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Report to Rep. George H. Mahon, Chairman, House Committee on Appropriations; by Elmer B. Staats, Comptroller General.

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The Army's fiscal year (FY) 1979 ammunition appropriation request was \$1.15 billion for procuring conventional ammunition and \$265 million for related production support. The ammunition is for annual peacetime training and reserve wartime stocks. Most of the requested production support funds are for modernizing and expanding the Army's ammunition plants. Findings/Conclusions: The \$85 million requested for three conventional ammunition items should not be appropriated now because: there are unresolved issues about Copperhead rounds relating to system vulnerability, weather effects and cost-effectiveness; an impact switch for increasing the reliability of the 105-mm high explosive antitank round is still being developed; and the ground-emplaced mine scattering system is not currently needed. Also, the Army should not procure a depleted uranium penetrator until a potential health hazard has been resolved. All but 2 of 13 modernization and expansion projects reviewed were adequately justified. Two projects that should be deferred are replacing of four obsolete ammonia oxidation plants at the Holston Army Ammunition Plant with a new \$14.4 million facility and improving the main heating plant at the Iowa Army Ammunition Plant. Projects in the ammunition manufacturing methods and technology program were production oriented, the Army's review process was extensive, and past years' project results were disseminated for use by others. Production support and equipment replacement projects at four locations could not be supported. Recommendations: The House Committee on Appropriations should: reduce by \$85 million the Army's request for procuring conventional ammunition, reduce by

\$18.9 million the request for modernizing and expanding the ammunition production base, reduce by \$2.1 million the request for production support and equipment replacement, and direct the Army not to procure the depleted uranium penetrators until the potential health issue has been resolved. The Army should revise its procedures for reviewing annual support projects to insure that budget reviews are thorough and that they are conducted before the Army finalizes its budget. (Author/HTW)

REPORT BY THE

Comptroller General

OF THE UNITED STATES

Army's Fiscal Year 1979 Programs For Procuring Conventional Ammunition And Related Production Base Support

The Army has requested \$1.15 billion for procuring conventional ammunition and \$265 million for related production base support.

This report presents reasons for GAO's belief that

- funds should not be appropriated now for three requested items,
- two modernization projects should be deferred, and
- the Army overstated its production support and equipment replacement needs.

GAO recommends that the ammunition request be reduced by \$85 million and the production base support request by \$21 million.





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

B-172707

The Honorable George H. Mahon
Chairman, Committee on Appropriations
House of Representatives

Dear Mr. Chairman:

As requested on November 28, 1977, we reviewed the Army's justification for its fiscal year 1979 appropriation request for procuring conventional ammunition and related production base support.

On March 13, 1978, we gave your office some preliminary fact sheets and questions for the Army to answer on various ammunition line items and production base support projects for which funds were requested. In addition, on May 1, 1978, we provided you with a draft of this report.

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

Sincerely yours,

A handwritten signature in black ink, reading "Luther B. Starks".

Comptroller General
of the United States

D I G E S T

The Army's fiscal year 1979 ammunition appropriation request was \$1.15 billion for procuring conventional ammunition and \$265 million for related production support.

The ammunition is for annual peacetime training and reserve wartime stocks. Most requested production support funds are for modernizing and expanding the Army's ammunition plants. The remaining support funds are to cover repairs and replacement of equipment for sustaining current plant production, maintaining inactive ammunition plants and mobilization equipment, and developing improved ammunition production processes and techniques.

AMMUNITION HARDWARE

GAO reviewed the Army's justifications for its appropriation request for 18 items, including large dollar amounts and first time procurements. These items represented 68 percent of the ammunition request (\$780.1 million).

For the following reasons GAO concluded that \$85 million requested for three conventional ammunition items should not be appropriated now: (See p. 4.)

- The \$43.1 million for 2,500 Copperhead rounds should not be provided because the system's vulnerability to enemy countermeasures, effects of weather and terrain, and cost-effectiveness have not yet been resolved.
- The \$36.1 million for the 105-mm high explosive antitank round should not be provided because a full-frontal area impact switch for increasing the

round's reliability from 48 to 95 percent is still being developed.

--The \$5.8 million for the ground-emplaced mine scattering system is not currently needed because the system's dispenser had performance problems during development testing in February 1978. This delayed the system's type classification date to the fourth quarter of fiscal year 1979. It is Army policy to not schedule an item for procurement in a fiscal year unless its type classification is expected by the end of the first quarter of that fiscal year.

The Army also requested \$28 million for a 105-mm round called the Armor-Piercing, Fin Stabilized, Discarding Sabot-Tracer. The Army is currently procuring these rounds with a tungsten-type penetrator but plans to begin procuring rounds which have a depleted uranium penetrator after completion of testing and type classification which is scheduled for June 1978. The Army Surgeon General has expressed concern about the potential health hazard of depleted uranium munitions, and extensive environmental impact tests are being made. GAO believes that the Army should not procure the depleted uranium penetrator until the potential health hazard has been resolved.

PRODUCTION BASE SUPPORT

Modernization and expansion

GAO reviewed 13 of 22 modernization and expansion projects with estimated costs of \$167.8 million, or 84 percent of requested funds, and concluded that all but 2 of the projects were adequately justified by need, estimated cost, and available alternatives. (See p. 10.)

Replacing four obsolete ammonia oxidation plants at the Holston Army Ammunition Plant with a new \$14.4 million facility should be deferred because

- the existing new ammonia oxidation plant could be used to meet current operational needs,
- the old plants can be used to meet mobilization requirements,
- the estimated cost to construct the proposed plant may be unreasonably high,
- operating data on the existing new plant is essential to insure against construction of another plant with deficiencies, and
- the mobilization requirement is uncertain at this time.

The \$4.5 million project to improve and rehabilitate the main heating plant at the Iowa Army Ammunition Plant is premature and should be deferred because the exact work required is unknown. The estimated cost is based on work which may not be required. In addition, an evaluation of the boilers to determine if they should be replaced has not been completed.

Manufacturing methods and technology

GAO reviewed the ammunition manufacturing methods and technology program to determine if the fiscal year 1979 projects contained research and development efforts, the extent of the Army's project review process, and whether past project results were disseminated and made available for use by others. Time constraints prevented GAO from making a detailed review of the Army's review process.

GAO concluded that the fiscal year 1979 projects were production-oriented, the Army's review process appeared extensive,

and past years' project results had been disseminated for use by others. GAO's limited review did not disclose reasons for not funding the fiscal year 1979 projects with procurement appropriations. (See p. 15.)

Production support and equipment replacement

GAO reviewed 4 of 20 production support and equipment replacement projects estimated at \$9 million, or 29 percent of the funds requested. About \$2.1 million of the request is not needed based on the fiscal year 1979 production schedule at the four plants. (See p. 19.)

Although the Army improved its budget review procedures for annual support projects in response to GAO's report on the fiscal year 1977 program, additional improvements are needed to further strengthen these procedures.

The timing of the budget reviews for annual support projects was too late to benefit the Army's budget determinations. The reviews were not as thorough as they should have been, and their effectiveness was hampered by a lack of reliable data to substantiate the Army's request. As a result, the Army did not make the warranted reductions.

Accordingly, the production support and equipment replacement request should be reduced by \$2.1 million for unsupportable projects at the four locations included in the GAO review.

RECOMMENDATIONS

GAO recommends that the Committee

- reduce by \$85 million the Army's request for procuring conventional ammunition,
- reduce by \$18.9 million the Army's request for modernizing and expanding the ammunition production base, and

--reduce by \$2.1 million the Army's request for production support and equipment replacement.

GAO also recommends that the Committee direct the Army not to procure the depleted uranium penetrators until the potential health issue has been resolved.

GAO recommends that the Army revise its procedures for reviewing annual support projects to insure that the budget reviews are thorough and that they are conducted before the Army finalizes its budget.

ARMY COMMENTS

Because of lack of time, the Committee directed GAO not to follow its usual procedure of obtaining formal comments on this report from agency officials. Instead, GAO discussed the report and findings with Army officials, and they generally agreed with GAO's findings.

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CHAPTER 1

INTRODUCTION

The Army's fiscal year 1979 procurement of ammunition, Army appropriation request was \$1,420.1 million, consisting of \$1,154.8 million for procuring conventional ammunition and \$265.3 million for the related production base support.

The ammunition hardware request provides for annual peacetime training needs for U.S. Active and Reserve Forces and the acquisition of U.S. war reserve stocks for use during a war. The request includes 62 different ammunition line items, ranging from \$.5 million for 240,000 14.5-mm cartridges to \$144.4 million for 340,000 155-mm improved conventional munitions.

The ammunition production base support request consists of the following.

