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REPORT TO THE COMMITTEE ON
APPROPRIATIONS
HOUSE OF REPRESENTATIVES

72-0391

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Army's Program To Modernize
Ammunition Plants B-172707

Department of the Army

BY THE COMPTROLLER GENERAL
OF THE UNITED STATES

~~701137~~

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MAY 31, 1972





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

B-172707

FR Dear Mr. Chairman:

Your letter of March 10, 1972, requested the General Accounting Office to conduct a brief review of the Army's program to modernize its ammunition plants.

In accordance with your request, we obtained information concerning
1 (1) the nature of the Army's overall modernization program for ammunition *20* plants, (2) the consideration given to the results of the joint service study comparing the availability and cost effectiveness of various explosive fills, and (3) the modernization projects proposed for five of the plants in fiscal year 1973.

The review was conducted at Headquarters, Department of the Army; the Army Munitions Command, Dover, New Jersey; and the Army Ammunition Procurement and Supply Agency, Joliet, Illinois. In addition, visits were made to the Badger, Holston, Radford, Sunflower, and Volunteer Army Ammunition Plants. Information was obtained from pertinent records and from discussions with responsible agency officials and contractor personnel.

ARMY MODERNIZATION PROGRAM

In February 1968 the Department of Defense authorized the current Army program for modernizing ammunition production facilities to a level capable of meeting mobilization requirements. The program was to start in fiscal year 1970.

During the 10-year period preceding the current program, a total of \$687 million had been spent to support, expand, and modernize ammunition plants. Only \$13 million of this was classified as being for modernization.

The current modernization program was originally estimated to cost \$2.4 billion and was to be accomplished over a 5-year period. Subsequently, the Department of the Army issued guidance stretching the program to 7 years, then to 10 years, and finally to 12 years. The program originally included plants engaged in loading, assembling, and packing as well as those plants producing propellants, explosives, and metal parts, such as cases and shells. Since February 1968 the program has been expanded to include plants producing small caliber ammunition and to provide for construction to improve safety conditions. This expansion increased the estimated cost to \$3.1 billion.

The program is essentially an accumulation of projects submitted by contractors operating the Government-owned production plants. These

projects are reviewed by the Army Munitions Command and the Department of the Army. Priorities are established by the Munitions Command on the basis of guidance provided by the Department of the Army.

As of March 31, 1972, there were 22 plants involved in the modernization program. Appropriations for fiscal years 1970 through 1972 provided \$482 million in modernization funds. The Army's fiscal year 1973 appropriation request (the fourth increment in the 12-year program) was for \$133 million.

On the basis of our limited review of the program and our visits to some of the plants, we agree that modernization of ammunition-producing facilities is warranted and necessary. However, we have some reservations as to how the program has been approached.

Defense-wide coordination needed

The program has not been adequately coordinated on a defense-wide basis. The Navy also has ammunition-producing facilities and plans to modernize them. We believe the modernization programs of both services should be geared to meet defense-wide ammunition requirements. Independently developed programs could result in excess capacity when related to total defense needs.

The management of ammunition programs on a defense-wide basis is the subject of a separate GAO review currently underway. We will be pleased to furnish you with a copy of the report as soon as it is available.

More systematic project selection process needed

The program does not seem to provide for the upgrading of specific production lines or facilities on an orderly, time-phased basis geared to total product requirements. Instead, the program is essentially an accumulation of projects originally proposed by the contractors affecting individual operations or parts of facilities in all the plants over the 12-year period. In preparing its annual request for modernization funds, the Army generally selects projects, the total cost of which will approximate the amount of funding the Army believes will be made available. This approach leads to a number of problems.

- Projects are included and funded before the necessary design and engineering efforts are performed, resulting in a large backlog of of funded projects for which contracts have not been awarded.
- Lower priority projects are included before more important ones if they can be started more easily without extensive preliminary effort.

--Modernization tends to be piecemeal at all plants instead of being concentrated on specific production lines at specific plants. As a result, the program is not sufficiently flexible to permit the Army to react to changes in forecasted requirements or technological advances. For example, the program calls for modernizing different segments of similar propellant lines at both the Sunflower and Badger plants rather than first completely modernizing one of the lines. Recently requirements for this particular propellant have been reduced, and modernization at both plants is not necessary but is still planned.

We believe the program should be recast to concentrate on modernization of production lines or facilities selected in accordance with a realistic priority schedule that is phased to known product requirements. Also the program schedule should allow for necessary design and engineering effort to be completed before funding is requested or committed.

