that technical problems with the item have been resolved are not yet complete. Also, congressional conditions on using fiscal year 1986 funds had not been met.
- $10.5 million requested to expand a metal parts production facility should not be provided because lower cost alternatives are available.
- $18.3 million for two projects at the Radford Army Ammunition Plant (to construct a steam conduit or tieline and to upgrade a powerhouse electrical distribution system) is premature because there are unresolved issues which could affect the scope of the proposed projects.

Recommendations to the Committees

We recommend the House and Senate Committees on Appropriations make the following reductions to the Department of Defense's fiscal year 1987 appropriation request for ammunition items and the Army's ammunition production base:

- $624.7 million for 25 items in the Army's request.
- $248.3 million for 15 items in the Navy's request.
- $151.1 million for four items in the Marine Corps' request.
- $621.6 million for nine items in the Air Force's request.
- $177.6 million in the Army's ammunition production base program request.

These recommended reductions are delineated by budget line number and project number in appendixes VII, VIII, IX, X, and XI.

As requested, we did not obtain official agency comments on a draft of this report. However, at the conclusion of our review we did discuss its contents with Office of the Secretary of Defense, Army, Navy, Marine Corps, and Air Force officials. They agreed with some of our recommended adjustments and provided information on proposed funding increases to offset our recommended reductions. We have included information on their proposed funding increases in this report, but have not evaluated the information.

We are sending copies of the report to the Secretaries of Defense, the Army, the Navy, and the Air Force; the Commandant of the Marine Corps; and other interested parties.

Frank C. Conahan
Assistant Comptroller General

Contents

Tables

Abbreviations

AAP	Army Ammunition Plant
ADAM	area denial artillery munitions
AFLC	Air Force Logistics Command
AFOTEC	Air Force Operational Test and Evaluation Center
AFSC	Air Force Systems Command
API	armor piercing incendiary
BKEP	Boosted Kinetic Energy Penetrator
CEM	combined effects munition
CIWS	close-in weapon system
DAACM	direct airfield attack combined munition
DC	methylphosphonic dichloride
DF	methylphosphonic difluoride
DT&E	developmental testing and evaluation
ECP	engineering change proposal
FOT&E	follow-on test and evaluation
GAO	General Accounting Office
HE	high explosive
HEAT	high explosive antitank
HEI	high explosive incendiary
HEI-T	high explosive incendiary-tracer
HI FRAG	high fragmentation
ICM	improved conventional munitions
IIR	imaging infrared
IOT&E	initial operational test and evaluation
KMU	kit modification unit
LAP	load, assemble, and pack
MICLIC	mine clearing line charge
MPSM	multipurpose submunition
MTSQ	mechanical time and superquick
NOS	Naval Ordnance Station
OSD	Office of the Secretary of Defense
OT&E	operational test and evaluation
PM-TMAS	Project Manager-Tank Main Armament Systems
RAAMS	remote anti-armor mines system
SMCA	single manager for conventional ammunition
TDP	technical data package
TMD	tactical munitions dispenser
TNT	trinitrotoluene
TP	target practice
TP-T	target practice-tracer
TV	television

Introduction

As shown in table I.1, the military services' fiscal year 1987 appropriation request for ammunition was about $5.3 billion, including the Army's $353.9 million request for production base support.

Table I.1: Military Services' FY 1987 Ammunition Appropriation Request

Dollars in millions

Appropriations	Amount
Procurement of Ammunition, Army:	
Atomic materiel	$14.3
Conventional ammunition	1,789.0
Miscellaneous items	96.8
Production base support	353.9
Subtotal	**2,254.0**
Other Procurement, Navy:	
Air-launched ordnance	489.9
Ship gun ammunition	306.3
Other expendable ordnance	108.8
Subtotal	**905.0**
Procurement, Marine Corps:	
Conventional ammunition	608.3
Other Procurement, Air Force:	
Rockets and launchers	37.7
Cartridges	209.9
Bombs	1,149.8
Targets	13.1
Fuzes	36.8
Other items	85.2
Subtotal	**1,532.5**
Total	**$5,299.8**

Production base support funds are used to enhance ammunition production capacity by modernizing existing production facilities, building new facilities, and protecting and preserving facilities no longer required for active production. Table I.2 summarizes the Army's request for production base support.

Table I.2: Army's FY 1987 Production Base Support Request

Dollars in millions

	Amount
Provision of industrial facilities	$159.0[a]
Components for prove-out	8.7
Layaway of industrial facilities	22.9
Jefferson Proving Ground modernization	2.2
Modernization projects	161.1
Total	**$353.9**

[a]Includes $120.1 million for projects to modernize and expand the ammunition production base and $38.9 million for production support and equipment replacement.

Objectives, Scope, and Methodology

The Chairmen, Subcommittees on Defense, House and Senate Committees on Appropriations asked us to assess the justification for the fiscal year 1987 ammunition and production base support programs. We also examined the status of prior years' funding to identify any excess funds.

We evaluated the requests for ammunition by reviewing factors such as ammunition requirements, inventory positions, production problems, quality, testing and development, funded program status, unit costs, and field malfunctions to identify those items with potential problems. We analyzed production schedules, production capacities, past production, procurement lead times, and delivery of components to determine whether the programs could be executed efficiently and economically. We assessed projected receipt and loss data to assure that inventories would not greatly exceed objectives. We also determined whether a reasonable balance existed among programs for related ammunition end items (e.g., propelling charges, projectiles, and fuzes). We did not have time to verify the accuracy of all service-provided data, such as inventory positions, training consumption, and cost estimates, but we did compare their information with data from prior years to ascertain its overall reasonableness.

To assess projects for enhancing the production base, we determined whether designs were complete, whether items would be ready for production when the projects were complete, whether all reasonable alternatives were considered, and whether the need for the projects were firmly established.

To evaluate the justifications for specific ammunition items and projects, we interviewed officials involved in ammunition management

and procurement and obtained written briefings, status reports, and budget support data, from the services at the following locations:

- Army, Navy, and Air Force Headquarters, Washington, D.C.;
- U.S. Army Armament, Munitions, and Chemical Command, Rock Island, Illinois;
- U.S. Army Research and Development Center, Dover, New Jersey;
- U.S. Army Munitions Production Base Modernization Activity, Dover, New Jersey;
- Radford Army Ammunition Plant, Radford, Virginia;
- Scranton Army Ammunition Plant, Scranton, Pennsylvania;
- Project Manager, Tank Main Armament Systems, Dover, New Jersey;
- Project Manager, Cannon Artillery Weapons Systems, Dover, New Jersey;
- Project Manager, Mines, Countermines, and Demolitions, Dover, New Jersey;
- Project Manager, Mortars, Dover, New Jersey;
- Close Combat Armament Center, Dover, New Jersey;
- Naval Air Systems Command, Washington, D.C.;
- Naval Sea Systems Command, Washington, D.C.;
- Ships Parts Control Center, Mechanicsburg, Pennsylvania;
- Marine Corps Headquarters, Rosslyn, Virginia;
- U.S. Air Force Systems Command, Armament Division, Eglin Air Force Base, Florida; and
- Ogden Air Logistics Center, Hill Air Force Base, Utah.

We discussed a draft of this report with Office of the Secretary of Defense officials and with program officials of the Army's Office of the Deputy Chief of Staff for Research, Development, and Acquisition; the Navy's Office of the Deputy Chief of Naval Operations for Logistics; the Air Force's Office of the Deputy Chief of Staff for Logistics and Engineering; and the Marine Corps' Office of Deputy Chief of Staff for Installations and Logistics. We made changes to the report, where appropriate, to reflect the views of these officials. However, as requested, we did not obtain official agency comments on this report.

We conducted this review from October 1985 to April 1986 in accordance with generally accepted government auditing standards.

Army Ammunition Program

The Army's fiscal year 1987 request for ammunition was about $1.9 billion. We reviewed the Army's justification for 75 items, representing about 89 percent of the funds requested, and believe that $624.7 million is not needed in fiscal year 1987 for the following reasons:

- $70.7 million involves five items for which the proposed procurements would cause inventories to exceed requirements.
- $31.7 million for three items for which program quantities would exceed those stipulated in Army guidance.
- $379.2 million for 11 items for which total program quantities will not be delivered within the fiscal year 1987 funded delivery period.
- $41 million for two items which have unresolved component problems.
- $33.5 million for two items for which the programmed procurements are premature because of problems revealed during testing, inconclusive test results, and uncertainty about the need for one of the items.
- $7.5 million for one item that does not meet Army training needs.
- $61.1 million for one item because the large program quantity would require an unnecessarily large increase in production in fiscal year 1987 followed by a sharp decrease in subsequent years which may not be cost effective.

Army representatives proposed that any reductions be offset by funding increases for other items as listed in table II.12. We did not evaluate the appropriateness of funding these items because the list was provided after we had completed our field work.

Inventory Will Exceed Requirements

A total of $70.7 million of the funds requested for five items is not needed because program quantities will cause inventories to exceed objectives. Specifically, we believe the following reductions are warranted.

- $46.3 million for 76,800 120-mm. target practice M865 cartridges.
- $10.9 million for 860,000 25-mm. target practice-tracer (TP-T) M793 cartridges.
- $7.7 million for 6,000 105-mm. high explosive antitank (HEAT) M456A2 cartridges.
- $1.8 million for 143,000 M74 airburst simulators.
- $4 million for 22,000 8-inch M188A1 propelling charges.

120-mm. Target Practice Cartridge

The Army requested $104.9 million for 174,000 120-mm. M865 kinetic energy target practice cartridges, which are fired from the 120-mm. gun on the M1A1 tank. This request could be reduced by about $46.3 million to align ammunition deliveries more closely with training requirements.

According to information the Office of Project Manager-Tank Main Armament Systems (PM-TMAS) provided, the Army will have 125,622 more cartridges than needed when the fiscal year 1987 program is completed, as shown in table II.1 below.

Table II.1: M865 Deliveries Versus Requirements Through the FY 1987 Funded Delivery Period

	Quantity
Cumulative deliveries	306,990
Less: Cumulative requirements	181,368
Excess	**125,622**

We discussed this with PM-TMAS officials who agreed that the M865 would exceed needed inventory; however, not necessarily by the quantity we computed. They noted, for example, that fiscal year 1986 funding had not yet been released for the 44,000 cartridge war reserve increase. Accordingly, a contract had not been awarded yet for the fiscal year 1986 program, and continued delay could cause deliveries to slip further. They also said unit costs might increase if the fiscal year 1987 quantity request was reduced.

Because fiscal year 1986 M865 program production extends 3 months into the fiscal year 1987 funded delivery period, the Army has scheduled the fiscal year 1987 program to be delivered over a 9-month period ending September 1988. This action will require production at nearly a two-shift rate. However, reducing the fiscal year 1987 request by 76,800 cartridges would maintain production at a one-shift rate, and limit the excess M865 quantity to about 48,822 cartridges. At $603 per unit, this decrease of 76,800 cartridges would provide a $46.3 million budget reduction for fiscal year 1987.

Army Headquarters representatives said a $12.4 million reduction would result in matching deliveries of M865 training cartridges and M1A1 tanks. We based our assessment of the number of cartridges needed for training on calculations made by the project manager's office using its schedule for cartridge delivery and Army schedules for fielding M1A1 tanks. We found no reason to dispute the analysis by the project

manager's office, and therefore, believe a $46.3 million reduction is justified.

25-mm. TP-T Cartridge

Approximately $10.9 million of the Army's $25.5 million request for 2,018,000 25-mm. M793 cartridges is unnecessary because the full program quantity would result in excess inventory at the end of the fiscal year 1987 funded delivery period (September 1988), as shown in table II.2.

Table II.2: Excess Inventory of 25-mm. TP-T Cartridges

	Quantity
Inventory at September 30, 1985	962,000
Due in from prior year programs	3,975,000
Fiscal year 1987 request	2,018,000
Total	**6,955,000**
Less: Estimated usage through September 30, 1988	5,236,000
Projected inventory at September 30, 1988	1,719,000
Less: Inventory objective	859,000
Excess	**860,000**

The projected inventory position shows that a program reduction of 860,000 cartridges at an estimated total cost of $10.9 million is warranted. Army representatives said the request should be reduced by 46,000 cartridges estimated to cost $600,000 and said that projected training losses were underestimated. Neither budget documents nor discussions with the item manager during our review support the statement that the projected training losses are understated. Consequently, we believe a $10.9 million reduction is justified.

105-mm. HEAT Cartridge

The Army's $7.7 million request for 19,000 105-mm. M456A2 cartridges is unnecessary because quantities on hand and due in are sufficient to meet the Army's needs. The Army will have an excess of 6,000 cartridges at the end of the fiscal year 1987 funded delivery period (September 1988) without a fiscal year 1987 program, as shown in table II.3. Army representatives agree with the reduction.

Table II.3: Excess Inventory of 105-mm. HEAT Cartridges

	Quantity
Inventory at September 30, 1985	428,000
Due in from prior year programs	169,000
Total	**597,000**
Less: Estimated usage through September 30, 1988	6,000
Projected inventory at September 30, 1988	591,000
Less: Inventory objective	585,000
Excess	**6,000**

Airburst Simulator

The Army's $4.3 million request for all types of simulators includes $1.8 million for 143,000 M74 airburst simulators which, in our opinion, is unnecessary. Funding the full fiscal year 1987 program quantity would result in excess inventory at the end of the fiscal year 1987 funded delivery period (September 1988), as shown in table II.4.

Table II.4: Excess Inventory of M74 Simulators

	Quantity
Inventory at September 30, 1985	245,100
Due in from prior year programs	164,052
Fiscal year 1987 request	143,000
Total	**552,152**
Less: Estimated usage through September 30, 1988	351,000
Projected Inventory at September 30, 1988	201,152
Less: Inventory objective	108,000
Excess	**93,152**

We believe that this calculation, based on Army data, understates the potential excess from funding the full fiscal year 1987 program quantity because estimated usage is greater than prior years' actual usage. The Army estimated its training usage through September 1988 at 91,000 to 130,000 M74 simulators per year. However, during fiscal years 1982 through 1985 the Army's actual usage was about 60,000 M74 simulators per year.

Army representatives agreed the program should be reduced by 93,152 simulators or $1.1 million. Because the estimated usage appears to be overstated, we believe none of the $1.8 million for 143,000 simulators should be funded.

8-Inch Propelling Charge

Our review indicates that the $4 million in fiscal year 1987 requested for 22,000 8-inch M188A1 propelling charges is not needed because the quantity of propelling charges on hand and due in is sufficient to satisfy the Army's goal of balancing its propelling charge inventories with the inventories of the projectiles using the charges. As shown in table II.5, without the fiscal year 1987 program the Army will have an excess inventory of this propelling charge at the end of the fiscal year 1987 funded delivery period (September 1988). Army representatives agreed with the reduction.

Table II.5: Excess Inventory of 8-Inch M188A1 Propelling Charges

	Quantity
Inventory at September 30, 1985	505,000
Due in from prior year programs	377,000
Total	**882,000**
Less: Estimated usage through September 30, 1988	57,000
Projected inventory at September 30, 1988	825,000
Less: Inventory objective	737,000
Excess	**88,000**

Program Quantities Exceed Army Guidance

As shown in table II.6, the Army requested $64.5 million to procure three different types of nondevelopmental 120-mm. mortar cartridges. The cartridges are being procured as an interim measure until improved 120-mm. mortar ammunition is fielded in fiscal year 1989. The request should be reduced by $31.7 million because program quantities exceed Army guidance.

Table II.6: Army's FY 1987 120-mm. Mortar Ammunition Request

Dollars in millions		
Type of cartridge	**Quantity**	**Cost**
High explosive (XM933)	126,000	$44.7
Illuminating (XM930)	11,000	5.5
Smoke (XM929)	29,000	14.3
Total	**166,000**	**$64.5**

The fiscal year 1987 request is for the first procurement of 120-mm. mortar ammunition. In July 1985, the Army's Vice Chief of Staff decided that the initial ammunition acquisition objective should be limited to the 30-day war reserve requirement and the annual training ammunition requirements for the 9th Infantry Division (Motorized). Although Army records show that 83,000 cartridges, at an estimated

cost of $32.8 million, would be needed to meet this guidance, the Army requested $64.5 million for 166,000 cartridges. According to the Army's acting Product Manager for Mortars, the request would support a 60-day war reserve requirement and training for 2-1/2 years. He said the additional war reserve and training quantities were included to provide for a potential slippage in the development of the improved 120-mm. mortar ammunition. However, he agreed that the fiscal year 1987 request for 120-mm. mortar ammunition should be reduced by about $31.7 million to comply with Army guidance. He also agreed that, if additional ammunition was needed because of a development program slippage, the ammunition could be bought in fiscal year 1988 by exercising the contract option.

Army Headquarters representatives agreed with a reduction of $30 million for 77,000 cartridges. We believe the request should be reduced by about $31.7 million for 83,000 mortar cartridges to comply with the Army's Vice Chief of Staff guidance. If slippages should occur in the improved mortar ammunition development program, additional ammunition can be procured with subsequent years' funds. In fact, the current request for proposal includes a basic quantity of 83,000 mortar cartridges with an option to buy an additional 83,000 cartridges.

Deliveries Not Within Funded Delivery Period

According to Army budget guidance, ammunition program quantities reflected in a fiscal year budget request should be delivered within the fiscal year funded delivery period,[1] lead times considered. Quantities not deliverable within the funded delivery period should be programmed for a later fiscal year. In applying this to the fiscal year 1987 program, funds should not be programmed for fiscal year 1987 for items scheduled for delivery after the fiscal year 1987 funded delivery period, but rather should be programmed for future fiscal years.

