

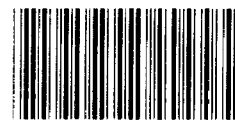
Fact Sheet to the Honorable  
Marvin Leath, House of Representatives

GAO

October 1985

# CHEMICAL MUNITIONS

## Cost Estimates for Demilitarization and Production



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UNITED STATES GENERAL ACCOUNTING OFFICE

WASHINGTON, D.C. 20548

NATIONAL SECURITY AND  
INTERNATIONAL AFFAIRS DIVISION

October 31, 1985

B-211808

The Honorable Marvin Leath  
House of Representatives

Dear Mr. Leath:

This is in response to your letter of September 30, 1985, requesting an examination of the Department of Defense's cost estimates for destroying and demilitarizing the existing stockpile of unitary chemical munitions and producing the proposed binary chemical munitions.

As agreed in subsequent conversations with your office, we obtained and are summarizing available program cost data with as much detail about DOD's cost estimates as time has permitted in order to respond before October 31, 1985, when the Fiscal Year 1986 Defense Appropriation Bill is expected to be considered by the House. In the case of the unitary munition estimates, we performed a limited review of the supporting documentation and discussed the methodology used in developing the estimates with responsible officials. We tried to obtain binary cost estimates from Army, Navy, and Air Force officials responsible for the respective munitions. However, the services did not provide the information to us in the time that we had available. Therefore, we are able to report only limited binary program cost estimates.

DEMILITARIZATION PROGRAM COST ESTIMATES

The U.S. Army Toxic and Hazardous Materials Agency is responsible for evaluating three options for demilitarizing and destroying unitary chemical munitions. The Agency estimates total program costs for option I at about \$1.7 billion; these costs are summarized in enclosure I. Option I calls for the construction and operation of a demilitarization facility at each site where existing munitions are stored. Option II envisions a single national site which would be located at Tooele Army Depot, Utah. The third option calls for two regional sites--Tooele Army Depot in the west and Anniston Army Depot, Alabama, in the east. Costs for options II and III are not available because they are still being developed by the U.S. Army Toxic and Hazardous Materials Agency. Studies addressing transportation options, accident risks, special shipping containers, special planned movement scenarios, and

security, among other factors, have not been completed by the U.S. Army Toxic and Hazardous Materials Agency and its contractors.

Officials responsible for the demilitarization and destruction program cost estimates told us that the total program cost of \$1.7 billion might vary as much as 30 percent. Assuming a 30-percent variance, the total program costs may be as high as \$2.2 billion or as low as \$1.2 billion.

#### COST ESTIMATES FOR BINARY PROGRAMS

The binary chemical munition programs currently consist of three items: the BLU-80/B Bigeye bomb, the M-687 155-mm. artillery round, and the XM-135 Multiple Launch Rocket System warhead. In order to provide you with at least some program cost estimates on these three programs and as agreed with your office on October 28, 1985, we extracted the following data from the Report of the Chemical Warfare Review Commission, June 1985. The Commission was established by the Congress and appointed by the President and performed its review over about a 3-month period preceding the report issuance date. The Commission reported the projected total production costs for the three binary systems over the next 8 years as \$2.749 billion, consisting of \$178 million for research and development, \$312 million for facilities, and \$2.259 billion for production. Obviously, production costs will depend upon what quantity is bought by the services to satisfy requirements. The Commission believed the stated requirements were uncertain and required additional analysis. The Commission has reported that more precise thinking and planning from the Department of Defense is needed as to how and in what quantities chemical weapons would be used tactically.

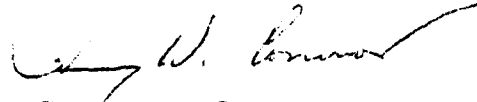
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We trust that this cost data will be helpful to you in the upcoming deliberations. As arranged with your office, we are sending copies of this fact sheet to the Secretaries of Defense,

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the Army, the Navy, and the Air Force and other interested parties upon request. If we can be of further assistance, please let us know.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Henry W. Connor", written in dark ink.