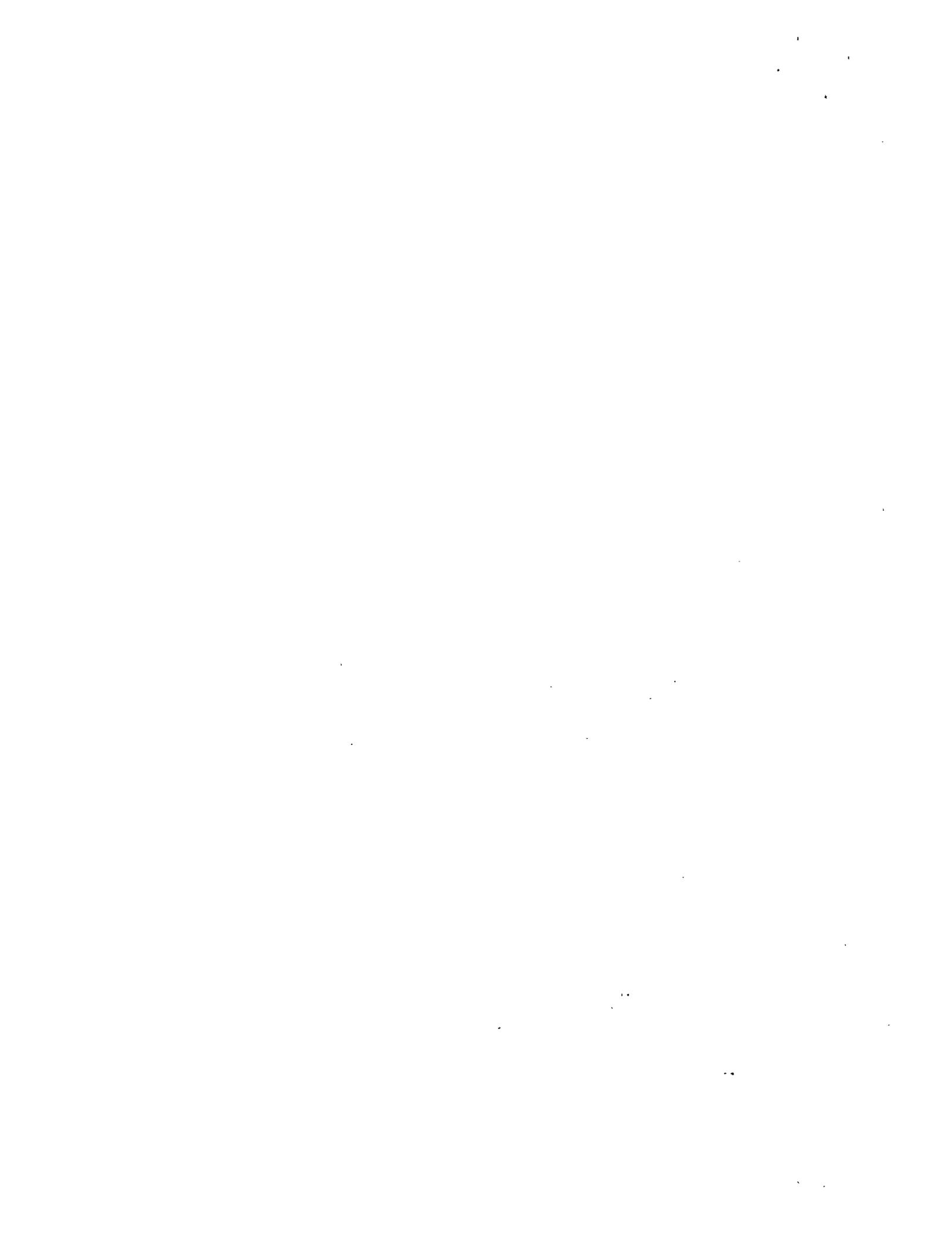
JOINT SERVICES STUDY OF
ALTERNATIVE EXPLOSIVE FILLS

In 1968 the military services began to look more closely at alternative explosive fills when production capacity for preferred fills was not sufficient to meet the demands in Southeast Asia. In January 1969 the Director of Defense Research and Engineering (DDR&E) requested a joint service technical group, composed of representatives of the three services, to study alternative explosive fills for high-use munitions and to prepare a cost-effectiveness analysis. Emphasis was to be placed on using commercially available products rather than on using explosives produced in Government-owned plants.

The study concluded that (1) alternative explosive fills existed which would not seriously degrade the effectiveness of munitions, (2) use of alternative fills could significantly reduce the cost of modernizing or expanding plants producing explosives, and (3) additional research was necessary to determine the acceptability of the alternative fills.

In a letter of March 1972 to the services, DDR&E stated that current plans called for decisions to be made in 1975 for major expansion and modernization of explosive production facilities. The letter also stated that, unless the required research and testing of alternative fills was accomplished, the services would not be in a position to make sensible decisions involving hundreds of millions of dollars.

The Army scheduled a portion of its TNT modernization program during the 1977 to 1979 time frame because one of the possible alternative fills--Minol II for Air Force bombs--would significantly reduce the requirement



for TNT facilities. The Army plan to modernize and expand production facilities for another type fill is scheduled to begin in fiscal year 1975—when the additional testing of alternative fills is to be completed and when reasonably firm requirements for all the various explosive fills can be computed. To this extent, the joint study has been considered in developing the Army's overall program.