Our review disclosed that $379.2 million of the Army's request for 11 items is unneeded because the total quantities requested will not be delivered within the fiscal year 1987 funded delivery period. The items and questionable dollar amounts are

- $117.3 million for two types of 155-mm. remote antiarmor mines system (RAAMS) projectiles,

[1]Simply stated, the "fiscal year funded delivery period" is the time (usually 12 months) during which quantities in a particular fiscal year program are delivered. It begins in the month following the procurement lead time interval and ends in the month when deliveries for a fiscal year program are completed.

- $85.1 million for 155-mm. high explosive (HE),improved conventional munitions (ICM) projectiles,
- $38.3 million for 7.62-mm. cartridges,
- $33.9 million for 155-mm. area denial artillery munitions (ADAM) projectiles,
- $31.2 million for 155-mm. binary chemical projectiles,
- $35.7 million for three types of 155-mm. propelling charges, and
- $24.4 million for mine clearing line charges (MICLIC), and $13.3 million requested for 5-inch rocket motors used with the MICLIC.

RAAMS Projectile

The RAAMS projectile contains nine antiarmor mines that are ejected from the projectile while it is in flight. The mines arm when they hit the ground and explode when activated or when built-in timing devices cause them to self-destruct. The M741 and M718 models differ in their preset times for mines to self-destruct.

Both the Army and Marine Corps requested funds for RAAMS projectiles, as shown in table II.7.

Table II.7: Army and Marine Corps FY 1987 Requests for RAAMS Projectiles

Dollars in millions

	Army		Marine Corps	
Model	**Quantity**	**Cost**	**Quantity**	**Cost**
M741	74,000	$105.4	17,129	$22.0
M718	9,000	11.9	13,236	17.0
Total	**83,000**	**$117.3**	**30,365**	**$39.0**

Neither the Army nor the Marine Corps request should be funded because large quantities from prior year programs have yet to be produced and continuing difficulties in obtaining component parts will delay the start of the fiscal year 1987 program. These problems will preclude delivery of the items within the fiscal year 1987 funded delivery period.

According to the Army's budget justification documents, the RAAMS's procurement lead time is 15 months. Therefore, production of the fiscal year 1987 program should start in January 1988 and end in December 1988. However, according to Army schedules, production of projectiles for the fiscal year 1986 and prior years' programs will extend through December 1988 on a one-shift basis. This schedule eliminates the need for a fiscal year 1987 program.

RAAMS production is behind Army schedules. For example, the Army planned to produce 47,898 RAAMS projectiles during calendar year 1985, but actually produced 29,431. The production delays were partly attributable to problems the Army had in obtaining components, such as pusher plates and body and pad assemblies. For example, one contractor for body and pad assemblies is 1 year behind schedule and, as of March 1986, the other contractor had produced only 100 of the 180,000 assemblies scheduled for delivery up to that time. The shortage of assemblies was so severe that the Army had to expedite awarding a contract to a third source to prevent the RAAMS production line from shutting down.

Army representatives said that the RAAMS program should be reduced by $70 million for 51,000 projectiles and that the Army plans to procure an improved, more expensive RAAMS in fiscal year 1987.

As indicated previously, none of the RAAMS projectiles are scheduled for delivery during the fiscal year 1987 funded delivery period. In addition, quantities still to be produced from prior years' programs will maintain the RAAMS production line on a one-shift basis through the fiscal year 1987 funded delivery period ending in December 1988. Therefore, we believe a fiscal year 1987 program is unnecessary.

155-mm. HE ICM Projectile

The Army requested $173 million for 441,000 155-mm. M483A1 ICM projectiles and the Marine Corps requested $48 million for 123,000 projectiles. We believe these combined requests should be reduced by $108.9 million for 278,000 projectiles—$79.9 million because 204,000 projectiles from the fiscal year 1987 program would be delivered after the fiscal year 1987 funded delivery period and $29 million because 74,000 projectiles from the fiscal year 1986 program are scheduled to be produced at the Mississippi Army Ammunition Plant (AAP) after the fiscal year 1987 funded delivery period.

Allocating the 278,000 projectile reduction to the services in proportion to their requests would result in an Army program reduction of $85.1 million for 217,000 projectiles and a Marine Corps program reduction of $23.8 million for 61,000 projectiles.

According to the Army's budget justification documents, the procurement lead time for this item is 12 months. Therefore, production of the fiscal year 1987 program should begin in October 1987 and extend through September 1988. However, current Army production schedules show that production of the fiscal year 1987 program at the Kansas and

Milan (Tennessee) AAPs will start in March 1988 and end in February 1989, with 204,000 projectiles scheduled for production after September 1988. The Mississippi AAP is not scheduled to produce any fiscal year 1987 program quantities; the Army has programmed sufficient quantities from prior year programs to produce at the minimum sustaining rate of 20,000 projectiles per month until January 1989—4 months after the fiscal year 1987 funded delivery period ends.

The M483A1 production has consistently fallen short of Army schedules. At the time of last year's budget submission, the Army planned to produce 721,000 projectiles during calendar year 1985 and to complete the fiscal year 1986 program by December 1987. However, the Army actually produced only 591,382 projectiles. Also, current Army production schedules show the Kansas and Milan AAPs will not complete their portion of the fiscal year 1986 program until March 1988, and the Mississippi AAP will not finish until January 1989.

The Mississippi AAP has fallen far short of its goal of being an integrated ammunition plant that would produce projectile bodies and grenades, as well as load, assemble, and pack them into completed M483A1 projectiles. The Mississippi AAP was originally scheduled to load, assemble, and pack 630,000 projectiles for the fiscal years 1983 through 1985 programs. However, this allocation has been reduced to approximately 232,000, with only 69,000 actually produced as of January 1986.

Moreover, grenade assembly machines at the Mississippi AAP have not been able to operate at design capacity. Most of the projectiles produced at the Mississippi AAP to date contain grenades loaded at other ammunition plants and shipped to Mississippi. However, the Army has stopped shipping loaded grenades to Mississippi because of the logistical burden as well as a grenade metal parts shortage that is constraining production at other plants. The Army is considering a proposal to replace the machines at the Mississippi AAP with proven, lower-capacity machines. If this is done, it could take 6 to 8 months before the first machine is installed. The Mississippi AAP is scheduled to reach its 20,000 projectile per month minimum sustaining rate in December 1987. Given the Mississippi AAP's long-standing start-up problems, achieving a 20,000 projectile per month minimum sustaining rate during December 1987 may be a very ambitious goal.

Army representatives initially said the Army program should be reduced by $61.7 million. Later, they asserted that with a planned Marine Corps program reduction (see p. 56), the Army's full fiscal year

1987 request was necessary to maintain production at the Milan, Kansas, and Mississippi plants over a 12-month funded delivery period. However, according to an Army procurement official, deliveries are still scheduled beyond the fiscal year 1987 funded delivery period, as previously discussed. According to Army representatives, the Army is reviewing several alternatives for the Mississippi AAP and, in all likelihood, none of the fiscal year 1986 program will be assigned to the Mississippi AAP. If this is the case, an additional reduction of $49.5 million for 126,000 projectiles may be in order.

We believe the Army's program should be reduced by $85.1 million for 217,000 projectiles, the Army's portion of the program scheduled for delivery after the fiscal year 1987 funded delivery period.

7.62-mm. Cartridge

All four services requested funds for 7.62-mm. cartridges,as shown in table II.8.

Table II.8: Military Services FY 1987 Request for All Types of 7.62-mm. Cartridges

Service	Quantity	Cost
Army	360,000,000	$87,600,000
Marine Corps	27,000,000	6,400,000
Navy	5,000,000	1,300,000
Air Force	2,000,000	400,000
Total	**394,000,000**	**$95,700,000**

Because of the size of the Army's request, the Army would have to expand production at the Lake City AAP, Missouri, to a two-shift basis to deliver the quantity within the fiscal year 1987 funded delivery period. If the Army program is reduced by 154 million cartridges costing $38.3 million, the remaining cartridges could be produced on a one-shift basis.

The fiscal year 1987 request of 394 million cartridges by all services is substantially greater than the fiscal year 1986 program of 161 million cartridges as well as the projected fiscal year 1988 program of 129 million cartridges. To produce the fiscal year 1987 program within the funded delivery period, the Army would have to schedule production on a two-shift basis of about 33 million cartridges per month. In comparison, the fiscal year 1986 and 1988 programs are scheduled to be produced on a one-shift basis. Such program fluctuations may not be cost effective. Production officials at the Army's procuring activity said the

Army does not plan to add a second shift at the Lake City AAP. Therefore, 154 million cartridges costing $38.3 million would be delivered beyond the fiscal year 1987 funded delivery period.

Army representatives said the program should be reduced by $35.2 million. However, we believe a reduction of 154 million cartridges costing $38.3 million is necessary to preclude multishift operation.

ADAM Projectile

The ADAM projectile contains 36 antipersonnel mines that are dispersed while the projectile is in flight. The mines arm when they hit the ground and explode when disturbed or when a built-in timing device causes them to self-destruct. Both the Army and Marine Corps requested funds for ADAM projectiles, as shown in table II.9.

Table II.9: Army and Marine Corps FY 1987 Requests for ADAM Projectiles

Dollars in millions

	Army		Marine Corps	
Model	**Quantity**	**Cost**	**Quantity**	**Cost**
M731	9,000	$33.9	10,972	$41.0
M692	0	0	10,386	38.8
Total	**9,000**	**$33.9**	**21,358**	**$79.8**

Neither the Army nor the Marine Corps request should be fully funded because an extensive production backlog, coupled with item malfunctioning problems, precludes delivery of the quantities during the fiscal year 1987 funded delivery period.

According to the Army's budget justification data, the procurement lead time for the ADAM is 15 months. Therefore, production of fiscal year 1987 program quantities should start in January 1988 and end in December 1988. However, the Army has scheduled production of the 76,000 projectiles in the fiscal year 1986 and prior years' programs through November 1988. As a result, only 4,000 projectiles from the fiscal year 1987 program can be produced through December 1988. This schedule effectively eliminates the need for 26,358 projectiles in the combined Army and Marine Corps fiscal year 1987 programs.

The Army has experienced some difficulty in achieving desired production levels because of mine malfunctions. Thirty of 38 production lots tested between February 1983 and October 1985 failed ballistics testings because of problems such as duds, trip wires not extending or failing to set off the mine after force was applied to the wire, and mines self-

destructing ahead of time. The Army is attempting to resolve these problems and has held production to a low rate because of them. For example, the Army originally planned to produce 17,684 ADAM projectiles during calendar year 1985, but actually produced 14,353.

Since the Army has scheduled fiscal year 1986 and prior year program production on a one-shift basis through most of the fiscal year 1987 funded delivery period, and mines continue to malfunction, we believe a fiscal year 1987 program is not needed.

Army representatives initially agreed that the Army's program should be reduced by $12.8 million, but later said that because of a planned Marine Corps program reduction (see p. 56), the full Army request was not only needed but would have to be increased by 9,000 projectiles ($33.9 million) to maintain minimum rate production through the fiscal year 1987 funded delivery period. This disregards the fact, as discussed above, that fiscal year 1986 program production will extend through the entire fiscal year 1987 funded delivery period. Therefore, a fiscal year 1987 Army program is unnecessary.

155-mm. Binary Projectile

The Army requested $60.6 million for 155-mm. M687 binary chemical projectiles. We believe that about $31.2 million of this request is not needed because the planned production of the pacing component, a chemical filled canister, extends beyond the funded delivery period. This is due to the current inadequate supply of the chemical methylphosphonic dichloride (DC) needed to produce methylphosphonic difluoride (DF), and a 5-month break in the production of DF pending completion of a new facility for DC production. The break in production of DF also creates an imbalance between the number of projectiles and the chemical canister.

Army officials believe the supply of DC at the Rocky Mountain Arsenal is sufficient to produce the fiscal year 1986 program and part of the fiscal year 1987 program. However, the amount of usable DC will be known only after the existing supply is purified. The purification process has been delayed because funds for this process were included in congressional conditions specified in section 1411 of the Department of Defense Authorization Act, 1986 (P.L. 99-145) on the use of fiscal year 1986 funds for binary chemical munitions.

The M687 binary projectiles could be produced within the fiscal year 1987 funded delivery period without having DF-filled canisters. However, this would create an imbalance between the projectiles and canisters because the projectiles cannot be used without the DF-filled canisters. Therefore, we believe this request should be reduced by a total of about $31.2 million— $5.1 million for the DF-filled canister production beyond the funded delivery period and $26.1 million to limit projectile production to the quantity required to balance with DF-filled canister production, while maintaining projectile production at a minimum sustaining rate.

Army representatives said procurement lead times for the fiscal year 1987 program may not be attainable because of congressional limitations on obligation of fiscal year 1986 funds which would extend the funded delivery period. We note, however, that the Army's estimate of the procurement lead times for the projectiles has not changed despite these limitations. Therefore, we believe the $31.2 million of the request should not be funded.

155-mm. Propelling Charges

The Army and Marine Corps requested funds for 155-mm. propelling charges, as shown in table II.10.

Table II.10: Army and Marine Corps FY 1987 Requests for 155-mm. Propelling Charges

Dollars in millions

	Army		Marine Corps	
Model	**Quantity**	**Cost**	**Quantity**	**Cost**
M3A1	866,000	$38.0	0	$0
M4A2	0	0	240,000	15.3
M119A2	637,000	55.6	0	0
M203A1	77,000	20.0	76,500	19.9
Total	**1,580,000**	**$113.6**	**316,500**	**$35.2**

Part of the fiscal year 1987 and prior year programs for the M3A1, M119A2, and M203A1 are scheduled to be completed after the fiscal year 1987 funded delivery period. Therefore, the services' requests should be reduced by the quantities scheduled to be completed after the funded delivery period. This would reduce the total request by $35.7 million—an $11.7 million reduction in the Army's M3A1 request, a $10.5 million reduction in the Army's M119A2 request, and a $13.5 million reduction in the M203A1 request.

The fiscal year 1987 funded delivery periods for the M119A2 and M3A1 programs end in July 1988. Therefore, production should be completed during July 1988. However, with deliveries scheduled at a constant one-shift rate of 50,000 per month for each type, 120,000 M119A2 and 266,000 M3A1 propelling charges are scheduled for delivery after July 1988. Similarly, the fiscal year 1987 M203A1 program should be completed during September 1988, but 52,000 propelling charges from this program are scheduled for delivery after September 1988.

An Army procurement activity official acknowledged that these programs were scheduled for completion beyond their funded delivery periods. He attributed it to the large fiscal year 1987 program quantity and the large quantity yet to be delivered from prior years' programs.

The projected fiscal year 1988 program for these propelling charges is considerably smaller—approximately 1 million charges for both the Army and Marine Corps. To avoid a period of accelerated production followed by a staffing cutback, we believe the fiscal year 1987 requests should be reduced by the quantities scheduled to be delivered after the funded delivery period.

Army representatives agreed the M3A1 program should be reduced by $11.7 million. For the other items, however, they said they provided a waiver on procurement lead times for the large fiscal year 1985 program which extended the fiscal year 1985 funded delivery period and that the waiver will also apply to the fiscal year 1987 program. Consequently, they said these items should be fully funded. Our review of budget backup data and the Army's response to congressional questions on the fiscal year 1987 budget supports the lead times we used in our analysis. Therefore, a $35.7 million reduction is warranted because the funds are not needed until fiscal year 1988 or later to meet production lead time requirements.

MICLIC and 5-Inch Rocket Motor

The Army requested $24.4 million for 2,307 M58A3 MICLIC and $13.3 million for 4,048 5-inch MK22 rocket motors used with the MICLIC. We believe the M58A3 program is unnecessary because a large production backlog and delays in starting production make it doubtful that any of the requested quantity could be delivered during the fiscal year 1987 funded delivery period. The $13.3 million requested for 5-inch MK22 rocket motors should also not be funded because the quantity requested will not be needed if the MICLIC is not funded.

The M58A3 is a 350-foot long line charge containing 1,750 pounds of composition C-4 explosive used to clear a path through minefields. It is launched into the minefield with a MK22 5-inch rocket. The Army first received funding for the M58A3 in fiscal year 1985, but the Marine Corps has procured the M59 and M69 alternate versions since fiscal year 1982. All of these models will share production facilities at the Milan and Louisiana AAPs. M58A3 production has not yet started, and only minimal M59 production has occurred at one plant. As of January 1986, 8,700 M58A3 and M59 live line charges were yet to be produced from Army fiscal year 1985 and 1986 programs and Marine Corps programs dating back to fiscal year 1983.

According to Army production schedules, the fiscal year 1986 and prior year programs for all line charge models will be completed by December 1987, the end of the fiscal year 1986 funded delivery period. To achieve this schedule, the Milan AAP should have reached its two-shift rate of 200 line charges per month in March 1986 but actually produced only 118 line charges. The Louisiana AAP was scheduled to reach the same level by July 1986. The two plants will then have to meet or exceed their two-shift rates for most of the following months through December 1987. Considering past delays in line charge production and one recent change to M59 production, we question whether this schedule will be met. Last year, the Army gave us a production schedule showing that live line charge production would begin in October 1985 at the Milan AAP and total 690 charges by the end of January 1986. However, only 17 live line charges have actually been produced at the Milan AAP through January 1986.

Likewise, the start of line charge production at the Louisiana AAP has fallen behind schedule. Last year, the Louisiana AAP was scheduled to begin M58A3 production in February 1986 and reach a 200-line charge two-shift rate by June 1986. The schedule had slipped 2 months to an April 1986 start and the first article test for the M58A3 was also scheduled for April 1986. Production schedules prepared in support of the fiscal year 1987 request have the Louisiana AAP scheduled to produce 200 M58A3 line charges per month by July 1986, just 3 months after its scheduled first article test. By comparison, the Milan AAP was able to produce only 17 M59 line charges in the 3 months after its first article test.