<u>Purpose</u>	<u>Amount</u> (millions)
Modernization and expansion	\$ 197.1
Production support and equipment replacement	31.0
Manufacturing technology	28.2
Layaway of industrial facilities	9.0
	\$ <u>265.3</u>

The fiscal year 1979 modernization and expansion program is the tenth increment of a multiyear plan begun in 1970. The overall goal of the program is to provide a modern, balanced, and responsive production base in support of U.S. and Allied Forces. In fiscal year 1979, the Army requested:

- \$41.0 million for initial production facilities for new ammunition items,
- \$62.9 million to modernize existing production facilities, and
- \$93.2 million to expand the production capacity for new, modernized ammunition items.

On July 20, 1977, we issued a report to the Chairman of the House Appropriations Committee on "Methods Used for Determining Conventional Ammunition Requirements" (LCD-77-401). In commenting on this report in March 1978, the Under Secretary of Defense (Research and Engineering) said that the current methods for determining conventional ammunition requirements are being addressed through a major Department of Defense study on defense combat sustainability. He also said that his office initiated a study on how to obtain the proper balance between expenditure of funds for ammunition war reserve inventories and ammunition production facilities.

These studies, expected to be completed in early fiscal year 1979, could result in major changes in Department of Defense policies affecting conventional ammunition inventory objectives.

In addition, the Army is revising its methodology for computing ammunition requirements. This new study, called WARRAMP, is expected to be completed in December 1978 and will result in revised requirements for ammunition items. Some changes may have to be made to the fiscal year 1979 program after completion of the Army study. Because the new study has not been completed, we reviewed the justifications for the items on the basis of the requirements computed under the old methodology.

SCOPE OF REVIEW

We interviewed and obtained documents from Department of Defense and Army officials. Following is a list of primary locations for our review:

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

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

Army Armament Materiel Readiness Command,
Rock Island, Illinois

Hawthorne Army Ammunition Plant,
Hawthorne, Nevada

Holston Army Ammunition Plant
Kingsport, Tennessee

Iowa Army Ammunition Plant,
Burlington, Iowa

Milan Army Ammunition Plant,
Milan, Tennessee

Radford Army Ammunition Plant,
Radford, Virginia

As in prior years, we did not review and validate the Army's computations for mobilization requirements.

CHAPTER 2

AMMUNITION HARDWARE

The Army's fiscal year 1979 appropriation request for procuring conventional ammunition was \$1,154.8 million. We examined the Army's justifications for 18 items involving large dollar amounts and first time procurements. These 18 items represented \$780.1 million, or 68 percent of the ammunition request.

Because of time constraints, we did not perform detailed reviews of the selected items but limited our review to the justifications for the selected items and the status and results of the testing programs for new items. As in the past, we did not review and validate the Army's computations for mobilization requirements.

Generally, we found adequate justification supporting the Army's request for the selected ammunition items, except for \$85 million requested for the following three:

--\$43.1 million for Copperhead rounds,

--\$36.1 million for 105-mm high explosive antitank rounds, and

--\$5.8 million for a new ground-emplaced mine scattering system.

There are various issues which should be resolved or better justifications obtained before funds are appropriated for procuring the first two items and the type classification date has slipped for the third item so that, in line with Army policy, funds are no longer needed.

In addition, the Army Surgeon General has expressed concern about a potential health hazard involving the depleted uranium penetrator in the Armor-Piercing, Fin-Stabilized, Discarding Sabot-Tracer and extensive environmental impact tests are being made. We believe that the Army should continue procuring the tungsten type penetrator until the potential health hazard issue has been resolved.

COPPERHEAD (XM712)

Copperhead is a 155-mm cannon launched guided projectile. It is equipped with a terminal guidance system and is launched from conventional howitzers.

The Army request for Copperhead consists of \$12.7 million to complete the initial production facility 1/and \$43.1 million for procurement of 2,500 rounds. There are numerous critical operational issues which still need to be resolved before a decision can be made as to whether the system will be fielded.

Copperhead is currently in engineering development. It is scheduled to be type classified in March 1979 when a production decision will be made.

In authorizing the fiscal year 1978 research and development funds, the Congress stipulated a date by which the Army and Navy Laser-Guided Projectile Programs must achieve an initial operational capability. The Army's current schedule for achieving the initial operational capability is about 10 months before the Committee's date.

We have reviewed this system for the past several years as part of our major acquisition review process. Our latest report on the status of the Army's Copperhead and the Navy's Laser-Guided Projectile Programs was issued May 1, 1978 (PSAD-78-38), and a copy was sent to the Committee. The report identifies several unresolved critical operational issues that could negate or degrade Copperhead's effectiveness. These issues, which include system vulnerability to enemy countermeasures, the effects of weather and terrain as well as cost-effectiveness, are discussed in detail in our other report. To avoid classifying this report we are not presenting the details here.

The Army recognizes there are operational issues affecting use of Copperhead and many questions are not resolved. A developmental and operational test program is planned to address these issues.

A comparison of the latest milestones with those in our latest status report shows slippage in the testing schedule. For example, the final engineering developmental and operational tests planned for November 1977 to October 1978 are now scheduled for March 1978 through April 1979. Also developmental and operational testing of initial production rounds was scheduled to begin in November 1979 and end in April 1980. These tests are now planned for April through August 1980.

1/In fiscal year 1978, \$21.8 million was appropriated for the initial production facility.

Another important operational consideration is the need for a target designating device to make Copperhead usable. Current plans indicate that such a device will not be fielded until about 7 months after Copperhead is fielded. To meet Copperhead's date, the Army plans to issue refurbished prototype designators until production models are available.

105-MM HIGH EXPLOSIVE ANTITANK
CARTRIDGE (M456)

The Army's fiscal year 1979 procurement request for this item totals \$36.1 million. This includes \$18.9 million for procurement of 82,000 new rounds and \$17.2 million for the procurement of components for remanufacturing 145,000 un-serviceable rounds in the inventory.

On April 24, 1978, Army officials said that the Army no longer plans to remanufacture the un-serviceable rounds. Instead, the rounds will be used for training purposes, and the \$17.2 million requested for the remanufacture will be reallocated to procure additional new rounds. According to Army officials, it would be more cost-effective to procure new rounds than to remanufacture rounds. Since the Army recently made this decision, we were unable to review the Army's decision.

The Army's plans for procuring new rounds are contingent upon successful development of a full frontal area impact switch which is needed to significantly improve the round's performance. The standard nose design requires solid nose impact to function. However tests conducted against actual tank targets and studies of the Arab-Israeli tank engagements have shown that the nose is not always the first part of the round to strike the target. In such instances, the round breaks up which causes duds and incomplete penetration. The new switch will expand the sensitive impact area and is expected to increase the round's current reliability of 48 percent so that it will be 95 percent reliable.

The House Appropriations Committee's report on the Department of Defense Appropriation Bill for 1978 stated that a review of this item was necessary because of serious malfunctions. The Army had stopped procurement of the round and the fiscal years 1976 and 1977 funds provided for this purpose had not been obligated. Consequently, the Congress did not provide additional funds for this item in 1978.

The Army is currently testing high explosive antitank rounds with the full frontal area impact switch and expects

to type classify the round in June 1978. We noted that the Army originally scheduled type classification in 1975 but continuing developmental problems have delayed completion. Consequently, we believe that funds should not be appropriated until resolution of the problem.

GROUND-EMPLACED MINE SCATTERING SYSTEM

The Army's fiscal year 1979 ammunition request included \$5.8 million for 11,000 mines. The Army also requested \$2.2 million to expand the production capacity for the mines and \$1.8 million in other procurement, Army appropriations. The latter represents funds for six mine dispensers.

At the time of the budget request, the Army's schedule for type classifying the ground-emplaced mine scattering system was the first quarter of fiscal year 1979. However, in February 1978 developmental testing of the dispenser was halted due to performance problems. The Army is currently revising the program to improve the dispenser's reliability and has rescheduled the system's type classification date for the fourth quarter of fiscal year 1979.

The Army's procurement policy states that, generally, an item will not be scheduled for procurement in a fiscal year unless it is scheduled for type classification by the end of the first quarter of the same fiscal year. Because the type classification date is no longer scheduled for the first quarter, the \$5.8 million for procuring mines is no longer needed.

We did not review the Army's \$2.2 million expansion project (5793594) for the mines but did obtain some general information about the project. The Army plans to fund expansion of the mines' production capacity before completion and prove-out of the initial production facility, which was funded in fiscal year 1978 (project number 5784869) based on the Army's plan for procuring mines during the 5 years between fiscal 1979 and 1983.

Because of the delay in the system's type classification date, it may be premature to proceed with increasing production capacity for the mines. In addition, since the development problems are with the dispenser, the \$1.8 million requested for them is no longer needed.