However, we believe further consideration would be appropriate. The Army still plans to modernize six more TNT lines, in addition to the 14 already completed or under construction. Contracts, totaling about \$53 million, for the six additional lines are expected to be awarded by June 30, 1972.

In the event of mobilization, the Army now has 21 old, but usable, TNT lines (10 currently in use and 11 in standby). These and the 14 new lines provide sufficient production to exceed known mobilization requirements for TNT. Furthermore, the testing still being done on alternative fills may further reduce TNT requirements for the future and improvements in TNT production technology may require retooling of the TNT lines.

In summary, the need to modernize TNT facilities beyond the 14 lines already completed or under construction appears questionable in light of the alternative fill study.

FISCAL YEAR 1973 APPROPRIATION REQUEST

In the fiscal year 1973 budget submission to the Congress, the Army requested \$133 million for modernization of ammunition plants. Included in this request was \$61.2 million for seven modernization projects at Badger, Holston, Radford, Sunflower, and Volunteer Army Ammunition Plants. In the Army's program revision, dated March 24, 1972, one of the seven projects was deleted and five new ones were added. This increased the number of modernization projects to 11 and increased the cost of the program to \$65.2 million.

The status of the overall modernization program for the five plants at March 31, 1972, was as follows:

<u>Plant</u>	<u>12-year program</u>	<u>Fiscal years 1970 to 1972</u>		<u>Fiscal year 1973 program</u>
		<u>Army approved</u>	<u>Contracts awarded</u>	
(millions)				
Badger	\$ 350.8	\$ 44.8	\$ 0.3	\$24.8
Holston	88.5	12.4	8.1	6.5
Radford	302.7	73.4	30.9	14.0
Sunflower	205.7	29.6	.2	12.3
Volunteer	<u>143.3</u>	<u>71.7</u>	<u>37.3</u>	<u>7.6</u>
Total	<u>\$1,091.0</u>	<u>\$231.9</u>	<u>\$76.8</u>	<u>\$65.2</u>

On the basis of our limited review of each project and our visits to each plant, we believe further justification for many of the projects should be required. Preliminary design and engineering work was incomplete for the construction projects and for the projects involving manufacturing processes and equipment. As a result, the Army did not have a sound basis for estimating project costs or expected savings. Most cost and savings figures were merely judgmental estimates. We noted that when one project was deleted from the program other projects were added, not on the basis of priority but to keep the total program for the year up to the level of funds anticipated.

Details concerning the fiscal year 1973 modernization projects at each of the five plants are included in appendixes I through V.

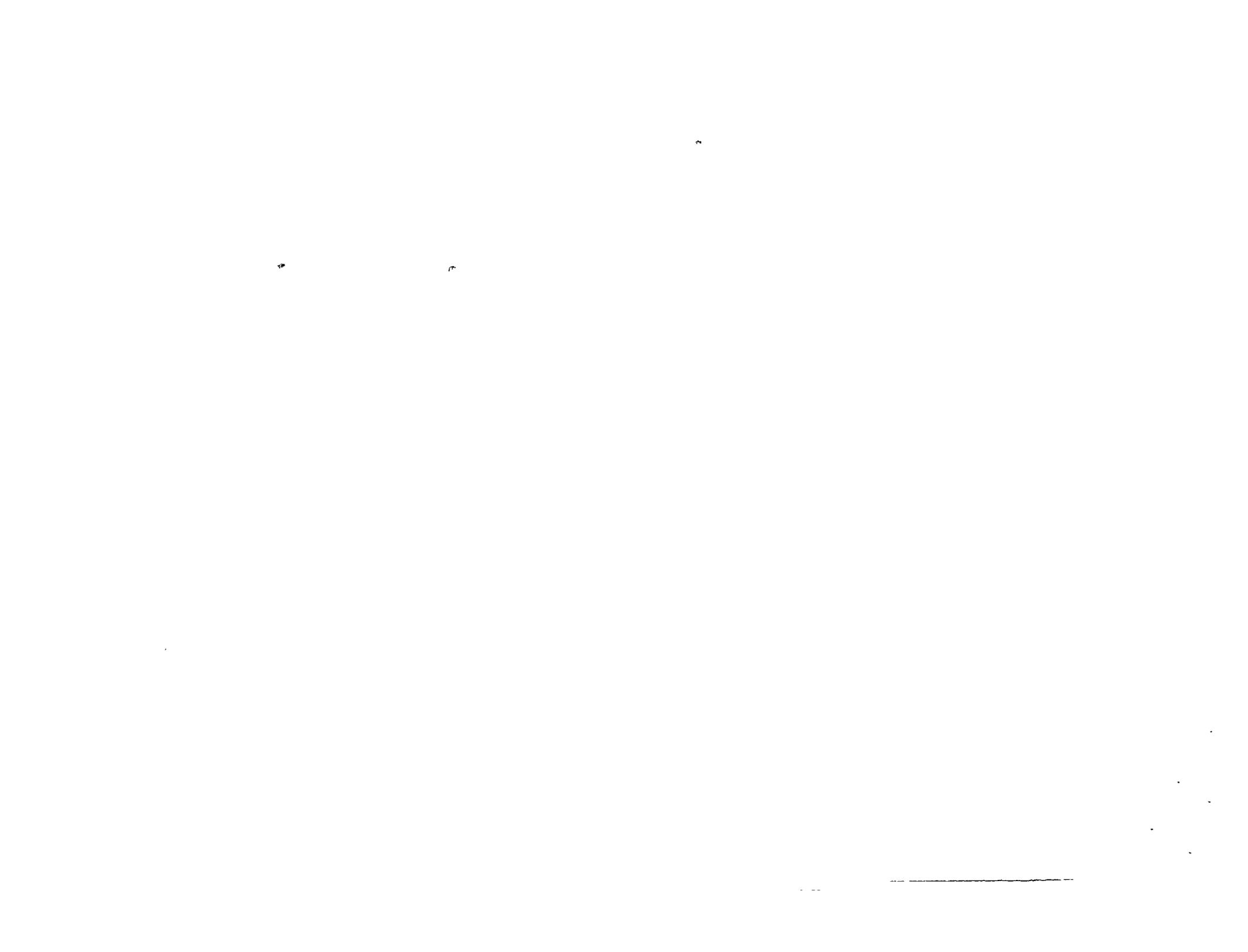
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We have not obtained formal comments on our findings or observations from the Army or the Department of Defense. No further distribution of this report will be made unless copies are specifically requested and then only after your agreement has been obtained or public announcement has been made by you concerning the contents of this report.