A recent problem with M59 production casts further doubt on whether stated production rates are attainable. M59 production at the Milan AAP was delayed by the need to develop a platform for workers to stand on

when loading line charges into containers, instead of standing in the container itself. Because of this change, production rates for the M59 at the Milan AAP are being halved, and Army officials informed us that completion of the fiscal year 1986 M59 program would slip 6 months into the fiscal year 1987 funded delivery period. Because the M59 and M58A3 share production facilities, this rescheduling will also delay M58A3 production.

We believe the Army's MICLIC program for fiscal year 1987 is not needed because of (1) the large prior year line charge programs that have yet to be produced and (2) the uncertainty whether multiple shift levels can be reached. Without a fiscal year 1987 program, quantities from fiscal year 1986 and prior programs can support both plants at above their one-shift capacity through the fiscal year 1987 funded delivery period. In addition, the Army's fiscal year 1987 MK22 rocket program should not be funded because the quantity requested will not be needed if the fiscal year 1987 MICLIC program is not funded.

Army representatives believe both ammunition plants can attain a production rate of 250 MICLICs per month; therefore, they propose only a $1.1 million reduction in the Army program. As discussed earlier, we believe that the multiple-shift operation is neither attainable nor desirable. The Army representatives said the 5-inch MK22 rocket motor program should be reduced by $4.2 million to properly align that program with the fiscal year 1987 MICLIC program. As noted before, however, the entire $13.3 million requested for rocket motors will not be needed if the MICLIC program is not funded.

Unresolved Component Problems

Our review indicated that the Army's request for two items with component problems can be reduced by $41 million if their production is held to a one-shift rate, as follows:

- $36.8 million for 25-mm. HEI-T cartridges and
- $4.2 million for red phosphorous smoke screening grenades.

The fiscal year 1987 programs would require accelerated production of the 25-mm. high explosive incendiary-tracer (HEI-T) cartridge and the red phosphorous smoke screening grenade, even though (1) fuze performance problems have constrained production of the 25-mm. cartridge, and (2) production of the grenade has been delayed because of a shortage of red phosphorous, a production facility fire, and grenade body production problems.

25-mm. HEI-T Cartridge

The Army requested $48.7 million for 2.8 million 25-mm. M792 cartridges. The M792 cartridge uses an M758 fuze. Because fuze performance problems are inhibiting production, we believe the program should be reduced by 2,125,000 cartridges for a total of $36.8 million.

Both producers of the M758 fuze have encountered problems with fuze performance. One producer, whose fuzes have yet to pass first article tests, discovered a fuze in an armed position on the production line. This potentially hazardous situation resulted in a production cutback and restrictions on all of the contractor's fiscal year 1984 program fuzes. Cartridges in the U.S. inventories that contain these fuzes are under suspension, and 337,000 additional fuzes are being held for X-ray inspection. This fuze producer also had problems with excessive dud rates and premature airbursts, and has not yet begun producing the fiscal year 1985 program. The second fuze producer was awarded the contract for the entire fiscal year 1986 fuze program, even though 286,000 of its fuzes were being withheld from production because of a quality deficiency report issued by one cartridge assembly plant. The report was issued because the assembly plant, which has not produced these cartridges for several months because of cartridge test failures, blames the failures on the fuzes. As of April 1986, the problem was unresolved.

Production facilities for the M792 cartridge are shared with the M793 TP-T cartridge at three commercial assembly plants. Completion of the full fiscal year 1987 request and the undelivered quantities as currently scheduled would require production above the cumulative one-shift rate for the three plants.

Considering the ongoing fuze performance problems, we believe M792 production should not be accelerated above a one-shift rate. Reducing the fiscal year program to a level that would sustain a one-shift production at all plants would allow more leeway to resolve fuze performance problems while still sustaining production.

As discussed on page 17, 860,000 M793 cartridges are unneeded because funding the full program quantity would result in excess inventory. Reducing the Army's M792 program by another 2,125,000 cartridges would allow all three cartridge assembly plants to operate at the one-shift rate through the end of the fiscal year 1987 funded delivery period and result in a budget reduction of $36.8 million.

Army representatives said the fuze problem may be resolved, but the program should be reduced by $24.5 million. They said the Office of the

Secretary of Defense (OSD) wants to buy out the inventory objective over a 3-year period rather than a 5-year period. The OSD budget analyst said significant savings could be achieved by buying out the inventory objective over 3 years. Given the fuze problems, we believe the program should be limited to the quantity necessary to support a one-shift operation. Compressing the program, if warranted, could take place in the fiscal years 1988 through 1990 programs.

Red Phosphorous Smoke Screening Grenade

Our review indicated that $4.2 million of the Army's $6.3 million request for 150,000 red phosphorous smoke screening grenades is unnecessary because a large production backlog makes it unlikely that the entire program can be completed within the funded delivery period.

Grenade production is behind schedule because of a shortage of red phosphorous, a production facility fire, and grenade body production problems. A total of 445,000 grenades are still undelivered from previously funded programs dating back to fiscal year 1982.

Meanwhile, the sole producer of the grenade body declared bankruptcy in January 1986. Although the Army has a new contractor for the grenade body, grenade production cannot begin until the new contractor produces parts that pass first article tests and are delivered to the Pine Bluff Arsenal, Arkansas, for assembly. According to Army schedules, grenade body deliveries were expected to begin in August 1986. Grenade production was scheduled to begin in September 1986 and reach the one-shift rate of 21,000 per month in February 1987. Although Army production schedules also showed that production was scheduled to increase to 35,000 grenades per month by September 1987 and continue at that rate through September 1988, officials at the Army's procurement activity said production of grenades at the Pine Bluff Arsenal would not exceed the one-shift rate of 21,000 grenades per month.

Because the Pine Bluff Arsenal has not produced this item before, prudence dictates limiting grenade production to the one-shift rate of 21,000 a month. Reducing the fiscal year 1987 request by 99,000 grenades would enable the arsenal to operate at the one-shift rate through the end of the fiscal year 1987 funded delivery period. This would reduce the Army's request by $4.2 million.

Premature Procurement

The Volcano system is being developed to deliver mines by helicopter or ground vehicles. This system consists essentially of the XM139 dispenser, the XM87 canister containing five antitank mines and one antipersonnel mine, and an XM88 practice canister for practice mines.

The Army requested $31.6 million for 16,000 Volcano mine canisters (XM87) and $1.9 million for 8,000 Volcano practice mine canisters (XM88).

We believe the fiscal year 1987 requests for the Volcano canisters are premature because of (1) deficiencies and problems identified during developmental and operational testing, (2) inconclusive operational testing results, (3) the absence of some needed Army testing, and (4) uncertainty about whether the XM88 practice mine canister will actually be used. In addition, deferring the funding could result in lower unit costs because an engineering and planning design change could reduce the canister's unit cost by 25 percent for the fiscal year 1988 program.

XM87 Mine Canister

The Volcano system did not meet reliability requirements during developmental testing because of failures relating to the canister and the mines. Further, the system did not meet reliability and maintainability requirements during operational testing. In addition, the operational test did not measure whether the canister could adequately and reliably dispense mines because the inert slugs used during the testing did not replicate mine distribution.

Testing the airworthiness of the helicopter-dispensed Volcano system is scheduled for completion in the second quarter of fiscal year 1987. Both the helicopter and ground vehicle dispensed Volcano systems are scheduled to be type classified as standard (i.e., approved for troop use) in the third quarter of fiscal year 1987. In addition, an Army official told us that a redesign of the XM87 mine canister could result in a 25-percent unit cost reduction in the projected fiscal year 1988 program.

XM88 Practice Mine Canister

The XM88 practice mine canister is for training and developing tactics for the Volcano system. Instead of live antitank and antipersonnel mines, the practice canister uses six dummy mines.

The XM88 practice mine canister was not available for Army developmental and operational tests. It is not scheduled for Army testing until

the second phase of developmental tests in September 1986 and operational tests in January 1987. The Volcano project manager said the user is now considering alternatives to the present training concept of using a practice canister.

The Volcano project manager said the dispensing capability of the Volcano system was measured only during developmental testing, not during operational testing. He agreed, however, that operational testing is needed to demonstrate the Volcano's effectiveness and reliability in a realistic operational environment. He also said the Volcano system's fielding date would slip one year if the fiscal year 1987 program is eliminated.

Army representatives said they have enough information to support type classification for limited production and the fiscal year 1987 program should be limited to a low-rate initial production quantity of 8,000 Volcano canisters. We believe that, given the uncertainties concerning the Volcano and the potential to reduce future costs, a fielding date slippage is justified and no funding for fiscal year 1987 should be provided.

Cartridge Does Not Meet Training Needs

The Army's $7.5 million request for 541,000 40-mm. M918 training cartridges should not be funded because the cartridge does not meet the Army's requirements. When the Army established its requirements for a 40-mm. training cartridge in February 1983, it wanted the projectile to produce sufficient noise and flash to be audible and visible at 1,500 meters in standard atmospheric conditions on level terrain and to cost less than the M430 high explosive cartridge.

Testing completed in October 1985 demonstrated that the M918 training cartridge provided satisfactory signature at 1,000 meters but not at 1,400 meters, the maximum range at which the M918 was tested. In December 1985, the Army's user agreed that a 1,000-meter range was essential while 1,200 meters was desirable to satisfy training requirements. Since the cartridge was not tested at 1,200 meters in October 1985, the Army conducted a limited observation exercise in February 1986 to assess the cartridge's sight and sound signature on impact at 1,200 meters. None of the 12 M918 training cartridges fired at 1,200 meters were audible to Army observers on impact and only 6 of the 12 met the sight signature requirement.

Army officials told us that the Army plans to improve the M918 cartridge to meet the sight and sound signature requirement at 1,200

meters. The improvements, which may require a redesign to increase the signature, will not be incorporated into the M918 training cartridge until the fiscal year 1988 program.

In addition to the range requirement, the Army wanted a training cartridge that would cost about half as much as the M430 HE cartridge. Recently, the Army decided that a 7 to 10 percent cost savings for the first year production was acceptable. However, our analysis of the Army's cost estimates showed that the M918 cartridge is projected to cost more than the M430 cartridge for fiscal years 1987 and 1988.

Army representatives said they were unsure whether the program should be reduced. We believe it should not be funded because the cartridge does not meet the Army's requirements.

Program Quantities Too Large

The Army and Marine Corps requested funds for improved 81-mm. high explosive mortar cartridges, as shown in table II.11. These cartridges are produced in the United Kingdom.

Table II.11: Army and Marine Corps FY 1987 Requests for 81-mm. HE Cartridges

Dollars in millions

	Army		Marine Corps	
Model	**Quantity**	**Costs**	**Quantity**	**Costs**
M821	404,000	$91.3	161,000	$33.4
M889	0	0	500,000	81.3
Total	**404,000**	**$91.3**	**661,000**	**$114.7**

The combined total request of 1,065,000 cartridges is much higher than the 255,000 cartridges provided in the fiscal year 1986 program and the 317,000 cartridges projected for the fiscal year 1988 program. The large fiscal year 1987 program will force the producer to operate on a two-shift basis and then scale back sharply to less than a one-shift basis for the fiscal year 1988 program. This may not be cost effective.

We believe it may be prudent for the services to stabilize production by limiting their requests to 660,000 cartridges (a one-shift production quantity). Army representatives agreed and said they are recommending that the fiscal year 1987 program be reduced by $61.1 million, or 270,000 cartridges. Such a reduction would lower the total Army and Marine Corps fiscal year 1987 program to 795,000 cartridges. An additional reduction of 135,000 cartridges to the Marine Corps program (see p. 57) would bring quantities to the level needed to support a one-shift

operation. Although Marine Corps representatives did not agree with the reduction, we believe the fiscal year 1987 requests for 81-mm. HE cartridges should be reduced by $61.1 million for the Army and $23.4 million for the Marine Corps to stabilize production and avoid the need to produce this new item at a greater than one-shift basis for the fiscal year 1987 program and then decreasing to less than a one-shift basis in subsequent years.

Army's Proposed Program Increases

Army representatives identified 26 items for which quantities could be increased to realign the program and/or to offset program reductions. Because the Army gave us the list after we had completed our field work, we did not review the justification for these items. Items the Army proposed for increases are shown in table II.12.

Table II.12: Army's Proposed Program Increases

Dollars in millions

Item	Quantity	Cost
Cartridges:		
5.56-mm. blank, M200	136,268,000	$12.5
7.62-mm. blank, M82	17,075,000	3.4
.22 cal. ball, long rifle	94,584,000	1.5
20-mm. TP-T, M220	2,648,000	8.5
20-mm. 4 TP/1 TP-1	733,000	2.0
40-mm. practice, M781	4,307,000	6.6
Projectiles:		
155-mm. smoke, M825	36,000	9.4
155-mm. ADAM, M731	9,000	33.9
155-mm. Copperhead, M712	3,500	125.5
8-inch ICM, M509	90,000	86.7
Fuzes:		
M739 point detonating	480,000	9.7
M577 mechanical time and superquick	60,000	3.4
Primer, percussion M82	674,000	1.2
Lightweight Multipurpose Weapon System AT-4, trainer	2,400	4.8[a]
Rockets:		
Hydra 70 HE/RS	15,000	7.7
Hydra 70 smoke	28,000	13.7
Hydra 70 illuminating	27,000	19.6
Hydra 70 MPSM practice	42,000	18.9
Signals:		
Kit, personal, foliage penetrating, red	1,000	0.1
Illuminating, red star	31,000	0.8
Illumimating, red star, parachute	80,000	2.0
Simulators:		
Projectile ground burst	276,000	2.4
Booby trap, flash	146,000	0.3
Booby trap, illuminating	90,000	0.3
Hand grenade, M116	117,000	0.9
Flash, artillery, M21	769,000	4.4
Total amount		**$380.2**

[a]Cost includes 447,000 9-mm. tracer cartridges for use in the AT-4 trainer.

Conclusion

We believe the Army's request is overstated by $624.7 million for (1) five items because inventories will exceed objectives, (2) three items because program quantities would exceed those stipulated in Army

guidance, (3) 11 items because total program quantities will not be delivered within the funded delivery period, (4) two items because component problems remain unresolved, (5) two items because programmed procurements are premature, (6) one item because it does not meet training needs, and (7) one item because the large quantity would require an unnecessarily large production increase.

Recommendation

We recommend the House and Senate Committees on Appropriations reduce the Army's ammunition appropriation request by $624.7 million for the 25 items shown in appendix VII.

Navy Ammunition Program

The Navy's fiscal year 1987 request consists of $905 million for 30 ammunition budget lines. We examined the Navy's justification for items in 14 of these budget lines representing $538.9 million, or 60 percent of the funds requested. Appendix VIII shows the budget lines reviewed and our recommended adjustments to the request.

We believe the request should be reduced by $248.3 million for the following reasons:

- $107.5 million for seven items because the programmed procurements are premature.
- $54.7 million for one item because the unit cost estimate is overstated.
- $33.1 million for three items because inventory would exceed requirements.
- $18 million for two items because production problems have delayed deliveries.
- $18 million for one item because total program quantities cannot be delivered until after the fiscal year 1987 funded delivery period ends.
- $17 million for one item because the initial procurement quantity is excessive.

Navy representatives proposed that any reductions be offset by increases in funding for other items which are listed in table III.5. We did not evaluate these items because the list was provided after our field work was completed.

Premature Procurements

A total of $107.5 million of the request is, in our opinion, premature because of program delays and, in one case, would result in procuring ineffective ammunition. The items and amounts are

- $42.6 million for Gator weapons,
- $7.6 million for FMU-140/B fuzes,
- $0.5 million for 25-mm. machine gun ammunition,
- $0.6 million for MK117 rocket motors,
- $9.6 million for Airboc chaff,
- $18.1 million for BSU-85/B bomb fins, and
- $28.5 million for Bigeye bombs.

Gator Weapon

The $42.6 million requested for 912 Gator weapons is premature because the date of approval for full production is uncertain. Production

approval depends, in part, on testing the weapon system with a fuze that is still under development.

Last year we reported that the planned Gator procurement for fiscal year 1986 was premature. At that time, production approval had been delayed and further delays were likely because the Gator still had to be tested with a new proximity fuze—the FMU-140/B. This new fuze is needed because the Gator requires a level, loft, and dive delivery capability from aircraft, while existing MK339 fuzes are suitable only for level delivery.

In considering the 1986 Department of Defense Appropriation Bill, the Senate Committee on Appropriations (Senate report No. 99-176, at p. 179) directed that fiscal year 1986 funds not be used to procure Gator weapons until the Navy had demonstrated that an acceptable fuze was ready for production. The Navy still has not done so. The FMU-140/B fuze is still being developed and has experienced program delays, which are discussed separately (see p. 41).

The Navy plans to test the FMU-140/B during Gator follow-on test and evaluation (FOT&E), which has been delayed because of a malfunction problem discovered by Air Force tests in October 1985. With the Navy's assistance, the Air Force identified the kit modification unit (KMU) as the probable problem. The KMU, designed by the Navy, provides the electrical circuitry that sets the self-destruct time and arms the mines after they are dropped from aircraft but before the dispenser opens. During the test, the KMU armed only 12 percent of the mines.

In February 1986, a Navy official told us the KMU problem had not been discovered before the Air Force tests because KMUs used during earlier developmental testing operated differently. The Navy does not plan to redesign the KMU, but will screen all production KMUs and use those that operate similarly to those used during developmental testing.

Because of the KMU problem, the starting date for the Gator FOT&E is uncertain, but a Navy official said the Navy would like to start the tests by May 1986. The tests are projected to take about 6 months to complete.

Navy representatives said that use of the Gator weapon does not depend on the development of the FMU-140/B fuze because the MK339 fuze is acceptable. They agreed, however, that the Gator loses operational capability when using the MK339 fuze. Limited production approval

was granted until Gator FOT&E is successfully completed. The FOT&E, which will use production representative FMU-140/B fuzes, will evaluate mine dispersion in dive and loft deliveries as well as level deliveries.