105-MM ARMOR-PIERCING, FIN-STABILIZED,
DISCARDING SABOT-TRACER (M735, XM735E1, XM774)

The Army's fiscal year 1979 budget request includes \$28 million for procurement of 49,000 cartridges and \$5 million for an initial production facility to produce depleted uranium penetrators.

Depleted uranium projectiles are being developed because two of the current 105-mm cartridges (M392 and M728) lack the capability to kill existing tanks under certain critical conditions and the third type currently produced--with a tungsten alloy penetrator (M735) does not provide the needed kill capability against improved tank armor.

According to the Army, the depleted uranium projectiles presently under development--the interim XM735E1 and the final version XM774--will provide significant performance improvements and cost savings. The Army estimates that the XM774 will be much more effective than the tungsten alloy penetrator and will cost \$90 to \$115 less per unit. The XM735E1 round, scheduled for type classification in June 1978, will provide the same performance as existing projectiles at lower cost. The XM774, scheduled for type classification in April 1979, is the only 105-mm antitank cartridge capable of defeating improved tank armor beyond the 1990s.

Approval of the Secretary of Defense is needed before depleted uranium munitions can be produced. The Army requested approval on September 23, 1977. If these depleted uranium munitions are not produced, the Army will continue to procure the more expensive tungsten alloy round.

On March 24, 1978, the Army provided the Under Secretary of Defense for Research and Engineering an Environmental Impact Assessment for the 105-mm depleted uranium rounds to update their earlier production approval request. In this submission, the Assistant Secretary of the Army for Research, Development, and Acquisition stated that the Army Surgeon General is concerned about the potential health hazard of depleted uranium munitions. Due to this concern, the Army has contracted for two independent studies to perform extensive environmental impact tests on the effects of depleted uranium munitions from production through field use. These studies are scheduled for completion this summer.

RECOMMENDATIONS

We recommend that the Committee reduce by \$85 million the Army's request for procuring conventional ammunition, as follows:

- Reduce by \$43.1 million the request for Copperhead.
- Reduce by \$36.1 million the request for the 105-mm high explosive antitank round.
- Reduce by \$5.8 million the request for the ground-emplaced mine scattering system.

We also recommend that the Committee direct the Army not to procure the depleted uranium penetrators until the potential health issue has been resolved.

CHAPTER 3

AMMUNITION PLANT MODERNIZATION AND EXPANSION PROGRAM

The Army's fiscal year 1979 request for modernizing and expanding the ammunition production base was \$197.1 million for 22 projects. The projects are similar to prior year requests. For example, the Army's plans for fiscal year 1979 call for

- an initial production facility for the new surface-launched unit fuel air explosive, which gives the Army standoff capability to clear mine fields;
- a project to expand production of antipersonnel and antitank mines for the ground-emplaced, mine scattering system;
- a modernization project to provide the Milan Army Ammunition Plant with a central facility to X-ray ammunition components and end items to identify those which are unsafe; and
- a support project to provide a pilot facility to ship and receive ammunition in containers at the Milan Army Ammunition Plant.

See appendix I for a complete project listing.

We reviewed 13 of the 22 projects estimated to cost \$167.8 million, or 84 percent of the total funds requested. All but the following two projects were adequately justified as to need, estimated cost, and consideration of available alternatives.

<u>Project number</u>	<u>Location</u>	<u>Description</u>	<u>Amount (millions)</u>
5793906	Holston	Construction of an ammonia oxidation plant	\$14.4
5793593	Iowa	Rehabilitation of a steam generating plant	4.5

In addition, the Army may want to defer the \$2.2 million expansion project for the ground-emplaced mine scattering system discussed in chapter 2.

PROJECT 5793906

At the Holston Army Ammunition Plant, the Army has an estimated daily need for 25 tons of nitric acid for peacetime production and 470 tons of nitric acid daily in wartime. The Army plans to meet these needs with

- a 330-ton plant completed in 1974 but not yet operational and
- a 150-ton plant proposed for fiscal year 1979 funding.

It expects to use the 150-ton plant to produce its peacetime needs and put the 330-ton plant in layaway since the respective minimum daily production capabilities of the two plants makes this an attractive option. Details follow.

The Army plans to construct--at a cost of \$14.4 million--a new 150 tons-a-day ammonia oxidation plant to produce nitric acid at the Holston Army Ammunition Plant. An earlier plant was funded in fiscal year 1970 (Project 5702072) to replace six plants now being exceeded by the Army. The proposed plant will replace the last four plants at Holston. The Army justified this project on the basis that the older plants cannot meet pollution abatement standards without modifications, have been in operation for 21 years, and replacement parts for them are scarce and may soon have to be fabricated. The Army is taking steps to insure that the proposed plant will use the same production and pollution abatement process as the latest plant and will be energy self-sufficient.

The construction of another new ammonia oxidation plant at this time does not appear fully justified because

- the latest ammonia oxidation plant can be used to produce nitric acid for current operations if additional nitric acid storage capacity is provided;
- the old plants are operational and can produce the additional quantities of nitric acid needed for mobilization requirements;
- the estimated cost of \$14.4 million to construct the proposed 150-ton plant may be unreasonably high; and
- operating data on the latest plant is essential to insure against the construction of another plant with deficiencies.

As of March 1978, the peacetime requirement for nitric acid at Holston was 25 tons a day, which was being produced intermittently using two of the four old plants. When completed in January 1981 the Army plans to use the proposed new plant for peacetime production at minimum capacity of 75 tons-a-day intermittently on an 11-day cycle because of limited storage at Holston for weak nitric acid of 800 tons.

The minimum production capability of the latest plant is 150 tons-per-day of nitric acid. Army and Holston Army Ammunition Plant officials told us that to operate the plant efficiently it must be operated on a 14-day cycle at 150 tons per day, and there is a need for additional storage capacity of 1,300 tons at an estimated cost of \$1.5 million if used for current operations.

Although the four old ammonia oxidation plants to be replaced by the new plant each can produce 50 tons of nitric acid daily, only two meet State of Tennessee pollution abatement standards. One is equipped with a molecular sieve (pollution abatement equipment) developed under a manufacturing methods and technology project, and the other has been jury-rigged to meet applicable pollution abatement standards.

The cost estimate of \$14.4 million for the proposed ammonia oxidation plant was provided by the Corps of Engineers. In March 1978 it was being reviewed by the Production Base Manager's office. The estimate is almost twice the June 1977 estimate of \$7.6 million.

The latest 330-ton ammonia oxidation plant was completed in September 1974, but as of April 1978, it had not been fully accepted by the Army. A mechanical failure occurred during prove-out tests, resulting in pollution above the allowable levels for new facilities. Needed repairs are expected to be completed in September 1978 when further tests are planned. If they prove successful, the Army plans to place the plant in lay-a-way and to use it only during mobilization.

The proposed 150-ton plant will be the ninth constructed since 1970 at various Army ammunition plants. The others cost between \$3.8 million and \$12.7 million each, and although all have been completed, all have operational deficiencies or require design changes. (See app. II.)

The Army's latest computation of the mobilization requirement for nitric acid at Holston is 470 tons-a-day. The

capability to produce nitric acid using the new ammonia oxidation plant and the two old plants equipped with pollution abatement equipment is 430 tons-a-day, within 3 percent of the mobilization requirement. The requirement for the explosives using the nitric acid (RDX/HMX) appears uncertain at this time. After computing its mobilization requirement of 470 tons-a-day, the Army decided not to produce a planned heavy user of RDX/HMX, the 105-mm XM710 improved conventional munition. Potential changes in the requirements for RDX/HMX items emerging from research and development and weapons inventory changes may raise the requirement.

Conclusion

We believe that construction of another ammonia oxidation plant at the Holston Army Ammunition Plant is premature and that the Army should: (1) obtain additional required storage capacity for nitric acid, (2) operate the latest ammonia oxidation plant intermittently at its minimum operating capacity of 150 tons-a-day, and (3) place the four older plants on standby for use only if necessary.

Recommendation to the Committee

We recommend that this \$14.4-million project for construction of a new 150 tons-a-day ammonia oxidation plant be deferred until further evaluation of the need for and cost of the proposed plant has been completed by the Army.

PROJECT 5793593

This \$4.5-million project is to improve and rehabilitate the main heating plant at the Iowa Army Ammunition Plant, to make it more efficient and to operate it properly with a recently installed precipitator (pollution abatement equipment). The project will provide new coal handling equipment, new steam control systems, and replacement of some deteriorated plant support structures. It also includes installation of a turbine which is designed to operate with the present boilers and provide an auxiliary source of electrical power.