Sincerely yours,

Comptroller General
of the United States

CH The Honorable George H. Mahon
Chairman, Committee on Appropriations *H 300*
House of Representatives



BADGER ARMY AMMUNITION PLANT

BARABOO, WISCONSIN

The Badger plant was built on 7,417 acres at a cost of \$82 million during World War II to manufacture smokeless powder and double-base rocket propellant.

The plant was inactive from August 1945 to January 1951. It was reactivated during February 1951 in support of the Korean conflict. Ball powder facilities were built during 1954 and 1955. Smokeless powder, double-base rocket propellant, and ball powder were produced during the Korean conflict. From January 1958 to December 1965, the Badger plant was in a standby status. In January 1966 the plant was reactivated. It began producing ball powder in June 1966, rocket propellant in September 1966, and smokeless powder in August 1967. The ball powder, rocket propellant, and two smokeless powder lines are still active.

The Army has tentatively scheduled the Badger plant to operate through the fiscal year 1977 production period at the following personnel levels:

<u>Fiscal year</u>	<u>Personnel</u>
1973	1,950
1974	1,920
1975	2,000
1976	1,980
1977	1,300

The above staffing is contingent on the ball powder production program remaining at Badger and is subject to change because of competition from private industry. The smokeless powder production lines may be deactivated at the end of fiscal year 1972, depending on future requirements.

The Army's current plans call for \$350.8 million to be spent in modernizing this plant during the 12-year period. The status at March 31, 1972, of Badger modernization projects for which funds were appropriated in prior years was as follows:

APPENDIX I

	<u>Army approved</u>	<u>Contracts awarded</u>
	(millions)	
Fiscal year 1971 projects:		
5712013--construct an ammonia oxidation facility	\$ 9.641	\$0.091
5712014--construct a nitric and sulfuric acid concentrator	9.699	.063
5712016--construct a nitrocellulose manufacturing facility	7.117	.013
Fiscal year 1972 projects:		
5722015--construct an oleum facility	13.612	.143
5722019--construct a continuous nitroglycerin facility	<u>4.767</u>	<u>-</u>
Total	<u>\$44.836</u>	<u>\$.310</u>

FISCAL YEAR 1973 PROJECTS

There are three projects for Badger in the fiscal year 1973 program.

	Appropriation <u>request</u>	Revised program <u>3-24-72</u>
	(millions)	
Projects:		
5732606--construct a solventless roll facility	\$13.400	\$12.318
5732633--construct a nitrocellulose purification facility	7.000	6.988
5732619--replace a filtered water underground distribution system (phase I)	-	<u>5.500</u>
	<u>\$20.400</u>	<u>\$24.806</u>

Project 5732606

This project is for modernizing an existing manually operated solventless roll facility with a mechanized facility having capacity of 1 million pounds per month. It is similar to a Sunflower project (Project 5722373) included in the fiscal year 1972 appropriation request. (See app. IV.)

The Army is authorized to modernize to a level capable of meeting mobilization requirements. The Congress has provided funds for solventless roll facilities at the Sunflower plant which are sufficient to meet this capability. Funding of the Badger project would result in modernizing facilities well in excess of the authorized level.