We believe the Gator program is premature and should not be funded because the approval date for full production is uncertain and the Gator has not been tested with a fuze that will allow full operational use. If the fiscal year 1987 Gator program is funded, the request should be reduced by $4.3 million to reflect the use of the lower cost MK339 fuze in lieu of the FMU-140/B fuze.

FMU-140/B Fuze

The Navy's request for Rockeye bombs includes $7.6 million for FMU-140/B fuzes, which we believe is premature because of delayed production approval for the fiscal year 1986 program.

In fiscal year 1986, the Navy requested $8.3 million to procure FMU-140/B fuzes. At that time, the Navy indicated operational test and evaluation (OT&E) and full production approval would be completed in March 1985. However, the fiscal year 1987 request indicates that testing and production approval dates have slipped to February 1986 and May 1986, respectively and that the operational testing of the FMU-140/B fuze depends on the results of the Gator FOT&E. At the time of our review, the Gator FOT&E had not yet started and was projected to take about 6 months to complete. Therefore, the FMU-140/B production approval date of May 1986 could slip further—possibly to November 1986.

In view of the testing and production approval delays, we believe fiscal year 1987 funding for the FMU-140/B fuze is unnecessary. In effect, fiscal year 1986 funding can be used to offset the fiscal year 1987 request. Navy representatives agreed with our position.

25-mm. Machine Gun Ammunition

The $0.5 million request for 25-mm. high explosive incendiary (HEI) ammunition is premature because this item is being improved. The product improved version will not be available in time to use the requested fiscal year 1987 funds. In prior years, the Navy procured 138,000 25-mm. HEI cartridges for $3.7 million, for which deliveries will continue through May 1988. Navy officials said these cartridges were not effective enough against air-to-surface and air-to-air targets because of lack of penetration and poor graze capability. They also have a high

cost. Therefore, in fiscal year 1986, the Navy began a program to correct these problems. This program is scheduled to be completed in September 1988.

In view of the problems with the 25-mm. cartridges, we believe funding for additional 25-mm. HEI ammunition is unnecessary until the product improvement program is satisfactorily completed.

Navy representatives agreed procurement of the 25-mm. HEI cartridge should be deferred until the product improvement program is completed.

MK117 Rocket Motor

The Navy's $2.6 million request for jet-assisted takeoff rocket motors includes about $0.6 million to purchase 376 MK117 rocket motors. Because of a delay in receiving production approval, the fiscal year 1986 program has been delayed by a year, thus precluding the need for a fiscal year 1987 program.

Since fiscal year 1984, the Navy has received about $4.5 million to purchase about 3,000 MK117 rocket motors. The specific quantities and amounts by fiscal year are shown in table III.1.

Table III.1: MK117 Rocket Motor Procurement History

Fiscal year	Quantity	Amount
1984	500	$774,000
1985	1,050	1,580,000
1986	1,436	2,144,000
Total	**2,986**	**$4,498,000**

The Navy requested fiscal year 1986 funding for the MK117 rocket motor program because it expected to approve full production in May 1985. However, this approval date has slipped about one year. The delay resulted from the need to perform qualification testing of a design change in the rocket motor case which was made to correct a problem discovered during a drop test.

Navy representatives agreed that fiscal year 1986 funds should be used to offset the fiscal year 1987 request.

Airboc Chaff

The Navy's fiscal year 1987 budget request of $40.9 million for airborne expendable countermeasures includes $9.6 million for Airboc chaff, which is unnecessary because of delayed production approval.

The Navy requested $26.5 million in fiscal year 1986 for the Airboc chaff program. At the time of the request, the Navy had scheduled Airboc OT&E for March 1985 and production approval for April 1985. The fiscal year 1987 budget request shows that Airboc failed the OT&E and that further OT&E was scheduled for April 1986. The Navy expected that production would be approved in June 1986—a delay of 14 months.

The production approval delay precludes the need for funding in fiscal year 1987. Navy representatives said fiscal year 1986 funds should be used to offset the fiscal year 1987 request.

BSU-85/B Bomb Fin

The $18.7 million requested in the fiscal year 1987 budget for BSU-85/B bomb fins should be reduced by $18.1 million because of delays in the fiscal year 1986 program.

The approved fiscal year 1986 request included $18.1 million for initial fin procurement with approval for limited production in September 1985. The fiscal year 1987 request shows that the scheduled approval for limited production had slipped to February 1986. However, in March 1986 a Navy official told us that the fin still had not been approved for limited production.

Navy data supporting the fiscal year 1987 request also show that OT&E was scheduled from February to August 1986 and approval for full production was scheduled for September 1986. However, according to a Navy official, in March 1986, the fin still needed certification for OT&E. He believed that testing would begin in about May 1986. If the test period is 6 months, as indicated by the fiscal year 1987 budget backup data, then tests would be completed in November 1986 and full production would be approved after completion of OT&E.

Because production approval for the BSU-85/B fin has slipped, the fiscal year 1986 program will extend into the fiscal year 1987 program period. The fiscal year 1987 request should, therefore, be reduced by $18.1 million.

Navy representatives agreed that fiscal year 1986 funds for the BSU-85/B fin should be used to offset the fiscal year 1987 request.

Bigeye Chemical Weapon Program

The Navy requested fiscal year 1987 funding of about $28.5 million for Bigeye bombs. Bigeye is an air-delivered binary chemical weapon designed to generate a persistent nerve agent from two nonlethal chemicals. The basic components of the Bigeye bomb include the FMU-140/B proximity fuze; the reactor assembly, including the chemical QL; the ballonet assembly, including the chemical sulfur; and the tail fin assembly. The weapon is shipped and stored as a complete round except for the ballonet, which is shipped and stored separately.

In last year's report, DOD's Fiscal Year 1986 Ammunition Procurement and Production Base Programs (GAO/NSIAD-85-141, Sept. 16, 1985), we identified numerous problems with the Bigeye that we believed should be corrected before the Congress provided funding to buy Bigeye components. These problems included (1) the Bigeye's inability to produce the required minimum purity/biotoxicity of the nerve agent VX at the required temperature range of minus 40 degrees Fahrenheit to 140 degrees Fahrenheit, and (2) other critical issues that could prevent the Bigeye from achieving the required reliability goal.

Also, last year's congressional conference committee report agreement (House report No. 99-450, page 178) directed that the Secretary of Defense submit a report describing the operational requirements for the Bigeye, actual performance of the Bigeye during operational testing, and any acceptable exceptions before funds for the Bigeye components could be obligated.

The Navy conducted its first phase of Bigeye operational testing from May 1985 to September 1985. On January 17, 1986, the Commander, Operational Test and Evaluation Force (the testing agency), issued the initial Bigeye operational evaluation report. Although this report stated that the test was limited because no lethal agent had been produced during the test, it disclosed that the Bigeye did not meet the required 90-percent reliability. Bigeye reliability, it stated, was only 73 percent. Further, the report recommended that

- prior to further operational evaluation, the Navy (1) ensure that the Bigeye can generate the required minimum purity of the chemical nerve agent and (2) improve weapon reliability to meet the 90-percent reliability requirement, and
- the Bigeye be approved for limited fleet introduction only after a proximity fuze (i.e., the FMU-140/B) has been approved for production.

In addition, an issue which casts further doubt on Bigeye's reliability was surfaced in 1985 during the rough-handling portion of the environmental test conducted at Aberdeen Proving Ground. This rough-handling test disclosed that the sulfur-filled ballonets, in the present container support system, could not withstand the stresses induced by transportation shocks. Nine of 10 test items showed damage to the vapor barrier bag even with careful handling during the environmental extreme tests. Further, 9 out of 10 ballonets suffered bag damage and sulfur loss during transportation-vibration tests.

The environmental test report recommended that (1) the supports in the ballonet containers be replaced with a more resilient material to eliminate the problem and (2) the ballonet and container be certified by an independent transportation test to determine if the problem was resolved.

The January 1986 Bigeye initial operational report states that (1) the FMU-140/B dispenser proximity fuze is a basic component of the bomb and (2) the bomb should not be approved for limited fleet introduction until a proximity fuze is approved for production. Navy representatives said the Bigeye needs the FMU-140/B fuze for only dive and loft deliveries. Since the Bigeye can use the MK339 fuze for level delivery, the Navy will procure the Bigeye with this fuze if the FMU-140/B fuze does not receive timely limited production approval. However, as discussed on page 41, the FMU-140/B fuze is still being developed and has not been approved for production. In addition, the Bigeye has encountered operational reliability and environmental problems during testing. Therefore, we believe funding should not be provided for the Bigeye in fiscal year 1987.

Overstated Unit Cost Estimate

The $54.7 million requested for 79,814 FMU-139/B fuzes is not needed because the unit cost estimates were overstated in fiscal years 1985 and 1986. Thus, excess funds available from these two program years are sufficient to satisfy the fiscal year 1987 procurement requirements.

Navy funding for the fiscal years 1985 and 1986 programs were based on unit prices of $841 and $764.23, respectively. The Navy based its fiscal year 1987 budget request on a unit cost estimate of $684.94. However, a $300 unit price was established in a contract awarded on December 10, 1985, for 25,000 fuzes in the fiscal year 1985 program. Subsequently, the Navy exercised an option to this contract to procure an additional 50,000 fuzes at the same unit price for the fiscal year 1986

program. Because of the differences in the budgeted and actual unit costs, the Navy will have an unused balance of $13.5 million from the fiscal year 1985 program and $23.2 million from the fiscal year 1986 program—a total of $36.7 million.

We estimate that the fiscal year 1987 unit price should be about $315 on the basis of a 5-percent markup for inflation. Using this unit price and the quantity in the fiscal year 1987 request, the Navy would need only $25.1 million, or $29.5 million less than the requested amount. If the funds remaining from the fiscal years 1985 and 1986 programs were also applied against the fiscal year 1987 program, no funding would be needed for the FMU-139/B fuze.

Navy representatives agreed the request for the FMU-139/B fuze should be based on the $300 unit price. However, they said this unit price should be applied to only 70 percent of the required fuzes because Navy planning requires a second source that would produce 30 percent of the fuzes.

Based on the Navy's comments, we determined that the Navy needs only $34 million for the fiscal year 1987 FMU-139/B fuze program. This amount could be satisfied from the $36.7 million remaining from prior year funds, eliminating the need for additional funding in fiscal year 1987.

Inventory Will Exceed Requirements

A total of $33.1 million of the Navy's request should not be funded because usage is overstated and additional procurement would cause inventories to exceed requirements. The amounts and items are

- $19.7 million for three types of 5-inch 54-caliber gun ammunition projectiles,
- $6.5 million for the close-in weapon system (CIWS) 20-mm. dummy round, and
- $6.9 million for the other ship gun ammunition 25-mm. TP-T cartridge.

5-Inch 54-Caliber Gun Ammunition

The $75.8 million requested for 5-inch 54-caliber gun ammunition should be reduced by $19.7 million for the following items.

- $14.5 million requested for 5-inch 54-caliber puff projectiles (item D291) and $1.3 million of the $3.6 million requested for 5-inch 54-caliber puff

projectiles (item D290) should not be funded. Based on the Navy's noncombat expenditure allocations as of October 1985, the Navy has overstated their usage by 29,060 for item D291 and by 7,533 for item D290 through the fiscal year 1987 funded delivery period. Therefore, excess inventories equal to the overstatements would result unless the reductions are made.

- $3.9 million of $6.9 million requested for 56,800 5-inch 54-caliber blind, load, and plug projectiles should not be funded because, based on authorized expenditure allocations as of October 1985, the Navy has overstated its usage by 32,525 projectiles through the fiscal year 1987 funded delivery period. Therefore, an excess inventory would result if the total requested quantity were to be procured. A reduction of $3.9 million for 32,525 projectiles is therefore appropriate.

20-mm. Dummy Round

The $41.8 million requested for CIWS ammunition should be reduced by $6.5 million because the Navy has overstated usage estimates by about 3.4 million rounds. We compared projected usage from October 1, 1985, through the fiscal year 1987 funded delivery period (as shown in the Navy's budget data), with noncombat expenditure allocations as of October 1985. We found that projected usage shown in the budget data was overstated by 3,438,800 rounds costing $6.5 million. Therefore, we believe a program reduction of $6.5 million is warranted.

25-mm. TP-T Cartridge

The $26 million requested for other ship gun ammunition should be reduced by $6.9 million because the Navy has overstated usage estimates by 1,430,000 cartridges. We compared projected usage from October 1, 1985, through the fiscal year 1987 funded delivery period (as shown in the Navy's budget data), to noncombat expenditure allocations as of October 1985. We found projected usage shown in the budget data was overstated by 1,430,000 cartridges costing $6.9 million and, therefore, procurement of the total requested quantity would result in excess inventory.

Navy representatives gave us revisions to the October 1985 noncombat expenditure allocations that they said would support the Navy consumption figures used to prepare the Navy's request for ammunition items discussed in this section. Our review of these revisions disclosed that the consumption allocations were revised for four of the five items we identified as overstated. However, the Navy's revised consumption

allocations only materially affected one item—the authorized consumption for the 5-inch 54-caliber puff round (item D290) increased by 1,230 rounds at $166.22 each, or about $200,000. We amended our position accordingly.

Production Problems

A total of $18 million of the Navy's request for two items is not needed for the following reasons:

- $3.6 million of the $5.2 million requested for Rockeye practice bombs is not needed because bombs cannot be produced until an engineering change proposal (ECP) is included in the technical data package (TDP). Also, the unit price is overstated.
- $14.4 million for the 5-inch 54-caliber projectile is not needed because a required component has not been produced satisfactorily.

Practice Rockeye

A total of $3.6 million of the $5.2 million request for 628 practice Rockeye bombs is not needed because of delays in approval of an engineering change and an overstated unit price. Prior procurement programs for the practice Rockeye are shown in table III.2.

Table III.2: Practice Rockeye Procurement History

Fiscal year	Quantity	Amount
1982	400	$1,406,232
1983	888	3,229,354
1984	1,598	6,020,816
1985	1,120	4,130,560
1986	1,555	8,355,015
Total	**5,561**	**$23,141,977**

None of the bombs in the above programs had been delivered as of February 1986. The Army Single Manager for Conventional Ammunition (SMCA) advised the Navy in September 1985 that practice Rockeye bombs could not be produced until an ECP was incorporated into the TDP and conical washers were provided. The ECP's purpose is to reduce the probability of foreign object damage to the aircraft—a problem uncovered during testing. Conical washers are needed to improve the ECP's reliability.

Navy representatives said the ECP is needed only for bombs used with the F/A-18A and AV-8B aircraft, which constitutes about 30 percent of

the bomb program. Therefore, they said that the remaining quantities could be produced even if the ECP is not available in time for the fiscal year 1987 buy. Also, they stated that the fiscal year 1987 program calls for 75 percent of the bombs to use a MK339 fuze and 25 percent to use a FMU-140/B fuze; if the FMU-140/B fuze is not available, the entire buy will be with the MK339 fuze. Further, they did not object to a reduction in the request to compensate for using the lower-cost MK339 fuze.

We believe if 30 percent of the bombs require the ECP, then the fiscal year 1987 request should be reduced by 30 percent or 188 bombs valued at about $1.5 million. An additional reduction of $2.1 million is also warranted because the Navy priced the entire fiscal year 1987 program based on a bomb unit price with the FMU-140/B fuze, which has a much higher unit price than the MK339 fuze. The difference in unit price between the two fuzes is $4,717.72. Since the FMU-140/B fuze has not been approved for production, the Navy must use the MK339 fuze for the remaining 440 bombs in the fiscal year 1987 program. Therefore, we believe the request should be reduced by a total of $3.6 million.

5-Inch 54-Caliber Gun Ammunition

The request of $14.4 million for 5-inch 54-caliber high fragmentation (HI FRAG) projectiles ($10.6 million) and propelling charges ($3.8 million) should not be funded because of problems in producing a component necessary for a complete round.

Last year, we reported that the 5-inch 54-caliber HI FRAG fiscal year 1986 budget request warranted close monitoring for several reasons. One reason was that the Navy had not completed the HI FRAG low-rate initial production buy originally funded in fiscal year 1981. The current situation is virtually unchanged from last year. As of January 1986, the Navy had received 1,065 rounds of the 10,000-unit low-rate buy; the quantity received is identical to that delivered as of February 1985.

This delay results primarily from the unavailability of a component—a retaining ring—necessary for a complete round. Several attempts to produce the retaining ring have been unsuccessful. The Navy is considering several alternative courses of action, but the problem remains unsolved. All other components for the initial production buy have already been produced and are on hand.

The Navy has awarded a contract for producing these rings for the fiscal year 1984 quantity. The Navy had planned to add the quantities required for the fiscal years 1981 and 1985 programs to the fiscal year

1984 contract after successful completion of first article testing. However, as of March 1986, none of the retaining rings could pass all phases of the first article testing.

Anticipating that the current contractor may not be able to produce acceptable rings, the Navy is exploring at least two alternatives. One alternative involves having the Naval Surface Weapons Center-White Oak, Maryland, prepare to mold rings and serve as a backup source of production. The Navy expected to determine the center's ability to produce retaining rings by May 1986. The second alternative involves changing the design to eliminate the need for the retaining rings. This effort is being done by the Naval Surface Weapons Center, but results are not expected until about October 1986.

As shown in table III.3, the Navy has already received substantial funding to procure HI FRAG projectiles beginning with the fiscal year 1981 initial production procurement.

Table III.3: HI FRAG Projectile Program

Fiscal year	Quantity	Amount
1981	10,000	$9,057,000
1984	18,764	20,156,000
1985	22,606	17,862,000
1986	9,763	8,674,000
Total	**61,133**	**$55,749,000**

In view of this prior funding, the need for fiscal year 1987 projectile funding is questionable until the Navy satisfactorily resolves the retaining ring problem.