The final design and estimated cost for this project is based on a scope of work which the Production Base Manager and Iowa Army Ammunition Plant officials believe is required. The Army Corps of Engineers, which is responsible for final review of the project designs, has not concurred in the planned work because the heating plant has not been evaluated during operation. The heating plant has been inoperable since June 1976 when it was shut down to install

the precipitator. Although installation of the precipitator was completed in September 1977, efforts to restart the heating plant have been unsuccessful. The Corps pointed out that the boilers are over 36 years old and may have to be replaced, in which case major modifications to the scope of work would be required. Production base manager officials told us that additional funds will be needed if the boilers must be replaced, and the project will not be executed.

A study scheduled for completion in June 1978 will determine why the present heating plant will not operate and will estimate the remaining useful life of the boilers. Following its completion, the exact nature of the required work should be known.

Conclusion

We believe this project is premature because (1) the estimated cost is based on work which may not be required and (2) an evaluation of the boilers has not been completed to determine if they should be replaced.

Recommendation to the Committee

We recommend that this \$4.5-million project to improve and rehabilitate the main heating plant be deferred until the exact nature of the work required is known. At that time a coordinated effort to improve and rehabilitate the entire plant and make it operate with the new precipitator can be conducted.

CHAPTER 4

MANUFACTURING METHODS AND TECHNOLOGY--

IMPROVING AMMUNITION MANUFACTURING PROCESSES

The Army's fiscal year 1979 request for ammunition production base support funds includes \$28.2 million for 56 manufacturing methods and technology projects. These projects are designed to develop improved processes, techniques, and equipment for use in the ammunition production base.

We reviewed 7 projects in detail and made a cursory review of the other 49 projects primarily to determine if the fiscal year 1979 projects contained research and development efforts. We also inquired (1) about the extent of the Army's project review process and (2) whether the project results are disseminated and available for use by others. Because of time constraints we did not make an indepth review of the review process or the specific criteria used by the Army to review the projects. Our limited review disclosed that:

- the fiscal year 1979 projects are production-oriented and consequently it is appropriate to fund them with procurement appropriations,
- the Army's project review process appears extensive, and,
- the past years' project results were disseminated and made available for use by other Government agencies and private industry.

FISCAL YEAR 1979 PROJECTS ARE PRODUCTION-ORIENTED

The House Committee on Appropriations reduced by \$15 million the Army's fiscal year 1978 request for the manufacturing methods and technology program because (1) it was concerned about the requested 60-percent funding increase over the previous year's program and (2) it appeared that some research and development projects were included. Because of the Committee's concern, the Army took precautions to insure that only production-oriented projects were included in the fiscal year 1979 program.

The Army has emphasized to those responsible for initiating and reviewing manufacturing methods and technology projects that any inclusion of research and development

could further jeopardize the program. The Army further stressed the importance of not including research and development efforts.

Our review of 7 ammunition manufacturing methods and technology projects in the fiscal year 1979 program disclosed that each was in response to a production problem. These projects represented \$7.8 million, or 1.5 percent of the total requested funds. One project is designed to develop automated equipment which will insert grenade layers into projectiles. The automated equipment is expected to replace a manual process which is costly and hazardous to personnel. Another project is designed to develop technology to reduce energy requirements during production. This project is important because the energy required to produce ammunition during a mobilization may not be readily available.

We also made a cursory review of the other 49 ammunition manufacturing methods and technology projects in the fiscal year 1979 program and found no indication that any of the projects were not production-oriented.

ESTABLISHED REVIEW PROCESS APPEARS EXTENSIVE

Army procedures provide for extensive reviews of all manufacturing methods and technology projects. Reviews are made by the U.S. Army Materiel Development and Readiness Command headquarters staff, the ammunition Production Base Manager, the U.S. Army Armament Research and Development Command, the U.S. Army Armament Materiel Readiness Command, the Industrial Base Engineering Activity, and the U.S. Army Materials and Mechanics Research Center.

The U.S. Army Materiel Development and Readiness Command is the overall coordinator of the Army's manufacturing methods and technology program. In addition to munitions, the program includes weapons, missiles, communications, and combat vehicles. Our review was limited to the munitions program which is managed by the Production Base Manager. The U.S. Army Armament Research and Development Command executes the program through inhouse efforts and contracts with private industry. The U.S. Army Armament Materiel Readiness Command is responsible for the readiness of the ammunition production base and is the user of the technology. The Industrial Base Engineering Activity and the U.S. Army Materials and Mechanics Research Center review the proposed projects for technical feasibility and economic practicability and serve as advisers to the Production Base Manager. These organizations recommend project revisions and deletions, including efforts that appear to be research and

development. Above the U.S. Army Materiel Development and Readiness Command, interest tends to be based on broader budgetary considerations.

PROJECT RESULTS ARE DISSEMINATED

Manufacturing methods and technology project results are disseminated through formal written reports, technical journals, newsletters, business and trade publications, and defense community conferences.

A final summary report and a technical report is required at the completion of each project. These reports are distributed to other Department of Defense and Government agencies and to private industry when applicable. We reviewed examples of these and found that the reports were extensive. They were production-oriented summaries of improved processes, techniques, or equipment.

The manufacturing technology program, in general, has been the subject of articles appearing in defense community journals, such as "National Defense" and "Defense Management Journal." Quarterly, the Army publishes the "Mantech Journal" to communicate the latest manufacturing technology developments to Government and industry. An edition devoted to Army armament included a number of references to manufacturing methods and technology efforts, such as water management and small caliber ammunition manufacturing.

The water management study, part of a pollution abatement project, was concerned with the recycle and reuse of plant waste water. Study results were reported in a "Business Week" article and discussed at conferences attended by Government and industry representatives. A technical study report was distributed within the Army and a Production Base Manager official stated it was provided to other Department of Defense, Government, and industry sources.

The small caliber ammunition manufacturing project resulted in a new high speed manufacturing process, which has been discussed at Defense manufacturing technology conferences and was the subject of a Production Base Manager "technology brief" prepared for the Department of Defense ammunition community. The Production Base Manager stated that other nations are interested in the new process, and a technology demonstration is planned in May and June of 1978.

A recent analysis completed by the Production Base Manager shows that 60 percent of the 101 ammunition manufacturing methods and technology projects completed since 1969

were implemented by the Army, and another 23 percent have applications and are planned to be implemented. Following are some examples of projects which have been implemented:

- A molecular sieve which is currently being used to abate air pollution from nitrocellulose (basic explosive) manufacturing lines at the Radford Army Ammunition Plant and successfully abates air pollution emitted from an ammonia oxidation plant which produces nitric acid at the Holston Army Ammunition Plant.
- Automated equipment installed at the Indiana Army Ammunition Plant to manufacture propellant charge bags which was previously labor-intensive and costly.
- A system to recycle huge quantities of water used in the manufacture of nitrocellulose at the Radford Army Ammunition Plant. It may be used in continuous nitrocellulose modernization projects at the Badger, Indiana, and Sunflower Army Ammunition Plants.
- Automated equipment to produce the point detonating M739 fuze with anticipated savings of \$0.32 per fuze. The mobilization requirement for this fuze is almost 3-million a month.

CONCLUSIONS

The Army is taking measures to insure that projects are production-oriented and that research and development efforts are not included in the program. This program appears to be of utmost importance to the modernization and expansion program because it insures that the most advanced technology available is used.

Numerous organizations are involved in the review process, and based on our limited review, it appears that the reviews are extensive.

The results of the projects are widely disseminated and available for use by Government agencies and private industry. We verified on a limited basis that the results of projects are used.

CHAPTER 5

ANNUAL SUPPORT PROJECTS

The Department of the Army's fiscal year 1979 budget requested \$31 million for production support and equipment replacement at 20 facilities in active production. These funds are for projects to repair, rehabilitate, or replace equipment at active Government-owned facilities to sustain current production schedules and quality levels.

We visited four Army ammunition plants--Hawthorne, Iowa, Milan, and Radford--to evaluate the need for selected projects. The annual support projects for these four plants had a total value of \$9 million, or about 29 percent of the total fiscal year 1979 program.

The Army had improved its budget review procedures for annual support projects in response to our 1976 report. 1/ However, additional improvements are needed to further strengthen these procedures. We found that in some cases:

- Army personnel responsible for reviewing the projects had not verified the support data for the cost estimates and economic analysis.
- The project's technical acceptability was not adequately evaluated.
- Equipment descriptions were vague, and there was a lack of documentation to substantiate the plant's cost estimates and justifications.
- The timing of the budget reviews was too late to be of use in the Army's budget determination.

On the basis of our review of the four annual support projects, we believe that the dollar amount of valid annual support projects needed during fiscal 1979 to support production at these plants will be \$2.1 million less than the \$9 million appropriation request.