Equipment and process designs for this project are less than 10 percent complete and are scheduled for completion in February 1973. Building designs have not been started; however, they are scheduled for completion in March 1973. Equipment procurement will start in January 1973 and is scheduled for completion in April 1973. The construction contract is scheduled to be awarded in April 1973, and completion of construction is planned for August 1975.

APPENDIX I

Cost and savings estimates were made by the operating contractor and were based on informal vendor quotations and on engineering judgment. The Munitions Command Comptroller questioned the adequacy of cost documentation and considered the project to be marginal as to economic worth if current actual production rates are used. Because the design of the project has not been completed, we believe the cost and savings estimates are questionable.

Project 5732633

This project is for constructing a 4-million-pound-per-month nitrocellulose purification facility.

Equipment and process designs for this project are 60 percent complete and are scheduled for completion in May 1972. Building designs have not been started. Final building designs are scheduled for completion in March 1973. The Army plans to initiate equipment procurement in January 1973, and completion is scheduled for March 1973. The construction contract is scheduled to be awarded in April 1973, and the completion of construction is planned for August 1975.

Cost and savings estimates were prepared by the operating contractor and were based on informal price quotations from vendors and on engineering judgment. In reviewing these estimates, the Munitions Command Comptroller questioned the adequacy of the cost documentation and the credibility of the study. Because the design of the project has not been completed, we believe the cost and savings estimates are questionable.

In addition, the Army has requested \$2.2 million for an engineering development project which will explore methods to eliminate pollution in nitrocellulose purification by using a continuous magnesium nitrate process. This effort is scheduled for completion in June 1974. If the effort is successful, the batch process and equipment to be constructed under this project will become obsolete.

Project 5732619

This is part one of a three-phased program, estimated to cost \$16.5 million, for replacing segments of the plant's underground water distribution system. Each phase is estimated to cost \$5.5 million; the second and third phases are scheduled for fiscal years 1975 and 1978.

The Army Materiel Command reviewed this project and expressed concern over the lack of sufficient data supporting the need for the project. The Materiel Command informed the Army Munitions Command in January 1972 that a field study involving excavation and inspection to determine the conditions and characteristics of the waterlines should be made before the need for a large-scale replacement program could be evaluated.

The field study will be used by the Corps of Engineers in designing the construction to be undertaken. The Army has scheduled completion of the final design for April 1973. The construction contract is scheduled to be awarded in June 1973, and completion of construction is scheduled for June 1975.

Since the Army has not determined the number of waterlines to be replaced, there is no sound basis for estimating the costs of this project. We believe that the Army should delay requesting funds for this project until the number of waterlines to be replaced is identified.

APPENDIX II

HOLSTON ARMY AMMUNITION PLANT

KINGSPORT, TENNESSEE

The Holston plant was built on 6,025 acres at a cost of \$111.3 million during World War II to manufacture Composition B, a high explosive composed of RDX, TNT, and wax. The plant was inactive between May 1946 and April 1949.

Since 1949 the Holston plant has operated at various production levels and has manufactured many different explosives based on RDX or HMX, a derivative of the RDX process. Holston is the only quantity producer of RDX- and HMX-based explosives, which are used in many types of bombs, cartridges, missiles, rockets, and special weapons. Currently six of the 10 production lines are active.

The Army has tentatively scheduled the Holston plant to operate at least through the fiscal year 1977 production period at the following personnel levels:

<u>Fiscal year</u>	<u>Personnel</u>
1973	1,820
1974	1,640
1975	1,560
1976	1,550
1977	1,470

The Army's current plans call for \$88.5 million to be spent in modernizing the Holston plant during the 12-year period. The status at March 31, 1972, of Holston modernization projects for which funds were appropriated in prior years was as follows:

	<u>Army approved</u>	<u>Contracts awarded</u>
	(millions)	
Fiscal year 1970 projects:		
5702068--upgrade RDX-HMX manufacturing facilities	\$ 4,114	\$3,797
5702072--construct an ammonia oxidation plant	7,602	4,333
Fiscal year 1971 project:		
5712077--engineering and process design for an anhydride plant	<u>.656</u>	<u>-</u>
Total	<u>\$12,372</u>	<u>\$8,130</u>

FISCAL YEAR 1973 PROJECTS

Three Holston projects are involved in the fiscal year 1973 program.

	<u>Appropriation request</u>	<u>Revised program 3-24-72</u>
	(millions)	
Projects:		
5732074--construct an acetic anhydride facility	\$6.200	\$ -
5732076--construct a lacquer- preparation facility	2.300	2.544
5732071--construct a hexamine and acetic acid mixing facility	<u>-</u>	<u>3.934</u>
Total	<u>\$8.500</u>	<u>\$6.478</u>

In March 1972 the Army Munitions Command deferred the construction of the acetic anhydride facility because the process to be used in making acetic anhydride had not been selected.