Henry W. Connor  
Senior Associate Director

Enclosure



ESTIMATED PROGRAM COSTS FOR  
DISPOSAL OF EXISTING CHEMICAL MUNITIONS

Currently the Department of Defense has unitary chemical munitions stored at eight locations in the continental United States, one site in Europe, and on Johnston Atoll in the central Pacific Ocean. Most of the total stockpile is in the United States, while some is in Europe, and a small amount on Johnston Atoll.

The U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) is evaluating three site option plans for demilitarizing and destroying these obsolete chemical munitions. One option anticipates the construction and operation of a demilitarization facility at each site where chemical munitions are currently stored, except for Europe. The total projected program costs of about \$1.7 billion for this option are summarized in table I.1. A second option consists of a single national site, which would be located at Tooele Army Depot, Utah. Option three calls for two regional sites--Tooele Army Depot in the west and Anniston Army Depot, Alabama, in the east. USATHAMA is still developing costs for the latter two options. Studies addressing transportation options, accident risks, special shipping containers, special planned movement scenarios, security, etc., have not been completed by USATHAMA and its contractors.

In an effort to provide safer, more efficient demilitarization of the stockpile at a lower cost, USATHAMA began a research and development program for innovative technology concepts. Its primary goal is to reduce the cost of demilitarization using existing technology. To determine whether such potential savings would result from development and implementation of an innovative technology, life cycle cost estimates are being developed. As part of this process, the cost model selects only those process components necessary for processing the munitions inventory stored at each site. It computes production costs using cost data and labor requirements stored in a data base. Also, it computes demilitarization support costs that are based on production costs and other statistics. The life cycle cost estimates generated by the cost model are based on specific component sizes and capacities. An optimization model assesses the impact of changing system size on life cycle cost and determines the minimum life cycle cost at each inventory site for each demilitarization system under consideration. The system cost and performance data generated by the optimization model are used for comparative analysis. Because of the large number of calculations required, a computerized analytical system was designed and implemented. We have been told by USATHAMA officials that this process has been

instrumental in evaluating various innovative technologies and developing program cost estimates for the demilitarization program.

USATHAMA officials responsible for developing the \$1.7 billion estimate told us that due to potential errors, improved methods, and adjustments, the total program cost estimate might vary by as much as 30 percent. Assuming a 30-percent variance, the total program cost may range between \$1.2 billion and \$2.2 billion.



Table I.1

Estimated On-Site Chemical Munitions Demilitarization Costs

<u>Activity</u>	<u>Design</u>	<u>Construction</u>	<u>Equipment</u>	<u>Operations</u>	<u>Closure</u>	<u>Other</u>	<u>Total</u>
(millions - FY 1985 constant dollars)							
Lexington Blue Grass Depot Activity, Ky.	\$ 4.9 <sup>a</sup>	\$ 25.3	\$ 60.0	\$ 52.8	\$ 5.8	\$	\$ 148.8
Anniston Army Depot, Ala.	4.9 <sup>a</sup>	25.3	61.0	92.0	5.8		189.0
Umatilla Depot Activity, Oreg.	4.9 <sup>a</sup>	25.3	61.9	102.7	5.8		200.6
Tooele Army Depot, Utah	.4	25.3	54.1	202.8	6.0		288.6
Pueblo Depot Activity, Colo.	1.0	19.6	53.1	64.3	5.8		143.8
Newport Army Ammunition Plant, Ind.	.6	12.5	24.4	31.9	4.8		74.2
Aberdeen Proving Ground, Md.	.6	12.5	24.4	35.7	4.8		78.0
Pine Bluff Arsenal, Ark.	1.1	4.0	27.9	52.2	5.0		90.2
Johnston Atoll	<u>29.0</u>	<u>49.0</u>	<u>87.0</u>	<u>205.0<sup>b</sup></u>	<u>6.0</u>	<u>76.0<sup>c</sup></u>	<u>452.0</u>
Total	<u>\$47.4</u>	<u>\$198.8</u>	<u>\$453.8</u>	<u>\$839.4</u>	<u>\$49.8</u>	<u>\$76.0</u>	<u>\$1,665.2</u>

<sup>a</sup>Includes \$4.5 million which is one-third of the one-time prototype design cost of \$13.5 million for an M55 rocket plant and \$.4 million for site specific modifications to that design.