CHANGES IN PROJECT APPROVAL PROCEDURES

In our July 30, 1976 report, we cited a need for improvements in the Army's review process. Although the

1/Programs for Procuring Conventional Ammunition and Modernizing and Expanding Ammunition Plants (LCD-76-449, July 30, 1976).

annual support projects went through three phases--prebudget, budget, and apportionment--followup onsite reviews were not made after the prebudget phase. The onsite prebudget reviews made were not as thorough as they should have been.

As requested, we evaluated progress of the U.S. Army Armament Materiel Readiness Command 1/ in revising its review procedures for annual support projects. We selected four plants for review--three of the largest projects for the Government-owned, contractor-operated plants and a Government-owned and operated plant (Hawthorne). As shown below, the Command had approved and submitted in its budget request \$10.5 million for these plants, of which the Army approved \$9 million.

<u>Location</u>	<u>Command request</u>	<u>Approved budget request</u>
	----- (millions) -----	
Radford	\$3.5	\$3.1
Iowa	3.0	2.5
Milan	2.9	2.3
Hawthorne	<u>1.1</u>	<u>1.1</u>
	<u>\$10.5</u>	<u>\$9.0</u>

Since our 1976 report, the Army has issued additional regulations for its reviews. The major difference between the Army's old review process and its new process is the expansion of its onsite reviews. Whereas prior onsite reviews only covered the prebudget phase, they now also cover the budget and apportionment phases.

The development and approval of the production support and equipment replacement projects begin with initial pre-budget guidance from Department of the Army. In response to this guidance, projects are conceived and initiated by the plant's operating contractors and reviewed by the Army's resident staffs. Staffs at the Government-owned, Government-operated plants follow a similar procedure. Over a 3-year period preceding the program year, three submissions--prebudget, budget, and apportionment--are required from the plants.

1/The Armament Materiel Readiness Command is referred to as the Command throughout this chapter.

Before the prebudget submission and after the budget and apportionment submissions, personnel from the Command organize and participate in onsite plant reviews, to evaluate the need, technical adequacy, and format of project submissions. In practice a single plant visit will cover projects in all three phases for different program years. Although Command officials consider the prebudget phase of the review process one of the most critical, production requirements for the program year are still uncertain at that time because they are made 2 to 3 years before the start of the fiscal year.

Prior to our 1976 report, only limited revisions were made to annual support projects as they progressed through the budget and apportionment phases. There was a tendency to retain the prebudget projects as approved, even though production requirements or other conditions had changed greatly.

This practice has changed with the expansion of the onsite review. Whereas formerly the onsite review only covered the prebudget submission, it now also covers the submissions at the budget and apportionment stages. The major emphasis is still placed on the prebudget submission, but items in the budget and apportionment submissions are revalidated.

At each of the three phases (that is, prebudget, budget, and apportionment), annual submissions from the plants are disseminated for review to offices within the Command Headquarters. These offices represent various areas of technical expertise, such as security, environment, energy conservation, and safety. The annual support requests are also submitted for review to resident staffs from the U.S. Army Materiel Development and Readiness Command at Rock Island.

After comments are received from these various offices, a production base review board, consisting of representatives from throughout the Command, reviews the annual support projects. This board meets twice annually: First, to review prebudget and budget submissions; and second, to review apportionment submissions. After each production base review board meeting, approved projects are submitted to the U.S. Army Materiel Development and Readiness Command Headquarters and to the Department of the Army. Each of the plants we visited had a prebudget and budget onsite review. The date of the latest review (budget onsite review) and the changes recommended by the review team are shown below:

	<u>Iowa</u>	<u>Milan</u>	<u>Radford</u>	<u>Hawthorne</u>
Onsite review	Sept. 1977	Oct. 1977	Jan. 1978	Nov.-Dec. 1977
Deletions recommended by onsite review team	\$745,000	-0-	-0-	\$90,000

In addition to the \$90,000 deleted at Hawthorne, the review team temporarily deleted \$134,500 contingent upon the Command's allowing use of production support funds for depot operations. It also deleted \$366,200 contingent on 5-inch cartridge case requirements. Hawthorne is not scheduled to produce this item in fiscal year 1979.

ADDITIONAL IMPROVEMENTS ARE NEEDED

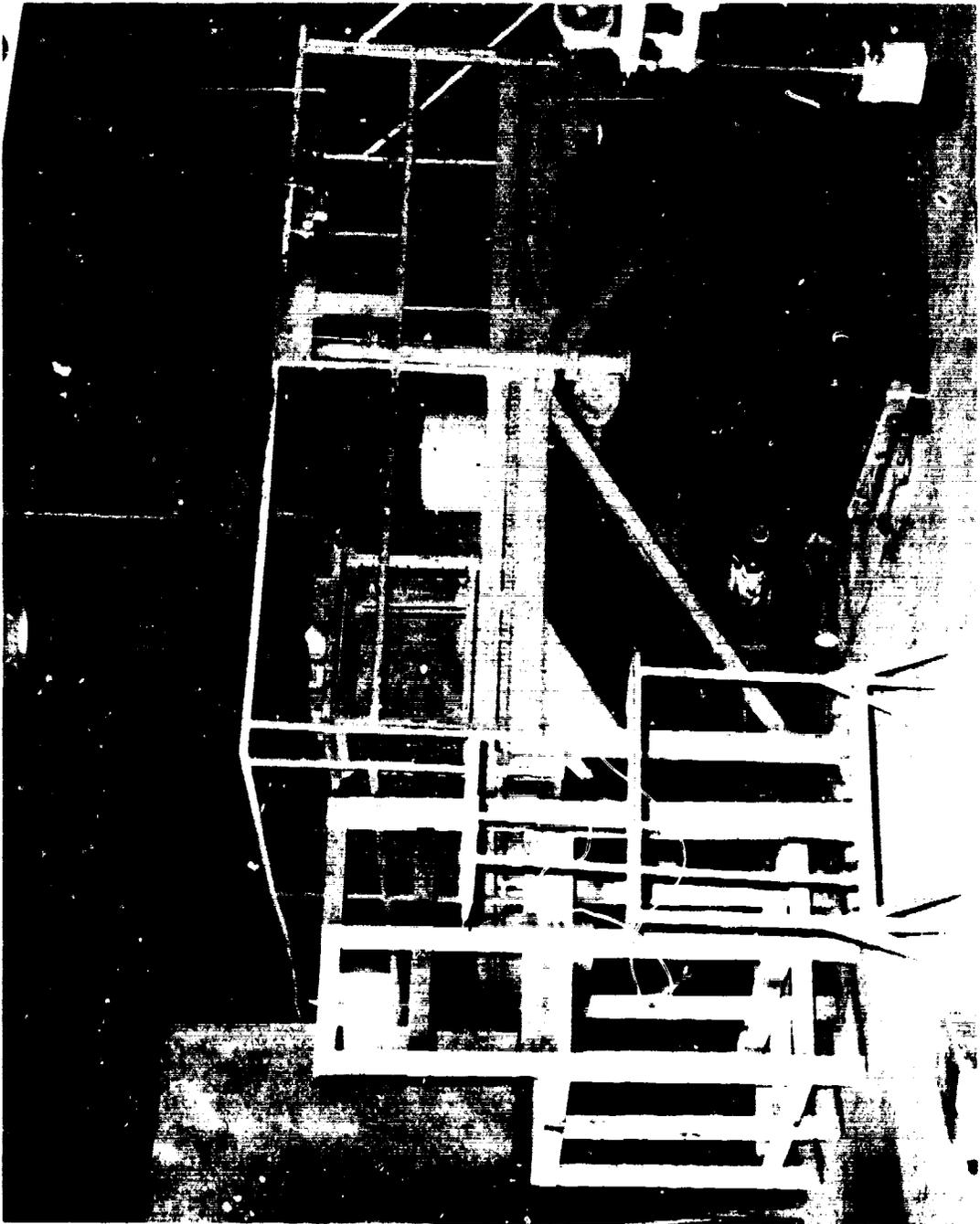
The Command's reviews provide valuable input for its management of production support and equipment replacement. There are some areas, however, in which the procedures should be strengthened and the plant's supporting detail improved.

Need to verify supporting data

The Command had not verified the data supporting the plant's economic analyses to justify new equipment purchases. In some cases, the data used by the plants in their economic analyses were inaccurate and the potential savings were overstated. For example:

--Iowa claimed that a building insulation project would reduce its heating costs for eight buildings from \$113,996 to \$5,756 a year. During our visit, the plant agreed that the estimated savings was overstated. This subproject was removed from the production base support program and placed in a fiscal year 1980 Military Construction, Army project.