The Army Munitions Command, in turn, has added Project 5732071 for constructing a central hexamine and acetic acid mixing facility for \$3.9 million to its fiscal year 1973 program at Holston.

Project 5732076

This project, estimated to cost \$2.5 million, is for constructing a separate lacquer-preparation facility which incorporates the latest technology in automatic controls and current industrial safety practices in processing flammable solvents. The present lacquer-preparation processes are performed in the same building adjacent to large tanks used to recrystallize the chemical explosive compound RDX. This is a recognized safety problem.

APPENDIX II

The equipment and process designs are 25 percent complete and are scheduled for completion in December 1972. The Corps of Engineers designs for the building cannot be started until the equipment and process designs are substantially complete. The building design is scheduled for completion in April 1973. Procurement of equipment will start in October 1972 and is scheduled for completion in July 1973. The construction contract for the facility is scheduled to be awarded in June 1973, and completion of construction is planned for July 1974.

The latest equipment cost estimate was based on informal quotations by vendors and engineering judgment. The construction cost estimate was prepared by the operating contractor and, according to the Army, was based on good engineering judgment. This project was not justified on an economic basis; no significant cost savings are anticipated. Because design of the project has not been completed, we believe the cost estimate is questionable.

Project 5732071

This project, estimated to cost \$3.9 million, is for constructing a central modern facility for mixing hexamine and acetic acid. The present process is performed in each of three buildings and involves manually pouring hexamine, an inert granular substance, from 50-pound bags into tanks containing acetic acid. This is a health hazard to operating personnel. The three buildings presently used in the mixing process are not a safe distance from adjacent buildings where RDX is processed. The proposed mixing facility will reduce or eliminate these health and safety hazards.

The equipment and process designs are 10 percent complete and are scheduled for completion in December 1972. The Corps of Engineers designs for the buildings cannot be started until the equipment and process designs are substantially complete. The building design is scheduled for completion in April 1973. Equipment procurement will start in October 1972 and is scheduled for completion in July 1973. The construction contract is to be awarded in May 1973, and completion of construction is scheduled for September 1974.

The latest equipment cost estimate is based on informal quotations by vendors and on engineering judgment. The construction cost estimate was prepared by the operating contractor and, according to the Army, was based on good engineering judgment. This project was not justified on an economic basis; no significant cost savings are anticipated. Because design of the project has not been completed, we believe the cost estimate is questionable.

RADFORD ARMY AMMUNITION PLANT

RADFORD, VIRGINIA

The Radford plant, built on 7,100 acres at a cost of \$82.8 million during World War II, was placed in standby in 1945, reactivated during 1946, and has operated at various production levels since that time.

Major items produced include single-, double-, and triple-base propellants; benite; clean burning powder; TNT; and mortar increments. Current scheduling calls for the production of a variety of propellants and explosives.

The Army has tentatively scheduled the Radford plant to operate through the fiscal year 1977 production period at the following personnel levels:

<u>Fiscal year</u>	<u>Personnel</u>
1973	4,130
1974	3,980
1975	3,940
1976	3,840
1977	3,800

The Army's current plans call for \$302.7 million to be spent in modernizing the Radford plant during the 12-year period. The status at March 31, 1972, of Radford modernization projects for which funds were appropriated in prior years was as follows:

APPENDIX III

	<u>Army approved</u>	<u>Contracts awarded</u>
	(millions)	
Fiscal year 1970 projects:		
5702319--construct a nitric acid-sulfuric acid concentrator	\$ 5.139	\$ 0.032
5702329--construct a sulfuric acid recovery facility	8.705	7.985
5702330--construct an ammonia oxidation plant	5.832	4.552
5702461--construct a nitric acid-sulfuric acid concentrator	4.224	3.603
5705241--construct a continuous nitrocellulose manufacturing facility	6.902	1.403
Fiscal year 1971 projects:		
5712318--construct a facility for single-base propellant	26.548	10.268
5712322--construct a continuous nitrocellulose manufacturing facility	7.555	0.138
5715505--increase tieline capacity and build an electric power transmission facility	2.968	2.968
Fiscal year 1972 project:		
5722321--construct a nitric acid-sulfuric acid concentrator	<u>5.544</u>	<u>-</u>
Total	<u>\$73.417</u>	<u>\$30.949</u>

FISCAL YEAR 1973 PROJECTS

There are two Radford projects in the fiscal year 1973 program.

	<u>Appropriation request</u>	<u>Revised program 3-24-72</u>
	(millions)	
Projects:		
5732468--construct an automated mortar increment line	\$12.600	\$10.747
5732464--construct a consolidated laboratory	<u>-</u>	<u>3.262</u>
Total	<u>\$12.600</u>	<u>\$14.009</u>

APPENDIX III

Project 5732468

This project is for constructing an automated mortar increment line for production of 60-mm and 4.2-inch mortar propellant increments. A prototype has been constructed, and proof testing of the prototype is scheduled for completion during December 1972. Problems are being encountered in this testing.