The Navy's fiscal year 1987 request also includes $3.8 million for two types of HI FRAG propelling charges used exclusively with HI FRAG projectiles. Because the HI FRAG projectile request is premature, the $3.8 million to procure the propelling charges is unnecessary.

Navy representatives agreed additional funding for HI FRAG projectiles and propelling charges is not needed.

Deliveries Not Within Funded Delivery Period

The Navy's $26.3 million request for Zuni rockets includes $18 million for 18,872 MK71 motors. This amount is not needed because, in our opinion, none of the motors can be delivered within the funded delivery period.

Prior program quantities for the MK71 motors are shown in table III.4. An additional 3,650 MK71 motors are required for foreign military sales in fiscal year 1985 and prior years.

Table III.4: Zuni Rocket Motor Program

Fiscal year	Quantity	Amount
1982	10,482	$6,868,016
1983	4,733	3,962,230
1984	7,500	7,002,000
1985	20,719	20,820,937
1986	46,681	44,761,010
Total	**90,115**	**$83,414,193**

According to Navy officials, 19,877 MK282 igniters, a component of the MK71 motor, were delivered as of February 28, 1986. Of these, 11,404 were delivered between November 1, 1985, and February 28, 1986. A Naval Ordnance Station (NOS) official said the 11,404 igniters were produced from October 1985 through February 1986, or the equivalent of 2,281 igniters per month. However, NOS officials said only 2,500 igniters were being produced every other month as of March 1986 because of personnel limitations.

A production problem with the igniter, now apparently resolved, has caused a backlog of MK71 motor production. This backlog plus the current average monthly production rate of 1,250 MK282 igniters at the Naval Ordnance Station, Indian Head, Maryland, will cause the entire fiscal year 1987 and a large portion of the fiscal year 1986 program deliveries of the igniters and consequently MK71 motors to fall outside the funded delivery period. We estimated that the Navy would have to produce an average of 1,718 igniters monthly to produce the undelivered prior year programs by the end of the fiscal year 1987 funded delivery period. Considering that 19,877 igniters had been shipped as of February 28, 1986, and using the current average monthly production rate of 1,250 igniters, a total of 73,627 igniters would be produced through the fiscal year 1987 funded delivery period, ending in September 1989. Therefore, since igniters will not be available for 39,010 MK71 motors, none of the fiscal year 1987 quantity costing $18 million,

and 20,138 of the fiscal year 1986 program costing $19.3 million, can be delivered within the fiscal year 1987 funded delivery period. A fiscal year 1987 program is, therefore, unnecessary.

Navy representatives said NOS's stated production capacity of 3,000 igniters per month is sufficient to provide all needed MK282 igniters. We believe the NOS would need additional time and resources to increase monthly production to 3,000 monthly. An NOS official told us the station was producing a monthly average of only 1,250 igniters because of personnel limitations. Therefore, since prior MK71 motor programs require average monthly production of 1,718 igniters, we believe prudence dictates not providing additional funding for MK71 motors in fiscal year 1987.

Initial Procurement Quantity Larger Than Needed

The Navy's fiscal year 1987 request of $27.1 million for 8,000 MK83 general-purpose bombs should be reduced by $17 million. Production of 3,000 bombs funded in the fiscal year 1986 program was delayed because a facility to load the bombs was not available and the program was subsequently canceled. As a result, the fiscal year 1987 program becomes the initial buy of MK83 bombs with a new explosive and is larger than needed to test the ammunition production line.

MK83 bombs procured through fiscal year 1985 were loaded with an explosive called H-6. All MK83s procured subsequently will contain an explosive called PBX.

The Navy's fiscal year 1986 budget included about $11.4 million for 3,000 bombs with PBX. The contract for these bombs was scheduled for award in December 1986, with deliveries between April 1988 and March 1989. However, the Navy has since canceled the fiscal year 1986 program. Navy officials initially told us that a facility to load general-purpose bombs with PBX was being developed at the McAlester AAP, Oklahoma, but would not be available in time for the fiscal year 1986 program. Meanwhile, Navy officials said they planned to load the bombs at an interim facility—the Longhorn AAP.

In its report on the fiscal year 1986 Defense Appropriation Bill, (House report No. 99-332, at p. 223), the House Committee on Appropriations expressed concern over using an interim facility. The committee directed the bomb-loading capability to be established at the McAlester AAP as soon as possible. Further, the committee directed that if insensitive

munitions were proposed to be loaded in any facility other than at McAlester, a thorough justification should be submitted to the committee prior to implementation. According to Navy officials, the justification was not submitted and plans for an interim facility at the Longhorn AAP were canceled. They also said the fiscal year 1986 program for the MK83 bomb was canceled after the fiscal year 1987 budget request was submitted, making the fiscal year 1987 program the initial procurement of MK83 bombs with PBX.

Navy representatives said the loading line is being readied at the McAlester AAP for the fiscal year 1987 program and bomb bodies will be needed to test the line. Therefore, they agreed that since the fiscal year 1987 buy will be the initial procurement of bombs with PBX explosive fill, 3,000 to 5,000 bombs would be sufficient. Since the fiscal year 1987 program is the initial procurement, the program quantity should be limited to the minimum quantity of 3,000 bombs as was the Navy's plan in the fiscal year 1986 program. This will result in a $17 million reduction to the program.

Navy's Proposed Program Increases

Navy representatives identified numerous items for which program quantities could be increased. Because the Navy gave us a list of the items after we had completed our review, we were unable to review the justification for the items. However, the list includes three items—the practice Rockeye (see p. 48), MK71 motor (see p. 51), and FMU-139/B fuze (see p. 45)—for which we have recommended reductions in the fiscal year 1987 budget request. The reasons for the recommended reductions are discussed in detail in the body of our report. The items the Navy has proposed for increases are shown in table III.5.

Table III.5: Navy's Proposed Program Increases

Item	Quantity	Cost
AT4 rocket	74,000	$52,930,000
Mortar cartridges:		
60-mm. high explosive	537,000	25,562,000
81-mm. high explosive	175,600	24,584,000
81-mm. white phosphorous	93,000	18,047,000
2.75-Inch rocket:		
LAU-68 launcher	10,944	22,448,000
LAU-61 launcher	1,626	497,000
MK66 motor	20,900	6,894,000
Zuni 5-Inch rocket:		
MK71 motor	20,000	19,054,000
MK34 smoke	13,200	4,163,000
MK33 illuminating	176	129,000
.50-Caliber cartridges	18,921,800	21,949,000
Paveway II	1,364	13,545,000
Practice bombs:		
Rockeye	752	6,235,000
MK76	90,000	1,625,000
MK83 NTP	2,000	1,508,000
BDU-45 NTP	2,100	671,000
CXU-3 signal	72,000	243,000
BDU-48B	7,000	117,000
CXU-4 signal	14,100	44,000
MK-4 signal	7,800	8,000
FMU-139 fuzes	6,100	4,178,000
Close-in Weapon Support	23,800	297,000
25-mm. API cartridges	8,000	191,000
Total		**$224,919,000**

Conclusion

We believe the Navy's request is overstated by $248.3 million for (1) seven items because the programmed procurements are premature, (2) one item because the unit cost estimate is overstated, (3) three items because inventory would exceed requirements, (4) two items because of production problems, (5) one item because the program quantity likely cannot be delivered on schedule, and (6) one item because the initial procurement quantity is larger than needed.

Recommendation

We recommend the House and Senate Committees on Appropriations reduce the Navy's ammunition appropriation request by $248.3 million for 15 budget line items, as shown in appendix VIII.

Marine Corps Ammunition Program

The Marine Corps requested $608.3 million in fiscal year 1987 for ammunition. We reviewed the justification for 25 items representing $497.6 million, or 82 percent of the total request. We believe the request should be reduced by $151.1 million for the following reasons:

- $127.7 million for three items because the total program quantities cannot be delivered on schedule.
- $23.4 million for one item because program quantities are excessive.

Deliveries Not Within Funded Delivery Period

Our review disclosed that $127.7 million of the Marine Corps' request for three items is not needed because the total quantities requested will not be delivered within the fiscal year 1987 funded delivery period. The items and amounts are

- $23.8 million for 61,000 155-mm. M483A1, HE ICM projectiles;
- $64.9 million for 17,358 155-mm. M731 and M692 ADAM projectiles; and
- $39 million for 30,365 155-mm. M741 and M718 RAAMS projectiles.

The recommended reduction of $23.8 million for 61,000 M483A1 ICM projectiles stems from a combined reduction of 278,000 from the Army and Marine Corps programs. This reduction reflects the Marine Corps' proportionate share of the total program request that cannot be delivered within the fiscal year 1987 funded delivery period.

Also, only 4,000 of the 21,358 ADAM projectiles requested by the Marine Corps can be delivered within the fiscal year 1987 funded delivery period. Therefore, $64.9 million is not necessary for 17,358 projectiles.

Moreover, none of the Marine Corps' $39 million request for the 155-mm. M741 and M718 RAAMS projectiles is needed since none of the program quantity is scheduled to be delivered within the fiscal year 1987 funded delivery period.

Additional details supporting our positions on these items are discussed in appendix II, pages 21 through 26.

Marine Corps representatives said that these large quantities were scheduled outside the funded delivery period because they used an excessive procurement lead time. They agreed that the programs should be reduced for quantities that will not be delivered within the fiscal year 1987 funded delivery period. In fact, they calculated reductions of $29.3 million for M483A1 projectiles, $62.9 million for ADAM projectiles,

and $26.6 million for RAAMS projectiles—for a total of $118.8 million. They proposed that these reductions be used to increase funding for the four items listed at the end of this appendix. In addition, the Marine Corps wants to keep $2 million in the M731 ADAM program and $2 million in the M718 RAAMS program so that funding can be added for these items if circumstances change.

We believe the Marine Corps' program should be reduced by $127.7 million for the quantities scheduled for delivery after the fiscal year 1987 funded delivery period ends.

Program Quantities Too Large

The Marine Corps requested $114.7 million for 661,000 81-mm. improved HE cartridges. This is the Marine Corps' first request for such cartridges.

As discussed in appendix II, the combined Army and Marine Corps program of 1,065,000 81-mm. HE cartridges will require production on a multishift basis. It may not be cost effective when follow-on requirements are considered (the fiscal year 1988 program is projected at 317,000 cartridges). Army representatives agreed the fiscal year 1987 program is too large and are proposing a 270,000 cartridge reduction to the Army's program. Eliminating 135,000 cartridges from the Marine Corps program, estimated to cost $23.4 million, would lower the combined Army and Marine Corps program to 660,000 cartridges— the level needed to support a one-shift operation. This would stabilize production and avoid the need to produce this new item on a greater than one-shift basis and then decreasing to less than one-shift basis in subsequent years.

Marine Corps representatives said that the fiscal year 1987 program departs from normal programs because it calls for buying such a large quantity early in the program, rather than spreading the procurements over several years. Based on available production capacity and resources, and the scheduled fielding of the mortar system in fiscal year 1989, they said that the fiscal year 1987 program is appropriate because it assures that cartridges will be available when the mortar system is in place.

While these arguments have merit, we believe a 135,000 cartridge reduction to the program will not adversely affect fielding of the mortar system. In fact, the Marine Corps initially requested only $39.9 million for 253,000 cartridges in fiscal year 1987, but increased the final budget

request to $114.7 million for 661,000 cartridges when additional funds became available.

Marine Corps' Proposed Program Increases

Marine Corps representatives identified four items for which quantities could be increased to realign the program and/or offset our recommended reductions. Because we received the list after we had completed our review, we did not review the justification for these items. The items proposed for increases are shown in table IV.1.

Table IV.1: Marine Corps' Proposed Program Increases

Dollars in millions

Item	Quantity	Cost
155-mm. HE projectile	528,000	$81.9
155-mm. illuminating projectile	46,204	19.3
8-inch HE projectile	43,519	14.7
Lightweight multipurpose weapon system, AT-4	4,000	2.9
Total		**$118.8**

Conclusion

We believe the Marine Corps' request is overstated by $151.1 million because total program quantities for three items will not be delivered within the funded delivery period and because program quantities for one item are too large.

Recommendation

We recommend the House and Senate Committees on Appropriations reduce the Marine Corps' ammunition appropriation request by $151.1 million for four items, as shown in appendix IX.

Air Force Ammunition Program

The Air Force requested $1.5 billion for ammunition in its fiscal year 1987 program. We reviewed the justification for 19 budget line items representing $1.3 billion, or about 87 percent of the funds requested. Appendix X shows the items we reviewed and our recommended adjustments to the request. We believe the requests for nine budget line items could be reduced by a total of $621.6 million for the following reasons:

- $98.2 million of the $253.3 million requested for 30-mm. training cartridges and the CBU-89/B TMD/Gator is not needed because deliveries cannot be made during the fiscal year 1987 funded delivery period and new containers are not needed for the 30-mm. cartridges.
- $8.1 million, the total amount requested for the BDU-50 500-pound inert practice bomb, is not needed because the Air Force has enough MK-82 500-pound inert practice bombs to satisfy the fiscal year 1987 program requirements.
- $19 million of the $20 million requested for 81-mm. mortar cartridges is not needed because (1) most of the cartridges requested can be obtained from the Army and (2) the Air Force did not consider about 11,000 inert cartridges due in from the fiscal year 1986 program when developing the fiscal year 1987 request.
- $7.7 million, the total amount requested for BDU-48 practice bombs, is premature because the Air Force has not developed the technical data package required to produce the practice bomb.
- $233.2 million of the $566.7 million requested for the combined effects munition (CEM) is not needed because dual production sources are unnecessary. In addition, this reduction would eliminate the need for at least $20.8 million in prior year funding for production facilities.
- $138.9 million requested for the imaging infrared version of the GBU-15 glide bomb is premature because the weapon is still being developed and has not completed operational testing.
- $88.1 million requested for Durandal bombs should not be funded because it is not operationally suitable or effective and is planned to be replaced by another weapon.
- $28.4 million requested for Bigeye bombs is premature because of program uncertainties about availability of production facilities, unit costs, and operational test results.

Deliveries Not Within Funded Delivery Period

A total of $98.2 million of the $253.3 million requested for the following two items is not needed because some of the requested quantities cannot be delivered within the fiscal year 1987 funded delivery period and because new containers are not needed for one of the items.

- $17.3 million for 30-mm. training cartridges.
- $80.9 million for the CBU-89/B TMD/Gator weapon.

30-mm. Training Cartridge

The $59.1 million requested for 6 million 30-mm. training cartridges could be reduced by about $13.7 million because 3 months' production is scheduled beyond the fiscal year 1987 funded delivery period. An additional reduction of $3.6 million could be made to the 30-mm. request because new containers included in the $59.1 million request are not needed.

The Air Force's production schedule is based on an 18-month procurement lead time. In comparison, multiyear contracts awarded by the SMCA for fiscal years 1983 through 1985 required deliveries to begin 15 months after the start of the fiscal year; actual first deliveries were within 8 to 10 months. According to the SMCA, the contracts for fiscal year 1986 and 1987 programs will also require first deliveries within 15 months. On the basis of historical experience, we believe the contractors will easily meet this requirement.

Therefore, we see no basis for the Air Force's use of an 18-month lead time for its fiscal year 1987 program. Using a lead time of 15 months rather than 18 months, we estimate that about 1.4 million cartridges scheduled for delivery during January through March 1989 would be delivered after the fiscal year 1987 funded delivery period. Accordingly, the request could be reduced by about $13.7 million.

Air Force representatives agreed that based on a 15-month lead time a $13.7 million reduction is warranted, but said that the Army may not be able to achieve a 15-month lead time for the fiscal year 1987 program.

The fiscal year 1987 request of $59.1 million for 30-mm. training cartridges included about $3.6 million to procure 10,842 new containers that are not needed. In December 1985, the Air Force had 23,554 used containers in depot storage, most of which, according to the program manager, can be refurbished and used in lieu of procuring new containers. The new container cost includes new tube and strap assemblies. Air Force officials said $3.6 million requested for new assemblies will

not be needed because the Air Force has a repair program for tube and strap assemblies.

CBU-89/B TMD/Gator Weapon System

About $80.9 million of the $194.2 million requested for CBU-89/B TMD/Gator weapons and FZU-39/B fuzes is not needed, in our opinion, because 2,246 weapons will be delivered after the fiscal year 1987 funded delivery period. The SMCA is responsible for procuring all components, and assembling and delivering a complete system to the Air Force. Beginning with the fiscal year 1986 program, the Air Force has requested that the prime contractor be responsible for delivering a complete system. This modified acquisition strategy calls for the Army to furnish the contractor mines, FZU-39/B fuzes, and containers, which account for most of the total system cost.

Although the fiscal year 1987 program is scheduled to be the last procurement for the Air Force, the Navy plans to procure an average of about 1,350 weapons per year during fiscal years 1987 through 1991. According to data provided by the SMCA, the planned contract award date for the fiscal year 1986 program is September 1986, with first deliveries scheduled for December 1987 and final deliveries for November 1988. This represents a 26-month lead time, or 9 months more than that planned for the fiscal year 1985 program. The increase includes 5 months to allow the prime contractor the option to establish a load, assemble, and pack (LAP) facility and 4 months to ensure that the Army delivers the components. The Air Force is also using a 26-month lead time for the fiscal year 1987 request.

Air Force officials and the SMCA believe all serious bidders either will already have a LAP facility or will use the two existing government-owned LAP facilities for the fiscal year 1986 program. A new contractor probably would not win the fiscal year 1986 contract if the contractor has to invest funds to establish a LAP facility when the current contractor already has a facility. Therefore, we believe that 21 months would be a more realistic lead time for the fiscal year 1987 program because the 5 months to establish a LAP facility are unnecessary.

Using a 21-month lead time, we believe deliveries would begin in July 1988 and end in June 1989. Because fiscal year 1986 deliveries are to be completed in November 1988, fiscal year 1987 deliveries cannot begin until December 1988. Deliveries would therefore continue for 5 months beyond the fiscal year 1987 funded delivery period; the production of 2,246 Gators, including the FZU-39/B fuzes, would also be after the

fiscal year 1987 funded delivery period. As a result, the request could be reduced by about $80.9 million.