--Hawthorne estimated that the purchase of a \$114,000 inert loading system would save it \$70,000 a year for a total savings of \$451,290. This savings was predicated on: elimination of two operations, operation at full capacity (2-1/2 times present capacity), and material cost savings through bulk purchase. The plant had not documented the operations to be eliminated, production volume and type, and the basis for its material cost savings. The information we obtained at the plant conflicted with that used in the economic analysis. After we discussed this project with the Command, it supplied us with a memorandum which claimed that two operators would be eliminated. It did not identify which operations



INERT LOADING SYSTEM AT HAWTHORNE

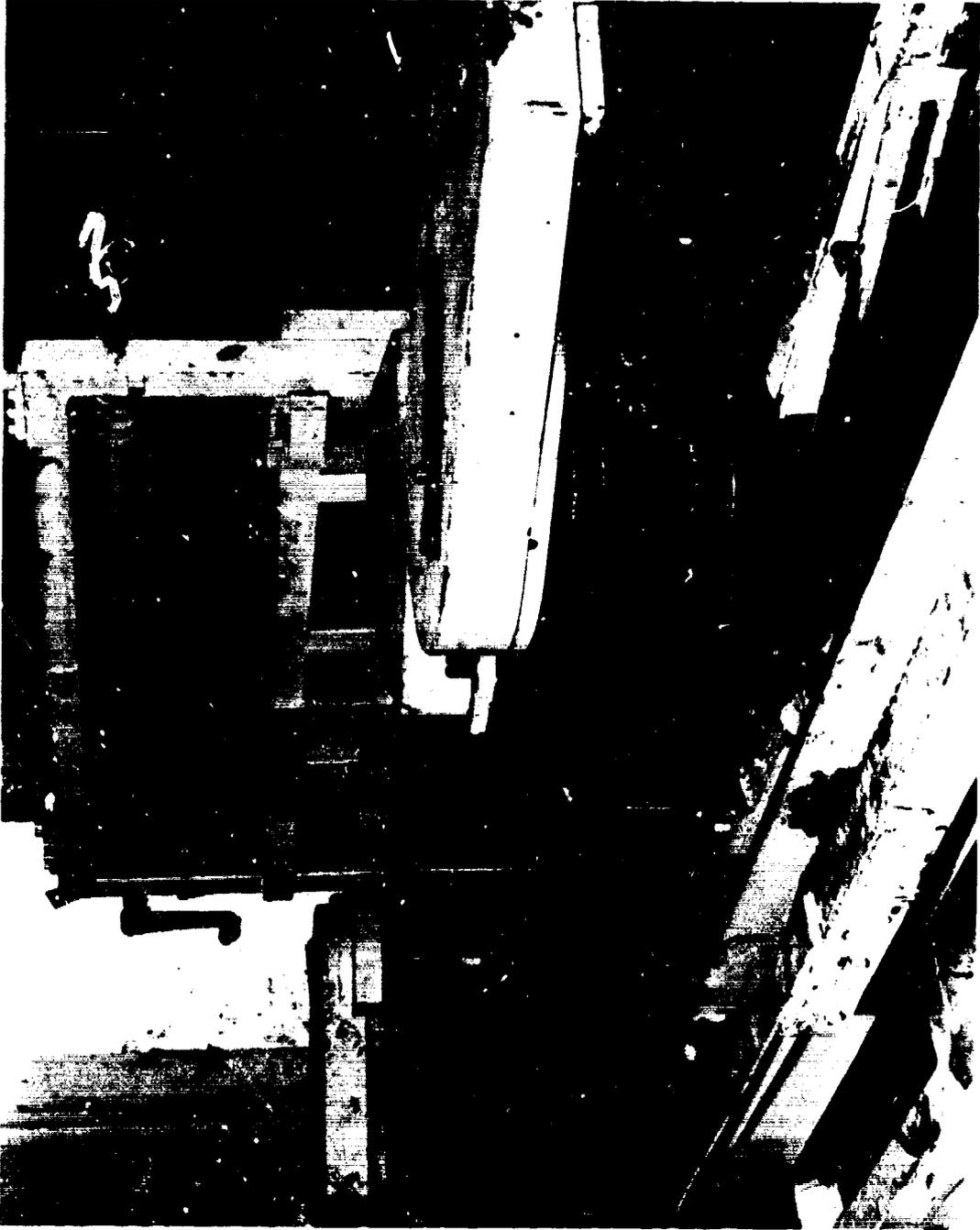
would be eliminated nor did it explain the basis for the original material savings estimate. A new economic analysis was prepared by the Command to justify the projects. The analysis was predicated on operating the system at 62 percent of capacity reported by the plant for 3 1/3 months of the year. Material savings used in the analysis were twice that which could be substantiated from a vendor.

The Command agreed that it would verify the support for the plants' economic analysis on a sampling basis in future reviews.

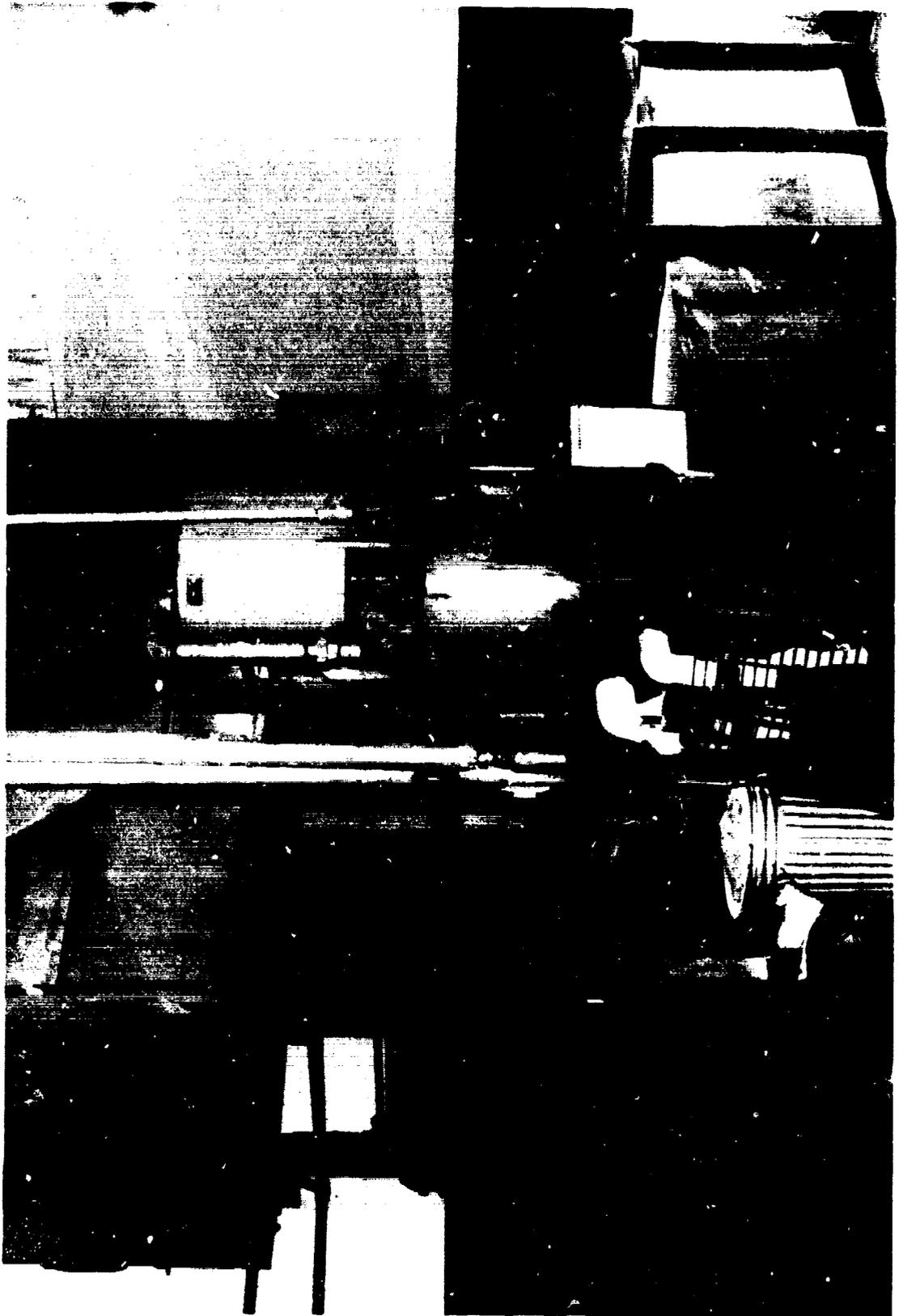
The Command reviews the plant's cost estimates only during prebudget onsite reviews. The cost estimates are too loose at that time to permit detail verification. We found that in some cases the plants overstated cost estimates in their budgets. For example:

- Milan requested \$143,530 to replace two box marking machines and a round marking machine. Their supporting documentation shows that the total cost for these items would be \$105,127. Thus the cost estimates were overstated by \$38,403.
- Hawthorne overstated by \$10,000 the estimated cost to buy and install a degreaser. Hawthorne requested \$60,000 although the supporting documentation showed that only \$50,000 was needed. The engineer who prepared the estimate added \$5,000 and another \$5,000 was added at the plant during preparation of the final request. We requested support for the increase, but the plant was unable to provide it.
- Radford requested \$103,680 to replace four poacher and blender tubs. Our review of their supporting documentation disclosed an error in applying an inflation factor to convert the cost estimates to fiscal year 1979 dollars. The material cost estimate was inflated twice, resulting in an overstatement of \$6,262.