The equipment and process design is 25 percent complete and is scheduled for completion in December 1972. Building design is 50 percent complete and is scheduled for completion in February 1973. Equipment procurement will start in September 1972 and is scheduled for completion in June 1973. The construction contract is scheduled to be awarded in April 1973, and completion of construction is planned for January 1975.

We were told that equipment cost estimates were based on Sunflower Project 5722373 and on production engineering work at Radford. The construction cost estimates were prepared by Radford on the basis of experience and engineering judgment and have not been concurred in by the Corps of Engineers. The Corps of Engineers is ultimately responsible for building design and cost estimates.

Because the design of the project has not been completed, we believe the cost and savings estimates are questionable. Also the Munitions Command Comptroller cited the lack of documentation in support of the estimates for this project.

Project 2732464

This project is for constructing a consolidated laboratory. The present testing facilities are housed in four widely scattered laboratory buildings and three support buildings ranging from one-tenth of a mile to over a mile apart. Some of these buildings are over 29 years old.

This project was included in the fiscal year 1973 program to prevent underprogramming, i.e., to fill the anticipated funding level established by the Department of the Army.

Building design is 25 percent complete and is scheduled for completion in March 1973. The construction contract is scheduled to be awarded in June 1973, and the completion of construction is planned for June 1975. The Army plans to initiate procurement of equipment for the consolidated laboratory in January 1973, and completion of procurement is scheduled for March 1973.

We were told that cost estimates were prepared by Radford and were based on informal vendor quotes, standard construction estimating techniques, engineering judgment, and experience gained from similar projects. The Corps of Engineers is ultimately responsible for building design and cost estimates. The Corps of Engineers has not concurred with the cost estimates prepared by Radford.

We note that the cost savings are contingent on reducing personnel from 271 to 242 and that these projected savings have not been validated.

Because the design of the project has not been completed, we believe the cost and savings estimates are questionable.

SUNFLOWER ARMY AMMUNITION PLANT

LAWRENCE, KANSAS

The Sunflower plant was built on 9,065 acres at a cost of \$176.3 million during World War II to manufacture smokeless powder and rocket propellant. The plant was in a standby status from July 1948 to January 1951 when it was reactivated and rehabilitated at a cost of \$55 million to manufacture explosives for the Korean War. Shutdown and layaway of the plant started in 1957 and were completed in 1960 at a cost of \$6 million. The plant was reactivated in 1965 at a cost of \$4.5 million to manufacture propellants for use in artillery and cannon shells and rocket motors.

Production was terminated at the Sunflower plant in June 1971. The Army's present plans call for reactivating the Sunflower plant in the event of mobilization.

The Army's current plans call for \$205.7 million to be spent in modernizing the Sunflower plant during the 12-year period. The status at March 31, 1972, of the Sunflower modernization projects for which funds were appropriated in prior years was as follows:

	<u>Army approved</u>	<u>Contracts awarded</u>
	(millions)	
Fiscal year 1971 projects:		
5712379--construct a nitric and sulfuric acid facility	\$ 8.065	\$0.027
5712380--Construct an ammonia oxidation facility	7.684	.015
Fiscal year 1972 project:		
5722373--construct a solventless roll facility, Unit 1	<u>13.894</u>	<u>.178</u>
Total	<u>\$29.643</u>	<u>\$.220</u>

FISCAL YEAR 1973 PROJECTS

The fiscal year 1973 appropriation request includes one project for the Sunflower plant--Project 5732383, estimated to cost \$12.6 million, for the construction of a continuous solventless paste preparation facility with a 2-million-pound-per-month capacity.

The equipment and process design was started in January 1972 and was 12 percent complete at March 31, 1972. This design work is scheduled to be completed in January 1973. The buildings are being designed by the Corps of Engineers, and the design work is scheduled for completion in March 1973. Equipment procurement will start in November 1972 and is scheduled for completion in March 1973. The Corps of Engineers has scheduled award of the construction contract in June 1973, and the completion of construction is planned for February 1976.

The latest cost estimates for equipment and construction total \$12.3 million. The equipment cost estimates are based on informal quotations from vendors on all major items. Construction costs were developed by the Sunflower plant's operating contractor using engineering judgment.

An economic analysis for this project was prepared by the contractor. After reviewing this analysis, the Munitions Command Comptroller said this project would require a large expenditure of funds and expected savings were small. He recommended that projects of a more vital nature be undertaken.

Because the design is incomplete, we believe the cost estimates are questionable. We noted that this project was included in the justification for the Army's 1972 appropriation. The project was subsequently deferred by the Army and included again in the justification for fiscal year 1973 funds.