Air Force program officials did not agree with the reduction. They said that if the fiscal year 1987 program is reduced (1) some prospective bidders may lose interest in the program, precluding the opportunity for effective competition, (2) prices will increase because of the smaller program quantities, and (3) a production break could occur if fiscal year 1988 funding is delayed. They also said that since planned fiscal year 1987 deliveries are based on minimum sustaining rates at the government-owned LAP facilities, production can be increased to assure delivery of the whole program within the fiscal year 1987 funded delivery period.

Even with our recommended reduction, the residual program will exceed $100 million, which we believe should be large enough to ensure competition. If the Air Force requests funding for 2,246 Gators in its fiscal year 1988 program, the production level should remain constant. Cost increases can be minimized by writing options into the fiscal year 1986 contract. Finally, increasing production at the LAP plant may not be an option since the Army is attempting to stabilize the work force at its ammunition plants.

Substitute Item Meets Needs

The $8.1 million requested for 35,000 BDU-50 500-pound inert practice bombs is not needed because the Air Force has enough MK-82 500-pound inert practice bombs to satisfy the fiscal year 1987 program requirements, as shown in table V.1.

Table V.1: Excess Inventory of MK-82 Practice Bombs

	Quantity
Inventory balance at June 30, 1985	52,299
Due in from prior year programs	10,002
Total	**62,301**
Less: Planned use through fiscal year 1987 delivery period	1,544
Projected inventory at end of fiscal year 1987 delivery period	60,757
Less: Inventory objective	16,049
Excess	**44,708**

The only difference between the BDU-50 and the MK-82 is that the MK-82 can be fuzed while the BDU-50 cannot. The Air Force could use 35,000 of the excess MK-82 practice bombs to satisfy the fiscal year

1987 training requirements for the BDU-50 bombs and still have 25,757 remaining, which is 9,708 more than the Air Force's inventory objective.

Air Force program officials agreed with our position and now plan to use the MK-82 practice bombs for training rather than procuring BDU-50 practice bombs. Air Force Headquarters representatives said that (1) a study, due to be completed around September 1986, is underway to determine future annual consumption of MK-82 inert bombs and (2) if the MK-82 can be used in lieu of the BDU-50, the Air Force will adjust the fiscal year 1988 budget request.

81-mm. Mortar Cartridges Are Available From Army Inventory

The $20 million requested for 208,000 81-mm. mortar cartridges could be reduced by about $19 million because (1) the Army can provide about 182,000 cartridges from its inventory and (2) the Air Force did not consider about 11,000 cartridges due in with fiscal year 1986 funds when developing its fiscal year 1987 request.

The Army is converting to a new 81-mm. mortar tube and ammunition that cannot safely be used in the Air Force's older mortar tubes. Because production facilities will be converted to produce the new ammunition, the Air Force is requesting funds to procure the total quantity required to meet its needs for up to 14 years for the four types of 81-mm. ammunition it uses: high explosive, illuminating, white phosphorous, and inert cartridges. The request includes $3.9 million for 43,000 illuminating cartridges that the Air Force does not need. The Air Force requested 68,000 illuminating cartridges, the minimum procurement quantity, but needs only 25,000 cartridges.

According to Army item managers, the Army needs most of its inventory because the new 81-mm. mortar tube and ammunition will not be available until mid or late 1987; therefore, the Army could not satisfy Air Force requirements from inventory. However, Army inventory balances as of September 30, 1985, and the Army's estimated annual consumption, indicate the Army has sufficient stocks for three of the four types of 81-mm. cartridges, as shown in table V.2.

Table V.2: Army's Inventory and Annual Consumption of 81-mm. Cartridges

Cartridge type	Number on hand	Estimated annual consumption	Years' supply on hand
High Explosive	3,000,000	290,000	10+
Illuminating	338,000	18,000	18+
White Phosphorous	214,000	26,000	8+

The Air Force's request of $18.2 million for these cartridges is unnecessary because the Air Force's year-to-year needs can be met from the Army's inventory. Further, use of the Army's inventory could eliminate the procurement of 43,000 unnecessary illuminating cartridges at a cost of $3.9 million. Since the items are furnished from inventory, procurement lead times will be minimal, rather than the 18 months specified in budget backup data. Therefore, to the extent the Army needs to be reimbursed for these items, the Air Force can request funding in its fiscal year 1988 program, and the Army could use Air Force funds to procure new 81-mm. cartridges.

Air Force program officials disagreed with our position on the availability of 81-mm. cartridges from the Army's inventory. They said that the Army told them it could not satisfy Air Force requirements. We received the same response from the Army. But based on Army data and the Army buying a new type of 81-mm. cartridge, we believe the Army has sufficient inventory to satisfy the Air Force's requirements for the three types of 81-mm. cartridges. Further, an Army representative told us that the Army currently has an excess of HE cartridges.

On the other hand, inert 81-mm. cartridges will have to be produced for the Air Force because the Army does not have any. However, $0.8 million of the $1.8 million requested for inert 81-mm. cartridges is not needed because 11,085 cartridges on order were not considered when the fiscal year 1987 requirement was determined. Therefore, the request should be reduced $0.8 million for 11,085 inert cartridges. Air Force representatives agreed with this reduction.

Lack of Technical Data Has Delayed Production of BDU-48 Practice Bombs

About $7.7 million of the $18.1 million requested for practice bombs is not needed because an Air Force configuration of the Navy's BDU-48 practice bomb has not been resolved. Also, technical data required prior to initiating procurement were not available. The Air Force's request for practice bombs includes the BDU-48, which simulates high-drag bombs, and the BDU-33 which simulates low-drag bombs.

The Air Force's initial request for BDU-48 bombs was in the fiscal year 1986 budget. Some design changes must be incorporated into the technical data package before initiating procurement. In January 1986, the Air Force program manager told the Logistics Operations Center and Headquarters, Air Force Logistics Command (AFLC), that fiscal year 1986 procurement funds should be considered for reprogramming because of delays in revising the TDP. The program manager subsequently concluded that the fiscal year 1987 request would be in jeopardy unless the required technical data were developed shortly.

In February 1986, Air Force Headquarters transferred procurement responsibility from AFLC to the Air Force Systems Command (AFSC) and directed that it remain with AFSC until it transfers program management responsibility. Headquarters also directed AFSC to expedite initial procurement of the BDU-48 to permit certification testing and obligation of fiscal year 1986 funds.

Funding the BDU-48 program in fiscal year 1987 appears premature because of the delays in the fiscal year 1986 program and uncertainties about the BDU-48's configuration and the required testing.

Air Force representatives estimated that flight certification and the availability of a TDP for the Navy version would be completed by mid-calendar year 1986; the TDP for the Air Force version is not expected to be available until July 1987. They said they will procure additional BDU-33 bombs if the TDP for the BDU-48 is not available for the fiscal year 1987 program.

Dual Production Sources Are Unnecessary

The $566.7 million fiscal year 1987 request for the combined effects munition (CEM) should be reduced by $233.2 million to more nearly align the program with past and projected program quantities. In addition, at least $20.8 million could be saved by not providing additional production capacity. The primary issue is whether dual CEM production sources are needed since the Air Force has reduced planned procurements in fiscal years 1988 through 1991 to less than 13,000 units a year, as shown in table V.3.

Table V.3: Air Force Programs for Combined Effects Munition

Dollars in Millions

Fiscal year	Programmed quantity	Proposed funding	Unit price
1986	13,500	$380.4	$28,177
1987	28,850	566.7	19,643
1988	12,801	272.8	21,311
1989	12,441	262.9	21,131
1990	12,524	261.3	20,864
1991	9,938	203.6	20,487
Total	**90,054**		

Establishing complete dual sources, related subcontractors, and other government-owned facilities provides production capacity that will be needed for only the fiscal year 1987 procurement.

In 1983, the Air Force determined that dual sources were needed to produce quantities projected to reach 40,000 or more by fiscal year 1988. Competition between two prime contractors was planned for fiscal year 1986. Each contractor was to develop separate subcontractors, and final assembly would be at a government-owned, contractor-operated facility. Ultimately, each contractor would be able to produce 1,000 units a month on a one-shift basis.

Essentially, a CEM consists of 202 bomblets placed into a tactical munitions dispenser (TMD). The bomblets and TMDs are produced by contractors and shipped to the Kansas AAP. There,the bomblets are loaded with explosives and placed into TMDs. The Army has totally equipped the Aerojet Ordnance Corporation (at a cost of about $14 million) to produce CEM bomblets and plans to award an $18.8 million contract to equip Honeywell Corporation as a second source for bomblet production. Honeywell has already expended $5.2 million of its own funds for an automated bomblet production line.

In 1982, the Army equipped Honeywell to produce the TMD at a cost of $14 million. In 1985, the Army awarded a $17 million contract to equip the Marquardt Company, a subcontractor to Aerojet, as a second TMD source.

The Air Force awarded production contracts for 10,961 CEMs to the initial prime contractor, Aerojet, and 851 units to the second source, Honeywell. The Aerojet contract awards totaled about $323.2 million, including the 1985 award for high-rate production of 9,275 units at a

unit price of $25,500. Honeywell awards totaled about $61.2 million, including the 1985 contract for 800 units at a unit price of $49,750 to continue low-rate initial production. The Air Force has options available under these contracts with each company for high-rate production. These options may be exercised for the fiscal year 1986 program quantity of 13,000 to 14,000 units. The program manager has not yet determined the quantity to be procured from each contractor.

Several factors support limiting CEM production to a single source beginning with the fiscal year 1986 buy. First, the Air Force has negotiated options for this procurement at firm-fixed prices of less than $22,000 per unit from either contractor. Secondly, during our review of the fiscal year 1986 budget request, the CEM program manager told us that annual quantities of less than 15,500 units warranted consideration of dropping the second source; the quantities have dropped to less than 13,000. The Air Force estimated that if a single source had to operate two shifts, a 10-percent savings could be achieved over single shift operations because overhead costs would be allocated differently. Competition has already reduced unit costs, and the Army single manager apparently intends to retain competition, beginning in fiscal year 1987, through component breakout procurement procedures. While Air Force plans for dual sources may have been consistent with congressional emphasis on increased competition, the large reductions in procurement of CEM justify using single prime sources—particularly if it is the most cost-effective approach. Finally, canceling the bomblet production facility scheduled for Honeywell could save $18.8 million, and an additional $2 to $4 million could be saved by limiting the load, assemble, and pack production capacity.

Officials of the Air Force's Armament Division and the Program Office agreed that canceling the planned dual production sources could substantially reduce the fiscal year 1987 budget request. Based on an average annual buy of 15,884 weapons through fiscal year 1991, the officials determined that the Air Force would require a 1987 program budget of $333.5 million; this represents a reduction of $233.2 million from the budget request of $566.7 million. The officials said that up to $20 million would be saved by limiting additional production capacity.

Air Force Headquarters representatives said that the program should not be reduced because fiscal year 1988 program quantities may be increased to support two producers. They said that fully equipping two sources provides for future competition and that the facilities would be

needed during mobilization. While these arguments are persuasive, provided there are sufficient quantities, the budget request indicates fiscal year 1988 quantities are sufficient for only one producer, and therefore, we continue to believe that dual production sources are unnecessary.

Weapon Still Under Development

Because of limited testing, the Air Force does not have an adequate basis for its request of $138.9 million for full production of 696 GBU-15 precision guidance munitions using imaging infrared (IIR) guidance modules.

A total of 1,993 GBU-15s with television (TV) guidance modules was procured during fiscal years 1980 through 1985. The contract unit price in fiscal year 1985 was about $128,000. Procurement of the IIR GBU-15 has been limited to 60 weapons using fiscal year 1985 funds.

Air Force procurement decisions for the $85 million fiscal year 1986 program were expected after a limited test program, which was scheduled to be completed in April 1986. During congressional hearings in April 1985 on the fiscal year 1986 budget request, the Air Force said that it did not have sufficient data to support fiscal year 1986 production and that additional tests were necessary to assess weapon performance.

Program officials said that the fiscal year 1987 request is to procure the IIR version weapons only and that the procurement decision will be made after additional testing is completed in April 1987. The fiscal year 1987 procurement is the last scheduled procurement of GBU-15; the fiscal year 1988 and future procurements are for the AGM-130 powered version of GBU-15.

Testing of the IIR GBU-15 began with five weapon launches in the Development Test and Evaluation (DT&E) phase. This was followed by 11 launches in the Initial Operational Test and Evaluation (IOT&E) phase, completed in February 1985.

According to the Air Force Operational Test and Evaluation Center (AFOTEC), the test results were inconclusive—with some hits, a spotty matrix of misses, equipment malfunctions, and target acquisition problems. The air crew manually guided nearly all weapon launches to impact; automatic tracking was not used for reasons that were not entirely clear to AFOTEC.

The Air Force plans to make four launches which the GBU-15 program manager agreed is a limited effort. The program manager also said that although the AFOTEC plan for these tests provided criteria for judging the success or failure of these four launches, he has no other objective criteria for making the fiscal year 1986 production decision. Instead, the decision will be made subjectively at the Air Force Secretariat level.

AFOTEC's test plan for the four launches describes these limitations, stating that "full evaluation of IIR GBU-15 performance will not be possible based on the results of this four-weapon test." Results will be tentative data and subjective impressions of experts. Results will be combined with results from other operational tests and evaluations and used to produce a final report at the end of part-two testing scheduled for September 1986 through April 1987. These two parts form phase one of the FOT&E that AFOTEC will conduct.

According to the test plan, a final report after part one is not appropriate; it will not be possible to draw useful conclusions from the results of only four launches. Even if all four launches yield good terminal performance data, the statistical sample size is too small to support confident conclusions about system performance. AFOTEC recognized that the launches could be characterized as developmental rather than operational tests. In addition, AFOTEC stated that because only four weapons are available for test, missions must be designed to ensure that the probability of target acquisition is as near to certainty as possible. In this case, some operational realism must be sacrificed, the air crews will be highly experienced and trained, the modified IIR guidance modules will probably be hand-built and bench-tested, and all launches will be during daytime under ideal launch conditions. The 60 weapons procured with fiscal year 1985 funds could be used to complete the development program and operational tests.

The Tactical Air Command plans to conduct the second phase of FOT&E. According to AFOTEC, both phases need to be finished to support an IIR GBU-15 full-rate production decision and to determine the proper ratio of TV versus IIR GBU-15 guidance modules to be put into inventory. The primary issue is whether additional IIR GBU-15s should be procured before the development and the test and evaluation programs are completed. The Air Force will be uncertain of the weapon's effectiveness until at least April 1987.

Officials of the Armament Division and the Program Office agreed that a complete evaluation of the IIR version's performance would not be possible based on the four-shot test and that a final operational test report will be available only after all AFOTEC testing is completed. They said the 60 weapons procured to date will be used for test purposes. They also said the four launches would, however, provide adequate data for the Secretary to decide to continue production using fiscal year 1986 funds because the results can be combined with previous 11-shot operational tests, captive carry missions, and other factors such as air crew debriefings and video recorder results. The officials said that these factors, plus the remaining AFOTEC operational tests, provide a sound basis for requesting 1987 funds and full production. They said that the test program and the funding cycle are structured to integrate completely with production decisions.

Air Force Headquarters representatives said that although testing is incomplete, high-level Air Force officials have made the decision to proceed with the program. In our view, the Air Force did not have enough information about the IIR version system performance to either support production decisions for the fiscal year 1986 program or justify its budget request for 1987.

Additional Procurement Is Not Warranted

The $88.1 million request for procurement of Durandal bombs should not be funded because of problems with the weapon's operational suitability, logistics supportability, and overall lack of cost effectiveness when aircraft attrition is considered.

The Air Force considers the Durandal airfield attack weapon an interim weapon; it will be replaced by the Direct Airfield Attack Combined Munition (DAACM), which consists of 8 Boosted Kinetic Energy Penetrators (BKEPS) and 24 Area Denial Mines (HB-876) packed into a TMD. Program officials said that DAACM requires one-fourth the sorties Durandal needs. The Air Force has programmed about $13 million to procure DAACM in fiscal year 1988. First delivery of production units is expected in fiscal year 1990.

In responding to questions during congressional hearings on the fiscal year 1986 budget request regarding the Air Force analysis of data obtained from Durandal FOT&E, the Air Force said that "Overall results of the tests determined that the Durandal is both effective and suitable." In contrast, the final report on tests of Durandal's operational suitability and effectiveness—which DOD considers equally important

factors— states that the weapon is not suitable due to unsatisfactory ratings for maintainability and logistics supportability. According to the report, the limited number of weapons tested did not provide a comprehensive analysis of its tactical use. The report also stated that a statistically significant measure of mission reliability was precluded by the limited number of test rounds and the lack of a required 16-inch thick unreinforced concrete target. The report cited other factors limiting the usefulness of the tests, including a lack of (1) production containers, (2) adequate maintenance facilities, and (3) the safety collar device. Additional testing was recommended to further evaluate weapon delivery, supportability, and maintainability. Durandal program and other Air Force officials said that test report recommendations for further testing will not be implemented due to a lack of test weapons.

The program manager said that the Durandal is the only available munition designed for airfield attack, that the user had expressed no concerns over use of the weapon, and that all discrepancies related to operational suitability were corrected. The program manager said Durandal has been tested against 12 inches of unreinforced concrete to simulate runway targets and there is no requirement to penetrate 16 inches. He said that lot acceptance tests, which are not operational tests, indicate 85 percent reliability.

In our view, as well as that of the test organization, the tests did not provide a comprehensive analysis of Durandal's tactical use. Also, the statistical significance of the test results was limited—to the extent that a significant measure of mission reliability was precluded. In our opinion, continued procurement is not warranted.