<sup>b</sup>The \$205 million operations cost includes \$31 million to cover the disposal of the current U.S. stockpile of chemical munitions stored in Europe. This \$31 million is the cost of disposing of the munitions which will be moved to the Johnston Atoll facility in the central Pacific Ocean. The remaining \$174 million is the cost of disposing of the existing stockpile on Johnston Atoll.

<sup>c</sup>The \$76 million includes a \$50 million transportation cost projected by USATHAMA to move the existing chemical munitions from Europe to Johnston Atoll. The remaining \$26 million covers the total program management costs for the planning and development of the Johnston Atoll Chemical Agent Disposal System.

EXPLANATION OF COST ESTIMATES IN TABLE I.1

The following are brief descriptions of the kinds of costs included in each cost element and reasons for some cost variance between locations.

Design

A Chemical Agent Munitions Disposal System was designed and constructed at the Tooele Army Depot, Utah, in the 1970's and began operations in 1979. Its primary mission was to further develop proven industrial and military technology and demonstrate the applicability to large-scale demilitarization facilities. A secondary mission was to provide a facility to dispose of a type of munition then in storage at Tooele Army Depot. Tooele was chosen because it had the most complete representation of the 29 chemical munitions. The Tooele prototype system is capable of processing all chemical munitions in the stockpile and uses current technology to process munitions and bulk containers. However, due to its limited size and production rates, it cannot handle large-scale disposal.

Since then, the Johnston Atoll Chemical Agents Disposal System was developed, based on the first disposal system's technology and subsequent improvements, to dispose of the entire stockpile at Johnston Atoll. According to USATHAMA representatives, because of Johnston Atoll's location, its limited support facilities, its plant capacity, and its implementation of advanced technology, it was more costly to design the facility (\$29 million) than to design and modify the original prototype for other on-site disposal plants.

Costs for other facility sites in the design column of table I.1 reflect the costs to modify the designs for the Johnston Atoll disposal system and an M55 rocket plant to make each facility site specific. The design costs vary because of topography, the numbers and types of munitions stored there, existing support facilities, etc.

Construction

The construction column includes the estimated costs of building each facility designed to specific site modifications. In addition, the number and types of munitions stored at a facility impact facility construction costs. There are 29 different types of chemical munitions stored at 9 sites categorized into the 4 major classes of (1) rockets and mines, (2) explosively configured projectiles, (3) nonexplosively configured projectiles, and (4) bulk items (large bombs, spray tanks, storage containers).

The reasons enumerated above for Johnston Atoll's more costly design also apply to its more expensive construction cost of \$49 million versus \$12.5 to \$25 million for the other site facilities in the continental United States. On the other hand, Pine Bluff Arsenal's \$4 million construction cost represents the amount necessary to later modify a BZ chemical munition plant to handle M55 rocket disposal. Because the plan is to modify an existing facility, the construction costs will be appreciably less than the costs for complete new construction of a facility.

### Equipment

The costs in the equipment column include the development of procurement packages by the contractor, the management and administration of subcontractors, the fabrication of equipment, transportation of the equipment to the site, installation, acceptance testing, etc. Equipment costs will vary by site depending on facility capacities, number of different munitions, distance to the site, etc.

### Operations

Operations costs are affected by many of the same considerations discussed in the other cost elements. Operations costs include personnel, a 12- to 15-month facility testing period, materials, supplies, utilities, laboratory support, waste disposal, etc.

### Closure

Closure costs cover cleaning the surfaces of the facility and equipment to a minimum acceptable safety level. This level does not certify that all chemical agents have been removed or that the facility can be safely used for other purposes. Also, it does not include dismantling the facility. USATHAMA officials told us to certify and dismantle the facilities it might cost \$100 million but that it would not exceed the total estimated construction costs of about \$199 million.



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