VOLUNTEER ARMY AMMUNITION PLANT

CHATTANOOGA, TENNESSEE

The Volunteer plant was built on 7,297 acres at a cost of \$57.8 million during World War II for the manufacture of TNT. The plant was inactive from August 1945 until the spring of 1952 when it was reactivated for the Korean conflict. It was again in an inactive status from April 1957 until October 1965. Since 1965 it has operated at various production levels. Currently four of the 10 TNT production lines are active.

The Army has tentatively scheduled production at Volunteer through March 1974, at which time requirements are expected to decrease and Volunteer will compete with the Radford, Newport, and Joliet plants to determine which plants are the high-cost producers and should be shut down. The Army plans personnel levels at the Volunteer plant as follows:

<u>Fiscal year</u>	<u>Personnel</u>
1973	887
1974	887

The Army's current plans call for \$143.3 million to be spent in modernizing the Volunteer plant during the 12-year period. The status at March 31, 1972, of Volunteer modernization projects for which funds were appropriated in prior years was as follows:

	<u>Army approved</u>	<u>Contracts awarded</u>
	(millions)	
Fiscal year 1970 projects:		
5702418--construct three TNT lines	\$20.866	\$13.973
5702419--construct an oleum facility	10.273	8.728
5702420--construct an ammonia oxidation facility	5.216	4.171
5702426--construct a direct strong nitric acid plant	10.829	10.199
Fiscal year 1971 project:		
5712424--construct three TNT lines	<u>24.527</u>	<u>.246</u>
Total	<u>\$71.711</u>	<u>\$37.317</u>

FISCAL YEAR 1973 PROJECTS

There are three projects for Volunteer in the fiscal year 1973 program.

	<u>Appropriation request</u>	<u>Revised program 3-24-72</u>
	(millions)	
Projects:		
5732608--construct TNT bulk-handling facilities	\$7.100	\$6.979
5732639--replace a medical dispensary	-	.361
5732648--replace an acid laboratory	<u>-</u>	<u>.299</u>
Total	<u>\$7.100</u>	<u>\$7.639</u>

Project 5732608

This project, estimated to cost \$7 million, is for constructing facilities for automatic packaging of TNT into bulk containers or units for six modern TNT lines. For this project, equipment design is 35 percent complete and the building design is 10 percent complete. Equipment design is scheduled to be completed in October 1972 and building design in January 1973. The Army plans to initiate equipment procurement in April 1973, and completion of procurement is scheduled for June 1973. The construction contract is scheduled to be awarded by April 1973, and completion of construction is planned for December 1975.

The cost estimates for the TNT bulk-handling project are based on prototype costs, consultation with vendors, and previous construction at the Volunteer plant. Because of the status of the design, cost estimates for this project are questionable.

The primary justification for the TNT bulk-handling project is anticipated savings. The savings are predicated on production at mobilization rates for the life of the

APPENDIX V

project. According to the Munitions Command Comptroller, however, this is not the most likely situation. He said this project would not show a favorable return at current operating levels and refused to concur on the project because of poor economic return and lack of urgency.

Navy loading plants are major users of TNT produced at Army plants. However, these plants were not considered in planning for bulk handling of TNT. The Army project is to convert bulk loading of TNT into containers of 3,650 pounds each. Navy packing facilities are set up to receive TNT in 55-pound containers.

Engineering efforts to develop long-range design criteria for improved explosive handling, packaging, etc., for all Army plants have been going on since fiscal year 1970 and are scheduled for completion in fiscal year 1974. In view of these efforts, it may be inadvisable to proceed with this TNT bulk-handling project at this time.

Project 5732639

This project, estimated to cost \$361,000, is for replacing the present dispensary, a 30-year-old wooden structure.

As of April 13, 1972, the design of the new medical dispensary had not been started, but it is scheduled for completion in April 1973. The construction contract is scheduled to be awarded in April 1973, and construction is scheduled for completion in October 1974.

The estimated costs for this project were judgmental in that they were prepared by plant personnel without assistance from the Corps of Engineers which is responsible for the building design.

The estimated annual savings to be derived from the medical dispensary project are \$1,500 based on current and projected maintenance costs.

This project was included in the fiscal year 1973 program to prevent underprogramming, i.e., to reach the anticipated funding level established by the Department of the Army.

Project 5732648

This project, estimated to cost \$298,800, is for replacing the existing acid laboratory, now located in an old wood frame structure.

As of April 13, 1972, the initial design work was 75 percent complete, and the final design was scheduled for completion in January 1973. The construction contract is scheduled to be awarded in January 1973, and construction is scheduled for completion in January 1974.

The estimated costs for the acid laboratory were judgmental in that they were prepared by plant personnel without assistance from the Corps of Engineers.

The estimated annual savings to be derived from the new acid laboratory project are \$15,000 due to reduced operating and maintenance costs. This project was included in the fiscal year 1973 program to prevent underprogramming, i.e., to reach the anticipated funding level established by the Department of the Army.