The scope of our cost estimate verification at two plants was limited by a lack of documentation on how the estimates were developed. It appeared that the lack of documentation, at times, resulted because plant personnel guessed at the cost. In other cases plant officials did not know the source of the estimates. The Command agreed to verify the cost estimates on a sampling basis in future reviews.



BOX MARKING MACHINE AT MILAN



DEGREASER AT HAWTHORNE

We did not evaluate the projects for compliance with safety or other technical requirements. In two cases, however, we learned that the projects approved by the onsite team did not meet Command requirements. The equipment needed to meet these requirements costs more than the plant had provided for in its request.

--Iowa planned to build a projectile disassembly machine. The request approved by the Command did not include the cost of a \$50,000 disassembly station and its remote controls required for employee safety. An estimated cost of these safety requirements was not available. We were told it would be more than the amount approved for this subproject.

--The Command approved Iowa's request to purchase three melt kettles, which we subsequently learned did not meet the Command's technical requirements. There was some question as to whether they would be able to purchase all three kettles because they cost more than Iowa requested. This occurred even though the plant's estimate was based on the cost of 250-gallon kettles rather than its planned purchase of 150-gallon kettles.

The plants, in many cases, did not have the reliable data needed to aid the Command and us in evaluating their requests. Replacement of major equipment was justified by reference to excessive maintenance on the present equipment. However, the plants often had not kept maintenance records that would substantiate this justification in the plant's request. In other cases the description of the item that the plant sought to acquire was vague or incorrect. Thus, the review team did not have a clear idea of what it was approving.

Need for earlier budget reviews

The Command's budget reviews are too late to provide information for the Army to use in its budget. Eight of the fiscal year 1979 budget onsite reviews occurred after the budget was already fixed by the Army. For example, Army approved the full amount of \$1.1 million for Hawthorne. In its onsite budget review 2 months later, the team questioned \$590,700 of this amount (not including the inflation factor). Four other onsite reviews were so close to the setting of the budget that Army probably could not have considered the results in its budget decisions.

As noted earlier the Command makes onsite reviews of the projects in the prebudget phase. The usefulness of

these reviews is diminished by the unreliability of the data and uncertainty of the projects at that time. The budget reviews by contrast are much closer to actual implementation. The Army could use this information for its budget determination if the reviews were scheduled earlier.

REASONABLENESS OF ARMY'S BUDGET REQUEST

The Army set the total budget amount for each plant, specified that certain items be eliminated, and authorized the Command and the plants to work out the final projects. The amount approved for each of the four plants we reviewed was more than we believe should have been approved. Appendix III shows the reductions warranted had the Army considered the onsite review results and unneeded items identified by us and the plants along with its own deletions.

The plants were preparing their apportionment requests at the time of our review and eliminated most of the items questioned by the Army, the Command, and us. In some cases they deleted additional items which they believed should not have been included. Iowa, for example, had requested \$82,500 to replace three elevators. After the onsite review and approval of these items by the Command, the plant found that the annual inspections of the elevators disclosed no problems. It concluded that replacement was not warranted and deleted the elevators from its request.

In developing their apportionment budgets, the plants updated their cost estimates and added a 24.24-percent composite inflation factor to non-Corps of Engineer costs. Three plants added new items that were in the projects previously reviewed by the Command to bring their projects up to the total approved by Army. The total requested in Iowa and Milan's apportionment submissions matched the amounts approved by the Army. Hawthorne requested \$237,000 less in its apportionment submission than Army approved, while Radford requested \$70,000 more than Army approved.

The annual support projects for the four plants we reviewed should be reduced by \$2.1 million (23 percent of the approved budget for these plants):

- Equipment and improvements totaling \$1,068,300 should be deleted because they are not needed for fiscal year 1979 production. The Command agreed that \$800,070 of this amount should be deleted.
- Unreviewed items totaling \$1,006,241 should be deleted because they were added by the plants after Command review and have not been adequately evaluated

by the Army. These reductions are identified by plant in appendix IV.

The fiscal year 1979 projects will be reviewed by the Command's onsite review teams during the apportionment reviews. According to Command officials, the plants will not be allowed to purchase items which the review team concludes are not needed, and funds not needed at one plant will be reallocated to satisfy other needs. Command officials believed they would be able to use the entire \$31 million approved by the Army.

Because we did not randomly select projects in the fiscal year 1979 request to review, we cannot accurately estimate the total amount of unsupportable projects in that program.

CONCLUSIONS

The timing of the budget reviews by the U.S. Army Armament Materiel Readiness Command was too late to benefit the Army's budget determinations. The reviews were not as thorough as they should have been and their effectiveness was hampered by a lack of reliable data needed to substantiate their requests. As a result, the Army did not make the warranted reductions.

RECOMMENDATIONS

We recommend that the Committee reduce the Army request by \$2.1 million for the annual support projects shown in appendix IV.

We also recommend that the Army make additional needed improvements in its procedures. The schedule for reviewing and approving support projects should be modified to provide timely information for Army's budget determinations. The depth of the reviews also needs to be improved, and the plants should be required to develop and provide the reliable data needed to assist these reviews.

CHAPTER 6

EXPANSION PLANNING

In addition to reviewing the fiscal year 1979 appropriation request, we reviewed the actions taken on the recommendations in our 1976 report on the 1977 request. Two of the following three recommendations were implemented. The third was not.

- As recommended, the Army took steps to assure, as far as possible, a balanced production capability among components of end rounds.
- The Army now identifies the end-round production capability to be obtained with project funds requested.
- Although we recommended that the Army defer until fiscal year 1978 project 5773508 with an estimated cost of \$32.4 million for M509 shells, this was not done.

BALANCED PRODUCTION CAPABILITY

In 1976, the Army was in the early stages of a major production base expansion for a family of five artillery-delivered improved conventional munitions. These new munitions were designed and developed for use in existing 105-mm, 155-mm, and 8-inch artillery weapons. They differ considerably from the conventional high explosive rounds which are filled with an explosive that detonates on impact. The improved conventional munitions rounds carry a cargo of grenades or mine submissiles and are fuzeed to eject the cargo in the air down range discharging cargo over a broad area.

One of the Army's expansion objectives is to insure that, when the program is completed, it will have a balanced production capability among component facilities to provide a specific number of end rounds each month. For example, a capability to produce 30,000 shells a month would be useless without a corresponding production base for the cargo and the capability to load, assemble, and pack the shells.

In 1976 we reviewed the actual or planned starting and completion dates for the 23 improved conventional munition projects to expand the production base for the shell, fuze, cargo, and the load, assemble and pack facilities needed to produce complete 155-mm, M483, and 8-inch M509 end rounds.

We found that some facilities would be of little use during mobilization because the corresponding cargo, shell or load, assemble, and pack projects would not be completed.

In January 1977, a Systems Manager for Improved Conventional Munitions was established at the Project Manager's office. The Systems Manager's key areas of concern and responsibility are that he should

- be the single point of contact for Project Manager queries for information and status of improved conventional munitions' modernization and expansion projects;
- assure maximum use of existing capabilities and facilities, and monitor site selection activities for improved conventional munition projects; and
- assure the proper time phasing of the load, assemble and pack and the metal parts, fuze, propellants, and explosive efforts in regard to mobilization and the 5-year defense procurement.

During our current review, we analyzed the actual or planned starting and completion dates for six-load, assemble and pack and shell projects for the M509 round and six projects which will provide cargo for this and the M483 round. Generally, we found that the planned buildup will provide a balanced production capability through fiscal year 1983, prior to the last planned incremental buildup for this round which will provide 110,000 rounds a month. At that time, as shown by the following chart, the load, assemble and pack and cargo will be available between 1 and 1-1/2 years before the shell capability.

<u>Project number</u>	<u>Purpose</u>	<u>Estimated Cost (millions)</u>	<u>Estimated start</u>	<u>Estimated completion</u>
5823507	Load, assemble and pack	\$39.6	Feb. 1982	Feb. 1984
582C023	Cargo	36.8	Feb. 1982	July 1984
5833509	Shell	93.0	Feb. 1983	June 1985

The Systems Manager for Improved Conventional Munitions recognizes this shortfall and that project 5833509 should be funded earlier to provide the optimum balanced capacity. We were told that this project cannot be funded earlier, however, because current funding projections and requirements

for other ammunition production facilities prevent funding of this shell project which is estimated to cost \$93 million.