Bigeye Bomb Program Uncertainties

The Air Force's budget request of $28.4 million to procure Bigeye binary chemical bombs is premature because the fiscal year 1986 program has slipped and the congressional conditions on spending funds for binary chemical munitions in section 1411 of the Department of Defense Authorization Act, 1986 (P.L. 99-145) and direction in the conference committee report on the fiscal year 1986 Defense appropriations (House Report No. 99-450, at p. 178) have not yet been met.

The conference committee report directs the Secretary of Defense to submit a report describing the operational requirements and actual performance of the weapon during operational testing and any exceptions to the requirements deemed acceptable. This report depends on both the

Navy and Air Force test results, which will not be available until early calendar year 1987.

As a result of these uncertainties, the services have not determined the size of facilities, production schedules, and procurement quantities.

As of February 1986, the Air Force had completed some IOT&E. Final test results are scheduled to be available in early calendar year 1987. Compatibility tests with F-4 and F-16 aircraft began in April 1985 and were scheduled to end with the F-111 aircraft in May 1986. Additional IOT&E with the F-16 and F-111 aircraft were scheduled to start in June 1986; the test results are expected to be available in early fiscal year 1987. The F-4, F-16, and F-111 certifications and F-15, A-7, A-10, and B-52 aircraft clearances and certifications are being planned under the Air Force's SEEK EAGLE program, which has an uncertain completion date.

The independent Office of Operational Test and Evaluation within the Office of the Secretary of Defense plans to assess the test results. If the results support a decision for full production, the office must submit its assessment to the Congress.

In any event, the bulk of the test results are not expected to be ready in time for congressional consideration during the fiscal year 1987 authorization and appropriation hearings. The Air Force expects to end its FOT&E by July 1989.

In January 1986, the Air Force, Army, and Navy met to interpret the congressional conditions and to determine the size of the facilities needed to produce and assemble the chemical weapon. As of February 24, 1986, the services had not decided on a contractor for the metal parts, the type of contract to award, production quantities, a production schedule, or the size of the facilities. Under the present schedule, the funds would be released to the Navy in April 1987 with initial deliveries to the Air Force scheduled for July 1988. Air Force officials stated that the Air Force's requested fiscal year 1987 procurement funds (if appropriated) would not be released to the Navy until the Navy's procurement plan is completed and the contractor is identified.

Because of program uncertainties involving facilities, contract types, unit costs, testing, and the impact of program restrictions, we believe the Congress should not fund the $28.4 million fiscal year 1987 budget request for the Bigeye. The program manager substantially agreed with

our analysis. He agreed that, although acquisition and production planning is in process, the services have not made final decisions on these matters.

Conclusion

We believe the Air Force's request is overstated by $621.6 million for the following reasons: (1) two items because deliveries cannot be made during the fiscal year 1987 funded delivery period and new containers are not needed, (2) one item because a suitable substitute is available in the inventory, (3) one item because it is not ready for production, (4) one item because Air Force assets are due in and Army assets are available, (5) one item because dual production sources are unnecessary, (6) one item because it is still being developed, (7) one item because it is operationally unsuitable, ineffective, and is scheduled for replacement, and (8) one item because of uncertainties about production facilities, unit costs, testing, and other restrictions.

Recommendation

We recommend the House and Senate Committees on Appropriations reduce the Air Force's ammunition appropriation request by $621.6 million for nine budget line items, as shown in appendix X.

Ammunition Plant Modernization and Expansion Program

The Army's fiscal year 1987 ammunition production base support request of $353.9 million includes $281.2 million for the plant modernization and expansion program ($249.5 million is for 20 projects to modernize and expand the base and $31.7 million is for engineering design of modernization and expansion projects). We determined the design status of all 20 modernization and expansion projects, reviewed the justifications for 8 of the 20 projects representing $173.6 million of the $249.5 million requested, and examined the basis for the $31.7 million requested for the engineering design effort.

We believe the request should be reduced by $177.6 million for the following reasons:

- $133.4 million for seven projects is premature because final designs were not completed before budget submission, contrary to congressional guidance.
- $15.4 million to establish a second production facility to produce metal parts for the Bigeye bomb is premature because tests to demonstrate that technical problems with the item have been resolved are incomplete and congressional conditions on using fiscal year 1986 funds have not been met.
- $10.5 million for expanding a metal parts production facility should not be provided because lower cost alternatives are available.
- $18.3 million for two projects at the Radford AAP (to construct a steam conduit or tieline and to upgrade the powerhouse electrical distribution system) is premature because there are unresolved issues which could affect the scope of the proposed projects.

Projects With Incomplete Designs

Congressional guidance since 1976 directs that projects not be funded when the final design is incomplete prior to budget submission. This guidance states

"... the Committee believes ... completion of final design of each modernization and expansion project prior to submission of the appropriation request will provide a more sound basis for determining the scopes of projects and estimating costs..."

Our review indicates that $133.4 million for the seven projects shown in table VI.1 is premature because final construction or equipment designs were not complete when the Army's budget justification was submitted to the Congress in February 1986. The final designs for these projects ranged from zero to 25 percent complete; their planned design completion dates ranged from October 1986 to September 1988.

Table VI.1: Projects With Incomplete Designs as of February 1986

Dollars in millions

Project number	Description	Budget request	Percent complete	Estimated completion date
5870112	Expansion of production facilities for M203A1, XM215, and XM216 propelling charges at the Sunflower AAP, Kansas and Indiana AAP.	$58.3	0	Sept. 1988
5872055	Establish a new loading dock for explosives at the Holston AAP, Tenn.	3.5	0	May 1988
5872439	Modernize the A-5 drying process at the Holston AAP, Tenn.	5.9	25	Oct. 1986
5872487	Equipment to complete TNT line at the Radford AAP, Va.	2.0	0	Dec. 1986
5872688	Modernize a second Composition B line at the Holston AAP, Tenn.	24.0	0	July 1988
5873000A	Modernize Composition A facility line 10 at the Holston AAP, Tenn.	24.7	20	Feb. 1987
5873000B	Modernize Composition A facility line 9 at the Holston AAP, Tenn.	15.0	0	Apr. 1988
Total		**$133.4**		

According to Production Base Modernization Activity officials, the primary reasons for incomplete final designs were (1) budgeting for projects in fiscal year 1987 that had been planned for future years, (2) changes in processes or configurations, which, in turn, required project design changes or delays, and (3) delays in pacing Manufacturing Methods and Technology projects. According to Activity officials, the final designs for five of the seven projects, estimated to cost $102.8 million, were incomplete because the Army had not planned to request funds for them in fiscal year 1987, but the Office of the Secretary of Defense included them in the fiscal year 1987 budget to partially address shortfalls in mobilization production facilities.

In view of the congressional guidance, we see no need to provide funding for the seven projects listed in table VI.1.

Project 5870112

This $58.3 million project is to expand the production base for 155-mm. M203A1, XM215, and XM216 combustible case propelling charges. The M203A1 and XM216 propelling charges contain stick propellant, while the XM215 charges contain granular propellant. Funding requested for project 5870112 includes $51.8 million for a stick propellant production line at the Sunflower AAP, Kansas, and $6.5 million for a new production line for manufacturing all three types of charges at the Indiana AAP.

We believe funds should not be provided for this project. In addition to the design not meeting congressional guidance, a number of issues make the request premature in fiscal year 1987.

- Pacing Manufacturing Methods and Technology projects for blending stick propellant and developing an automated cutting, conveying, and handling system are not scheduled for completion until September 1988 and April 1987, respectively.
- The Army has no plans to procure the XM215 and XM216 propelling charges at least until fiscal year 1992; as of March 1986, neither was required for mobilization.
- Additional production capacity for M203A1 stick propellants is not needed through fiscal year 1991 because sufficient capacity is being established at the Radford AAP, Virginia, under Manufacturing Methods and Technology projects and a separate facility project.
- According to Activity officials, a new production line is unnecessary at the Indiana AAP because an existing line at the plant could be expanded at minimal cost to meet planned production requirements for the M203A1 through fiscal year 1991.
- According to Activity officials locating the stick propellant production line at the Sunflower AAP may not be viable unless a new continuous nitrocellulose nitrating facility, estimated to cost $28.6 million, is also built at this plant. According to budget backup data, nitrocellulose comprises 21.5 percent of the propellant's composition; it is not cost effective to transport nitrocellulose to other locations; and nitrocellulose cannot be produced at existing facilities because of safety and environmental deficiencies.
- The Army has not fully evaluated the potential for producing the stick propellant at the Radford AAP using the new $105.5 million continuous automated multibase propellant production line because the pacing Manufacturing Methods and Technology project needed to evaluate the line's placement will not be complete until September 1988.

Army Headquarters representatives agreed that these seven projects did not meet congressional guidance and that $100.8 million requested for four of the seven (projects 5870112, 5872055, 5872688, and 5873000B) should not be funded in fiscal year 1987. Army representatives said the other three projects should be funded because (1) project 5872439 is needed to address mobilization production base shortfalls for RDX explosives, (2) project 5872487 is for equipment to complete a TNT production line that does not require extensive designs, and (3) project 5873000A is required because of shortfalls in meeting peacetime and mobilization requirements for an explosive called composition A-5.

Except for project 5870112, we are not questioning the need for the production capacity, but rather whether they meet congressional guidance

for funding in fiscal year 1987. Since none of the seven projects meet the congressional guidance, we believe they should not be funded. Approving facility projects before final designs are completed may encourage submission of partially designed projects in the future.

Project 5870074B for Bigeye Bomb Metal Parts

This $15.4 million project is to establish a second facility to produce metal parts for the Bigeye bomb. A total of $17.6 million was provided in fiscal year 1986 for the first facility (project 5860074A). Both facilities are being designed to have the same production capacity. The Army requested funds for the second facility primarily to establish competition early in the Bigeye bomb program. A secondary objective was to provide additional production capacity.

As shown in table VI.2, the schedules for establishing the two metal parts production facilities overlap, precluding an opportunity to apply lessons learned from the initial facility to the expansion facility.

Table VI.2: Schedules for Establishing Bigeye Metal Parts Facilities

Project number	Planned starting date	Planned completion date
5860074A	November 1986	May 1988
5870074B	February 1987	July 1988

According to Activity officials, the Army originally scheduled the two facilities 2 to 3 years apart. However, according to the Army, funding the initial facility was delayed, which provides an opportunity to introduce competition earlier than planned. The Army acknowledges that establishing back-to-back initial and expansion production facilities presents some technical and cost risks. However, the Army asserts that the risks are low because the equipment to manufacture Bigeye bomb metal parts is commercially available. The Army also asserted that early competition could reduce item cost and shorten delivery schedules.

As discussed in appendixes III and V, we believe providing procurement funds to the Navy and Air Force for Bigeye bombs is premature because tests have not demonstrated that technical problems have been resolved and congressional conditions on using fiscal year 1986 funds have not been met. Consequently, we believe the $15.4 million requested for project 5870074B to expand the production capacity for the Bigeye bomb metal parts is premature and should not be funded.

Project 5870115 for XM864 Projectile Metal Parts

This $11.3 million project is to expand the production capacity for 155-mm. XM864 projectiles and consists of $10.5 million to complete a metal parts production line at the Scranton AAP in Pennsylvania, and $800,000 to establish a LAP production line at the Milan AAP in Tennessee. The Army had planned to request about $24 million for the project in fiscal year 1987. However, in December 1985 OSD decided to split the funding between fiscal years 1986 and 1987. OSD approved funding of $13.6 million in fiscal year 1986 to procure long-lead time equipment and $11.3 million in fiscal year 1987 to complete the production line. We believe the $10.5 million portion of the fiscal year 1987 project is not needed because the $13.6 million provided in fiscal year 1986 is sufficient to establish a complete metal parts production line at another location.

Before deciding to put the metal parts production line at the Scranton AAP, the Army considered locating the line at the Louisiana AAP or at one of two commercial producers' plants. The line would be able to produce 20,000 projectiles a month using a single shift of 8 hours a day, 5 days a week (1-8-5). Using existing production lines for the 155-mm. M483 HE ICM projectiles, the three potential producers provided the following cost estimates for establishing the production line at their respective plants:

- $17.7 million at the Louisiana AAP;
- $18.9 million at Chamberlain Manufacturing Corporation, Massachusetts; and
- $75.9 million at Norris Industries, California.

The cost estimates varied because of differences in existing M483 production equipment at the plants. The XM864 is similar to the M483, but the XM864 uses a basebleed motor, which gives it an additional range of 11 kilometers.

In April 1986, the Army was conducting a study to determine the total cost to place the metal parts production line at the Scranton AAP. The study guidelines provide for establishing a production line capable of producing metal parts for 10,000 XM864 projectiles a month on a 1-8-5 basis. In other words, the planned production line at the Scranton AAP, budgeted at a total cost of $24.1 million in fiscal years 1986 and 1987, will have only half the production capacity the Army had planned to establish at the other locations. Moreover, the line at Scranton AAP will cost more than the lines at two of the three other producers. Since lower-cost alternatives are available, we believe that the $10.5 million requested in fiscal year 1987 should not be provided.

Although Army representatives agreed with our analysis, they said that they continue to support placing the production line at the Scranton AAP because they were directed to do so. They did not say who provided the direction.

Energy Modernization Projects at the Radford AAP

Two fiscal year 1986 projects estimated to cost $53.2 million and two fiscal year 1987 projects estimated to cost $18.3 million are intended to upgrade steam and electrical generation and distribution systems at the Radford plant.

We believe it is premature to fund the fiscal year 1987 projects and to execute the fiscal year 1986 projects as planned until several issues concerning the scope of the projects are evaluated. These issues, described in the following sections, concern steam shortfalls which justify the tieline, the scope and independent execution of the electrical distribution projects, and the scope of the rehabilitation project. Production Base Modernization Activity officials generally agreed with our analysis and cited several actions that would be taken to address our conerns.

Project 5872134

This fiscal year 1987 project, estimated to cost $8.9 million, is to construct a 10,000-foot steam tieline or conduit from powerhouse 1 in the main plant area to the plant's "horseshoe" area. This tieline would provide the steam required for production processes during peacetime and would supplement the steam generated by boilerhouse 2 (located in an area referred to as the horseshoe area) during mobilization. Plant officials believe that supplying steam to the horseshoe area through the tieline will be less costly than expanding boilerhouse 2. In fiscal year 1986, project 5863565A—estimated to cost $39.8 million—was established to rehabilitate and modernize powerhouse 1, at an estimated cost of $16.9 million, and boilerhouse 2, at an estimated cost of $22.9 million.

To better understand the Army's position on the need to modernize the steam plants, we requested examples of serious deficiencies or downtime as a result of the condition of powerhouse 1 and boilerhouse 2. Examples cited included, breaks in the main steam header in powerhouse 1 and that powerhouse 1 did not meet National Fire Protection Association standards. Plant officials said downtime has been avoided only because they have used innovative methods and engineering expertise to maintain steam plant operation. Both Activity and plant officials cited a 1982 study on modernizing the steam plants to support this position. The study, done by a private consulting firm, identified numerous

areas requiring modernization and proposed alternatives. One alternative was to modernize and expand powerhouse 1 and boilerhouse 2. The report cited the steam plant's age (more than 40 years) as the primary factor justifying modernization.

An Army value engineering study stated that the plant suffers "horrendous" line losses. Another study stated the first step in modernizing steam generation at the plant is to determine actual steam usage. According to Activity and Radford plant officials, $370,000 has been requested for steam meters which could be used to identify excessive steam loss in the approximately 73 miles of steam lines at the plant.

A Manufacturing Methods and Technology Program report, dated January 1983, suggested the potential for significant steam reduction in the horseshoe area. A 59-percent reduction was measured in one forced-air dryer used to dry propellants. Plant officials question the accuracy of the report's measured savings and plan to reevaluate the study's findings.

A January 1986 value engineering report suggested that the boilers in boilerhouse 2, currently limited to 25,000 pounds per hour, or 75 percent of their design rate, may be able to operate at capacity. The study proposed a test to determine whether their design capacity could be achieved and what pollution abatement equipment would be required for such operation. A plant official told us no action had been taken on the proposal.

Project 5872225

This project, estimated to cost $9.4 million, is to overhaul the internal electrical distribution system in powerhouse 1. We believe it is premature because its planned scope is uncertain until the issue of the need to have the plant generate its own electricity is resolved. Further, according to the Production Base Modernization Activity, the project is out of sequence with fiscal year 1986 project 5862519 and if these projects are combined, a total of $2.5 million may be saved. Project 5862519 had been planned for fiscal year 1988, but OSD directed its funding before project 5872225. Project 5862519, estimated to cost $13.4 million, is to correct deficiencies in the external electrical distribution system at powerhouse 1. Although funded in fiscal year 1986, the final design is not scheduled for completion until November 1986.

An October 1985 value engineering study questioned the need for and the cost effectiveness of having the Radford plant generate electricity.

The Activity agreed that it may no longer be cost effective and has tried to determine this, aided by a commercial power company. Radford plant officials believe it is cost effective overall and said it adds to the plant's security in the event of interruptions in the commercial source, such as those caused by sabotage.

Radford and Activity officials questioned whether the local commercial power company had the needed electrical capacity and whether a second line independent of the first line (Radford procures about 50 percent of the electricity it uses) could be provided. In March 1986, Corps of Engineers, Activity, and power company officials met to discuss these issues. We spoke with a power company official who said the company had (1) the required electrical capacity, (2) a secure power source through access to other power sources, and (3) a plant with modern and efficient equipment and design.

The power company official also said the company was waiting for information from the Radford plant to develop a proposal for constructing a second power line to the plant and to estimate the cost of providing the electrical power. We believe it is important to compare the estimated cost to provide the power line and electricity to the investment cost required to modernize the Radford plant.

Activity officials generally agreed with our findings on the Radford energy projects. They said they would (1) install steam meters in the main plant and horseshoe area to check and verify steam shortfalls in the horseshoe area, (2) test boilerhouse 2 boilers to determine their maximum capacity, (3) examine the potential for expanding boilerhouse 2 to cover steam shortfalls, (4) further evaluate the potential for saving steam used in the forced-air dryers, and (5) award a single contract for projects 5862519 and 5872225.

Army's Proposed Production Base Program Increases

Army representatives identified seven projects to realign the program and/or offset reductions we are recommending. Because the Army gave us this list of projects after we completed our field work, we were unable to review their justification. Items the Army proposed for increases are shown in table VI.3.

Table VI.3: Army's Proposed Production Base Program Increases

Project	Cost
Omnibus design	$25,000,000
M82 primer	2,500,000
Forge room equipment in commercial facility	7,000,000
Forge room equipment in commercial facility	8,700,000
TNT safety corrections at Joliet AAP, Ill.	7,200,000
Nitro acid tanks at Holston AAP, Tenn.	200,000
Project XXXX at Mississippi AAP	27,400,000
Total	**$78,000,000**

Conclusion

We believe the Army's request is overstated by $177.6 million for the following reasons: (1) seven projects are premature because final designs have not been completed, (2) one project is premature because of unresolved technical problems and delays in the fiscal year 1986 program, (3) one project is not needed because lower-cost alternatives are available, and (4) two projects are premature because there are several unresolved issues which could affect the scope of the projects.

Recommendation

We recommend the House and Senate Committees on Appropriations reduce the Army's $353.9 million production base request by $177.6 million for 11 projects, as shown in appendix XI.

GAO-Recommended Adjustments to the Army's Ammunition Request

Dollars in millions

Budget line number	Item	Budget request	Recommended adjustments	Adjusted request	Remarks
3	Cartridge, 5.56-mm. ball	$15.0	$ •	$15.0	—
4	Cartridge, 5.56-mm. tracer	5.6	•	5.6	—
5	Cartridge, 5.56-mm. tracer clip	4.8	•	4.8	—
6	Cartridge, 5.56-mm. blank	7.0	•	7.0	—
7	Cartridge, 5.56-mm. blank, f/saw	18.4	•	18.4	—
8	Cartridge, 5.56-mm. 4 ball/ 1 tracer	29.4	•	29.4	—
9	Cartridge, 5.56-mm. ball, f/M16A2	3.4	•	3.4	—
11	Cartridge, 7.62-mm. 4 ball/1 tracer	68.5	−38.3	30.2	Deliveries not within funded delivery period. (See p. 24.)
12	Cartridge, 7.62-mm. ball	2.7	•	2.7	—
13	Cartridge, 7.62-mm. 4 ball/1 tracer, OHF	0.5	•	0.5	—
14	Cartridge, 7.62-mm. blank	15.9	•	15.9	—
15	Cartridge, .45 cal. ball	0.7	•	0.7	—
16	Cartridge, .50 cal. plastic 4 ball/ 1 tracer	5.4	•	5.4	—
17	Cartridge, .50 cal. 4 ball/ 1 tracer	9.6	•	9.6	—
18	Cartridge, .50 cal. APIT	4.0	•	4.0	—
19	Cartridge, .50 cal. ball	2.5	•	2.5	—
23	Cartridge, .50 cal. 4 ball/ 1 tracer	22.9	•	22.9	—
24	Cartridge, 20-mm. TP-T	9.7	•	9.7	—
25	Cartridge, 20-mm. 4 TP/1 TP-T	3.3	•	3.3	—
26	Cartridge, 25-mm. HEI-T	48.7	−36.8	11.9	Unresolved component problems. (See p. 31.)
28	Cartridge, 25-mm. TP-T	25.5	−10.9	14.6	Inventory will exceed needs. (See p. 17.)
30	Cartridge, 30-mm. TP	2.4	•	2.4	—
31	Cartridge, 40-mm. HEDP	28.7	•	28.7	—
32	Cartridge, 40-mm. TP	7.5	−7.5	•	Does not meet requirements. (See p. 34.)
34	Cartridge, 40-mm. practice	3.6	•	3.6	—
35	Cartridge, 40-mm. red smoke	1.8	•	1.8	—
36	Cartridge, 40-mm. green smoke	1.9	•	1.9	—
37	Cartridge, 40-mm. yellow smoke	1.9	•	1.9	—
41	Cartridge, 81-mm. illuminating	3.4	•	3.4	—
42	Cartridge, 81-mm. HE	91.3	−61.1	30.2	Program quantity is too large. (See p. 35.)
43	Cartridge, 81-mm. smoke	11.0	•	11.0	—
45	Cartridge, 81-mm. 1/10 range practice	2.9	•	2.9	—
46	Cartridge, 4.2-in. HE	22.0	•	22.0	—
47	Cartridge, 120-mm. HE	44.7	−23.8	20.9	Quantity in excess of Army guidance. (See p. 19.)

Budget line number	Item	Budget request	Recommended adjustments	Adjusted request	Remarks
48	Cartridge, 120-mm. illuminating	5.5	−1.0	4.5	Quantity in excess of Army guidance. (See p 19.)
49	Cartridge, 120-mm. smoke	14.3	−6.9	7.4	Quantity in excess of Army guidance. (See p. 19.)
50	Cartridge, 105-mm. HEAT	7.7	−7.7	•	Inventory will exceed needs. (See p. 17.)
53	Cartridge, 105-mm. DS-TP	41.6	•	41.6	—
54	Cartridge, 105-mm. APFSDS-T	20.3	•	20.3	—
55	Cartridge, 120-mm. APFSDS-T	75.9	•	75.9	—
58	Cartridge, 120-mm. TPCSDS-T	104.9	−46.3	58.6	Inventory will exceed needs. (See p. 17.)
59	Projectile, 155-mm. HE, ICM	173.0	−85.1	87.9	Deliveries not within funded delivery period. (See p. 21.)
60	Projectile, 155-mm. smoke	13.5	•	13.5	—
62	Projectile, 155-mm. ADAM	33.9	−33.9	•	Deliveries not within funded delivery period. (See p. 25.)
63	Projectile, 155-mm. RAAMS, M718	11.9	−11.9	•	Deliveries not within funded delivery period. (See p. 21.)
64	Projectile, 155-mm. RAAMS, M741	105.4	−105.4	•	Deliveries not within funded delivery period (See p. 21.)
65	Projectile, 155-mm. Basebleed	31.6	•	31.6	—
66	Projectile, 155-mm. Copperhead	8.2	•	8.2	—
67	Projectile, 155-mm. chemical	60.6	−31.2	29.4	Deliveries not within funded delivery period (See p. 26.)
68	Charge, propelling, 155-mm. GB	38.0	−11.7	26.3	Deliveries not within funded delivery period (See p. 27.)
70	Charge, propelling, 155-mm. RB M203A1	20.0	−13.5	6.5	Deliveries not within funded delivery period. (See p. 27.)
71	Charge, propelling, 155-mm. RB M119A2	55.6	−10.5	45.1	Deliveries not within funded delivery period. (See p. 27.)
73	Projectile, 8-inch, HE RAP	37.3	•	37.3	—
74	Charge, propelling, 8-in. WB	4.0	−4.0	•	Inventory will exceed needs. (See p. 19.)
77	Fuze, MTSQ M577A1	11.7	•	11.7	—
78	Fuze, MTSQ M582A1	11.2	•	11.2	—
79	Primer, Percussion	1.8	•	1.8	—
82	Canister mine, practice volcano	1.9	−1.9	•	Procurement is premature. (See p. 33.)
83	Canister mine, Volcano	31.6	−31.6	•	Procurement is premature. (See p. 33.)
84	Motor, Rocket, 5-inch, MK22	13.3	−13.3	•	Inventory imbalance with MICLIC. (See p. 28.)

Budget line number	Item	Budget request	Recommended adjustments	Adjusted request	Remarks
85	Line charge, M58A3, MICLIC	24.4	−24.4	•	Deliveries not within funded delivery period. (See p. 28.)
86	Modular pack mine system	23.4	•	23.4	—
88	Demolition munitions	13.7	•	13.7	—
91	Lightweight multipurpose system, AT-4	82.5	•	82.5	—
92	Lightweight multipurpose system trainer	2.5	•	2.5	—
99	Grenade, smoke RP	6.3	−4.2	2.1	Unresolved component problems. (See p. 32.)
100	Grenade, smoke IR	9.0	•	9.0	—
101	Signals, all types	18.0	•	18.0	—
102	Simulators, all types	4.3	−1.8	2.5	Inventory will exceed needs. (See p. 17.)
107-112	Miscellaneous equipment and explosives	60.3	•	60.3	—
Total[a]		**1,705.7**	**−624.7**	**1,081.0**	
Total[b]		194.4	•	194.4	
Total		**$1,900.1**	**$−624.7**	**$1,275.4**	

[a]Total for budget lines we reviewed.

[b]Total for budget lines we did not review.

GAO-Recommended Adjustments to the Navy's Ammunition Request

Dollars in millions

Budget line number	Item	Budget request	Recommended adjustments	Adjusted request	Remarks
201	General purpose bombs	$126.9	$−89.8	$37.1	Program quantity for MK83 bomb too large. (See p. 52.) Premature procurement for BSU-85/B fin due to program delay. (See p. 43.) FMU-139/B costs are overstated. (See p. 45.)
203	Walleye	35.3	•	35.3	
204	Rockeye	8.9	−7.6	1.3	Premature procurement for FMU-140/B fuze. (See p. 41.)
205	Zuni 5-inch rocket	26.3	−18.0	8.3	MK71 deliveries cannot be made during program period. (See p. 51.)
206	2.75 rocket	31.4	•	31.4	—
208	Machine gun ammunition	21.2	−0.5	20.7	Premature procurement for 25-mm. HEI cartridge due to product improvement program. (See p. 41.)
209	Practice bombs	30.7	−3.6	27.1	Overstated costs and production problems for practice Rockeye. (See p. 48.)
212	Airborne expendable countermeasures	40.9	−9.6	31.3	Premature procurement for Airboc chaff due to program delay. (See p. 43.)
215	Bigeye	28.5	−28.5	•	Premature procurement due to technical problems. (See p. 44.)
216	Jet assisted takeoff	2.6	−0.6	2.0	Premature procurement for MK117 motor due to program delay. (See p. 42.)
217	Gator	42.6	−42.6	•	Premature procurement because production approval has been delayed. (See p. 39.)
235	5-inch 54-caliber gun ammunition	75.8	−34.1	41.7	Problems producing required component. (See p. 49.) Inventory will exceed needs. (See p. 46.)
238	CIWS	41.8	−6.5	35.3	Inventory will exceed needs for the 20-mm. dummy round. (See p. 47.)
240	Other ship gun ammunition	26.0	−6.9	19.1	Inventory will exceed needs for the 25-mm. TP-T cartridge. (See p. 47.)
Total[a]		**538.9**	**−248.3**	**290.6**	
Total[b]		**366.1**	**•**	**366.1**	
Total		**$905.0**	**$-248.3**	**$656.7**	

[a]Total for budget lines we reviewed.

[b]Total for budget lines we did not review.

GAO-Recommended Adjustments to Marine Corps' Ammunition Request

Dollars in millions

Budget line number	Item	Budget request	Recommended adjustments	Adjusted request	Remarks
2	Small arm, all types	$18.5	$ •	$18.5	—
3	Machine gun, all types	32.0	•	32.0	—
4	Mortar, all types	216.8	− 23.4	193.4	Program quantity is too large. (See p. 57.)
5	Grenades, all types	8.3	•	8.3	—
6	Rockets, all types	41.3	•	41.3	—
7	Training, all types	31.1	•	31.1	—
8	Projectiles, 155-mm. all types	202.0	−127.7	74.3	Deliveries not within funded delivery period. (See p. 56.)
10	Projectile, 155-mm. Copperhead	37.8	•	37.8	—
12	Fuzes, all types	12.9	•	12.9	—
Total[a]		**600.7**	**−151.1**	**449.6**	
Total[b]		**7.5**	•	**7.5**	
Total		**$608.3[c]**	**$−151.1**	**$457.1**	

[a]Total requested for these budget lines. We reviewed request for items totaling $497.6 million under these budget lines.

[b]Total for items in budget lines we did not review.

[c]Budget lines total $608.2 million, due to rounding.

GAO-Recommended Adjustments to the Air Force's Ammunition Request

Dollars in millions

Budget line number	Item	Budget request	Recommended adjustments	Adjusted request	Remarks
1	2.75-in. rocket motor	$23.7	$ •	$23.7	—
2	2.75-in. rocket head, W.P.	8.3	•	8.3	—
9	Cartridge, 20-mm. combat	11.9	•	11.9	—
10	Cartridge, 20-mm. training	22.3	•	22.3	—
11	Cartridge, 30-mm. training	59.1	−17.3	41.8	Total quantity cannot be produced, and unneeded containers. (See p. 60.)
15	Cartridge, 81-mm.	20.0	−19.0	1.0	Army can provide from stock and error in computing requirements. (See p. 63.)
24	MK-82 inert /BDU-50	8.1	−8.1	•	Substitute available. (See p. 62.)
25	Durandal bomb	88.1	−88.1	•	Bomb neither operationally suitable nor effective. (See p. 70.)
26	Timer, actuator fin, and fuze	4.9	•	4.9	—
27	BSU-49 inflatable retarder	27.4	•	27.4	—
28	BSU-50 inflatable retarder	7.6	•	7.6	—
30	Bomb, 2,000-lb hard target	37.8	•	37.8	—
34	GBU-15	138.9	−138.9	•	System still being developed. (See p. 68.)
35	Bomb, practice	18.1	−7.7	10.4	Not ready for production. (See p. 64.)
39	CBU-89, TMD/Gator	194.2	−80.9	113.3	Total quantity cannot be produced. (See p. 61.)
40	CBU-87, combined effects munition	566.7	−233.2	333.5	Dual sources unnecessary. (See p. 65.)
41	Bigeye bomb	28.4	−28.4	•	Uncertainties regarding production, costs, and testing. (See p. 71.)
43	Aerial tow target	13.0	•	13.0	—
60	FMU-112/ FMU-139	36.8	•	36.8	—
Total[a]		**1,315.3**	**−621.6**	**693.7**	
Total[b]		**217.2**	**•**	**217.2**	
Total		**$1,532.5**	**$−621.6**	**$910.9**	

[a]Total requested and reviewed in these budget lines.

[b]Total for items in budget lines that we did not review.

GAO-Recommended Adjustments to the Army's Modernization and Expansion Program Request

Dollars in millions

Project number	Description	Budget request	Recommended adjustments	Adjusted request	Remarks
Provision of Industrial Facilities					
5870074B	Expansion of Bigeye bomb metal parts facility in commercial plant.	$15.4	$−15.4	$ •	Bigeye bomb has unresolved technical problems. (See p. 77.)
5870103	Initial production facility for binary chemical DC.	18.6	•	18.6	—
5870115	Expansion of XM864 projectile metal parts facility at Scranton AAP, PA. Initial production facility for load, assemble and pack at Milan AAP, Tenn.	11.3	−10.5	.8	Metal parts expansion cost excessive. (See p. 78.)
5872134	Steam tieline line, at Radford AAP, VA.	8.9	−8.9	•	Unresolved issues concerning scope. (See p. 79.)
5872158	Upgrade central laboratory at Indiana AAP.[a]	2.0	•	2.0	—
5872225	Upgrade electrical distribution system at Radford AAP, VA.	9.4	−9.4	•	Unresolved issues concerning scope. (See p. 79.)
872307	Expansion of 155-mm. stick propellant facility at Radford AAP, VA.[a]	3.1	•	3.1	—
872439	Productivity improvements at Holston AAP, Tenn.[a]	5.9	−5.9	•	Design not complete. (See p. 74.)
873000A	Modernize composition A line 10, Holston AAP, Tenn.[a]	24.7	−24.7	•	Design not complete. (See p. 74.)
873046	Omnibus engineering design.	16.2	•	16.2	—
873277	Expansion of 155-mm. M687 binary projectile metal parts facility at Louisiana AAP.[a]	4.6	•	4.6	—
Subtotal		**120.1**	**−74.8**	**45.3**	
Modernization Projects for Mobilization Shortfalls					
5870112	M203A1, XM215, XM216 propelling charge production lines at Sunflower, Kansas and Indiana AAPs.	58.3	−58.3	•	Alternative excluded, technology under development, and no design. (See p. 75.)
5872055	Explosive loading docks at Holston AAP, Tenn.[a]	3.5	−3.5	•	Design not complete. (See p. 74.)
5872084D	Correct deficiencies in black powder plant at Indiana AAP.[a]	27.0	•	27.0	—
5872293	Modernize TNT area support facility at Radford AAP, Va.[a]	2.9	•	2.9	—
5872301	Modernize M55 detonator loader at Iowa AAP.[a]	1.5	•	1.5	—
5872360	Replace gas distribution system at Louisiana AAP.[a]	0.8	•	0.8	—
5872487	TNT line at Radford AAP, Va.[a]	2.0	−2.0	•	No design. (See p. 74.)
5872688	Modernize composition B line 2 at Holston AAP, Tenn.[a]	24.0	−24.0	•	No design. (See p. 74.)

Project number	Description	Budget request	Recommended adjustments	Adjusted request	Remarks
5873000B	Modernize composition A line 9 at Holston AAP, Tenn.[a]	15.0	−15.0	•	No design. (See p. 74.)
5873046	Omnibus engineering design.	15.5	•	15.5	—
5873212	Expansion of 120-mm. cartridge case facility in commercial plant.[a]	10.6	•	10.6	—
Subtotal		**161.1**	**−102.8**	**58.3**	
Total		**$281.2**	**$−177.6**	**$103.6**	

[a]Projects reviewed by us only for design status. These projects total $102.9 million and represent $50.4 million of recommended adjustments.

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