The Systems Manager also pointed out that some of the load, assemble and pack capacity available for the M509 round could be used for the M483 round. A trade-off appears to exist under the current modernization and expansion plans between establishing an optimally balanced capacity among components of existing end rounds and establishing the needed production facilities for new items scheduled for procurement under the 5-year defense plan.

IDENTIFY END ROUND PRODUCTION
CAPABILITY WITH PROJECT FUNDS REQUESTED

Informing the Congress of individual improved conventional munition projects as they interface with other improved conventional munition projects was started in fiscal year 1978. The Army grouped subprojects for component parts under one project number, and identified these subprojects in the introductory section of the budget request with the end round capacity to be achieved. For example, fiscal year 1979 project 5790003, estimated to cost \$8.1 million, is for initial production facilities for the new surface launched unit fuel air explosive (SLUFAE) round which will provide a stand-off capability to clear mine fields. The end round requires a rocket motor, fuze, propellant and load, assemble and pack facilities. Projects to produce these components are identified as subprojects in the introductory section of the budget request. Grouping of these subprojects under one project number, describing the subprojects in the introductory section of budget requests, and scheduling completion at about the same time complies with our recommendation. We reviewed the planned completion dates for the component part projects and other similar multipart projects in the fiscal year 1979 request and found the projects were scheduled for completion at about the same time and that complete end rounds' capability would be available.

DEFER PROJECT 5773508 FOR M509 SHELL

Project 5773508 estimated to cost \$32.4 million was to provide shells for the M509 round. This project was scheduled for completion about 1 year before facilities would be available for the cargo and the load, assemble and pack operations.

We had recommended that the shell project be deferred until 1978. The Army disagreed because shell projects take longer than cargo and load, assemble and pack projects.

The Army also believed that it was imperative to establish a second source for the shell production to drive the unit cost down through competitive bidding. Consequently, the project was not deferred. This project is now scheduled for completion in fiscal year 1980, about 4 months before the load, assemble and pack project and 10 months before the cargo project.

CONCLUSIONS

The Army has emphasized phasing projects for component parts to keep capacity which cannot be used to a minimum and has improved the method the Army used to present and defend its appropriation request to the Department of Defense and the Congress.

MODERNIZATION AND EXPANSION PROJECTS

<u>Army priority</u>	<u>Project number</u>	<u>Installation/title</u>	<u>Estimated cost</u> —(millions)—
1	<u>a/5793142</u>	Mississippi-Constr and Equip 155-mm M483A1 ICM Complex	\$64.6
2	<u>a/5793046</u>	DARCOM Omnibus Engineering	10.8
3	<u>a/5797000</u>	Corps of Engineers Omnibus Engr	7.8
4	5794877	X-Fac-Mfg Facility for Prod. of 105-mm APDS Depleted Uranium Penetrators	5.0
5	<u>a/5794871</u>	X-Fac-GATOR Air Delivered Target Activated Mine System	7.5
6	<u>a/5790003</u>	X-Fac-SLUFAC Mmunition Prod Base	8.1
7	<u>a/5790012</u>	Crane-155-mm/8-inch Center Core Prop	1.0
8	<u>a/5793904</u>	X-Fac-Precision Time Fuzes for ICM	18.4
9	5793601	Indiana-LAMP 60/81-mm Propellant Charges	1.0
10	5793594	Iowa Ground-Emplaced Mine Scattering System (GEMSS) with Mine AP XM74 and Mine AT-AV XM75	2.2
11	5793002	X-Fac-Manufacturing Equip for Small Caliber Cartridge Case Cups	3.9
12	<u>a/5793558</u>	Milan-Expansion of Prod Facilities for Fuze, PD, M739	18.0

a/Reviewed by GAO

APPENDIX I

APPENDIX I

<u>Army priority</u>	<u>Project number</u>	<u>Installation/title</u>	<u>Estimated cost</u> —(millions)—
13	a/5793562	Milan-LAP of Mortar Fuzes	\$ 2.4
14	a/5793906	Holston-Ammonia Oxidation Plant for Nitric Acid Plant	14.4
15	5792582	Norris-Vernon-Mfg Fac for Cart Cases, Phase 3 of 3 Phase Project	12.5
16	5792006	Lone Star-Application of Solar Energy for Pre- Heating Make-Up Boiler Feedwater (O-36)	0.1
17	a/5792620	Milan-Central X-Ray Fac, Line V	6.0
18	5792995	Sunflower-Igloo Magazines, Phase I	2.4
19	5792983	Radford Fire Alarm System	2.4
20	a/5793593	Iowa-Rehab and Improve Main Heating	4.5
21	5792419	Volunteer-Modification of Industrial Liquid Waste Treatment Facility	2.0
22	a/5793109	Milan-Container Distribution Sys	<u>2.1</u>
		Total	<u>\$197.1</u>

a/Reviewed by GAO

Nitric Acid Facilities Built at Army Ammunition Plants Since 1970

<u>Location</u>	<u>Size</u> (tons a day)	<u>Cost</u> (millions)	<u>Construction</u> <u>period</u>	<u>Status</u>
Sunflower	300	\$6.0	1971-1977	Compressors undergoing design changes. Start up scheduled for summer 1978.
Radford	370	3.8	1970-1972	Rehabilitation project scheduled for fiscal year 1980 to meet air quality standards.
Badger	400	7.9	1971-1978	Compressor undergoing design changes. Additional construction costing \$1 million is needed. Completion scheduled for November 1978.
Volunteer	330	11.0	1970-1974	Operational with deficiencies.
Volunteer	220	5.2	1970-1974	Operational with deficiencies.
Joliet	280	12.7	1970-1974	Operational with deficiencies.
Joliet	300	6.6	1970-1974	Operational with deficiencies.
Holston	300	5.0	1970-1974	Mechanical failure during prove-out. Repairs scheduled for completion in September 1978.

Reductions Justified Had the Army Considered the Onsite Review
Results and Unneeded Items Identified by GAO and the Plants
Along With Its Own Deletions

	<u>Hawthorne</u>	<u>Iowa</u>	<u>Milan</u>	<u>Radford</u>
	----- (millions) -----			
Transfers to other funding	-	\$0.5	-	\$0.4
Deletions made by Army	-	-	0.6	0.2
Items questioned by onsite review	0.6	.9	-	-
Items questioned by GAO	0.3	-	0.1	-
Revised cost estimates and other changes	-	(0.5)	-	(0.3)
Other deletions by the plant	<u>0.1</u>	<u>-</u>	<u>0.4</u>	<u>0.3</u>
Reduction justified	1.0	.9	1.1	.6
Actual reduction made by Army	<u>-</u>	<u>.5</u>	<u>.6</u>	<u>.4</u>
Additional reduction justified	<u>\$1.0</u>	<u>\$0.4</u>	<u>\$0.5</u>	<u>\$0.2</u>

Fiscal Year 1979 Annual Support Projects GAO Questioned

<u>Subproject</u>	<u>Suggested reduction (note a)</u>	<u>Reason for reduction</u>
<u>Hawthorne AAP Inert loading system</u>	\$135,888	Present equipment adequate for current requirements. Work-load uncertainty and questionable economic analysis warrant further Command evaluation.
Degreaser	71,520	Not needed for fiscal year 1979 production.
Controlled water cooling system	93,572	Not needed for fiscal year 1979 production.
Optical comparator	11,920	Deleted by onsite review team.
16-mm sound projectors	5,960	Deleted by onsite review team.
Cafeteria equip- ment	89,400	Deleted by onsite review team.
Equipment for 5-inch cartridge case production	436,510	Not needed for fiscal year 1979 production.
Equipment for depot operation	66,752	Deleted by onsite review team.
Additions by plant after Command review	6,212	Not adequately evaluated by the Command
	<u>\$942,170</u>	
<u>Iowa AAP Additions by plant after Command review</u>	\$444,725	Not adequately evaluated by the Command
Total	<u>\$444,725</u>	

<u>Subproject</u>	<u>Suggested reduction (note a)</u>	<u>Reason for reduction</u>
<u>Milan AAP</u> Box marking machine	\$ 68,264	Present machine is in good condition requiring only normal maintenance.
Patrol road widening and resurfacing	64,078	Not needed since planned production did not material- ize at the plant.
Additions by plant after Command review	<u>414,962</u>	Not adequately evaluated by the Command.
Total	<u>\$547,304</u>	
<u>Radford AAP</u> Additions by plant after Command review	<u>\$140,342</u>	Not adequately evaluated by the Command
Total	<u>\$140,342</u>	
Grand Total	<u>\$2,074,541</u>	

a/These amounts include the appropriate inflation factor.