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Report to Congressional Requesters

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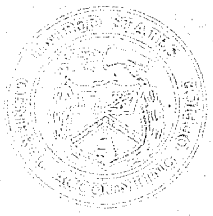
INDUSTRIAL BASE

Inventory and Requirements for Artillery Projectiles



GAO

United States
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Washington, D.C. 20548

National Security and
International Affairs Division

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March 20, 1995

The Honorable Ted Stevens
Chairman
The Honorable Daniel K. Inouye
Ranking Minority Member
Subcommittee on Defense
Committee on Appropriations
United States Senate

The Honorable C.W. Bill Young
Chairman
The Honorable John P. Murtha
Ranking Minority Member
Subcommittee on National Security
Committee on Appropriations
House of Representatives

In response to a requirement in the fiscal year 1995 conference committee report on Department of Defense appropriations (H.R. 103-747), we reviewed selected aspects of the Army's industrial base for the production of artillery projectile metal parts. This report provides information on (1) the quantity, location, and condition of artillery projectiles in Army and Marine Corps inventories and these inventories in comparison to stated requirements; (2) the Army's production base for artillery projectiles; and (3) the Army's plans for procuring new advanced artillery rounds.

Background

As the Single Manager for Conventional Ammunition, the Army buys conventional ammunition for the military services and maintains active and inactive ammunition production lines for required conventional ammunition items and components. The ammunition industrial base provides the capability for producing 14 munitions commodity families (such as artillery, bombs, and rockets) and hundreds of different end items and components.

There are three categories of industrial base producers: government-owned plants operated by the government, government-owned plants operated by contractors, and contractor plants. The plants are classified according to their production capability. For example, plants that produce nonexplosive components, such as empty projectiles, are called metal parts plants, while others that assemble the

metal parts, other components, propellants, and explosives into complete ammunition rounds are called load, assemble, and pack plants. Some have dual capability; that is, metal parts production and load, assemble, and pack. Since the break-up of the Soviet Union and the end of the Cold War, the Army has been reducing the number of active munitions plants. The downsizing currently in process results in an active munitions base for 1995 comprised of 9 government plants (3 operated by the government and 6 operated by contractors) and about 50 contractor plants.

The September 26, 1994, fiscal year 1995 conference committee report on Department of Defense appropriations expressed concern about the industrial base for production of artillery projectile metal parts and the ability of this base to respond to requirements, both now and in the future. Because of this concern, the conferees requested that we review the inventory and requirements for artillery projectiles.

Results in Brief

In November 1994, the Army had about 20.8 million artillery projectiles in its inventory,[1] consisting of 27 different types of projectiles. This inventory—stored at 18 U.S. locations, on 6 prepositioned ships, and in 3 other countries—was more than adequate to meet the Army's stated training and combat requirements[2] for most artillery projectiles. More than 98 percent of the inventory was categorized as usable. The Army inventory for 3 artillery projectile types was a total of 172,059 below stated requirements. On the other hand, the Army no longer had a need for 4 other projectile types because the Army had newer items in its inventory. The Army had in inventory 653,229 of these older projectiles as of November 1994. As of March 1995, the Marine Corps had a total inventory of about 4 million artillery projectiles compared to a requirement of about 2.3 million projectiles. About 85 percent of its inventory was usable. Of the Marine Corps' 24 artillery projectile types, its inventory for 5 types was a total of 407,823 projectiles below stated requirements. However, the Marine Corps no longer had a requirement for 7 other artillery projectile types; the Marine Corps had in inventory 99,909 of these outdated projectiles as of March 1995.

Because of decreasing requirements and funding constraints, the Army has been reducing its active production base for artillery projectiles and their

[1]This inventory represents stocks stored at the wholesale level and does not include retail stocks issued to operational commands and units.

[2]The combat requirement is the quantity needed to fight and win two nearly simultaneous major regional conflicts. The Army's requirements are classified.

associated metal parts. Army officials believe the reduced production base for artillery projectiles is more than sufficient to meet the Army's and Marine Corps' planned procurements of artillery projectiles.

The Army is developing four new advanced artillery projectiles to replace existing older rounds—two types each of 105-mm and 155-mm projectiles—and has recently completed development of another 105-mm projectile, which it does not plan to procure for its own use. Three of the four developmental rounds are to be loaded, assembled, and packed at Army ammunition plants, and the fourth is to be procured commercially. The Army has not decided where to produce the metal parts for the new projectiles. When the new projectiles enter production, the metal parts could be produced at Army ammunition plants or procured commercially.

Inventory and Requirements for Artillery Projectiles

Army

The Army's November 1994 inventory of about 20.8 million artillery projectiles included 27 different types or configurations of 105-mm, 155-mm, and 8-inch artillery projectiles (see app. I). According to Army records, these projectiles are stored at 32 different locations within and outside the United States, including 6 prepositioned commercial ships under contract with the Army (see app. II), and all but 371,620 projectiles, or about 1.8 percent, were usable.

The Army's artillery projectile inventory includes some older items and items that exceed requirements due to planned force structure changes. For example, even though the Army no longer has a requirement for 105-mm M60 projectiles, 105-mm M548 projectiles, 155-mm M449 projectiles, and 8-inch M404 projectiles—because it has newer items in its inventory—the Army has about 830,000 of these older rounds in its inventory. Although the Army currently has a requirement for three other types of 8-inch projectiles in its inventory, it has no procurement plans for them because the 8-inch howitzer is being phased out of the Army's force structure and it is being replaced by the Multiple Launch Rocket System. In November 1994, the Army had about 1.6 million rounds of 8-inch artillery projectiles in its inventory.

The Army's November 1994 inventory for three artillery projectile types—the 105-mm M913, the 155-mm M741A1, and 155-mm M712—was 172,059 below the Army's inventory objectives (the quantity by artillery projectile type is classified). However, after the 75,598 M913 projectiles due in from production are delivered, the total shortfall will be reduced to 96,461 projectiles. According to an Army official, the Army has no current procurement plans for M741A1 and M712 projectiles because of funding constraints and the Army's inventory for other artillery rounds generally exceeds requirements. In addition, although Army records show a shortfall for M712 projectiles, the requirement is continuously revised downward to the inventory level.

Marine Corps

The Marine Corps' March 1995 inventory of about 4 million artillery projectiles consisted of 24 different types of 105-mm, 155-mm, and 8-inch projectiles (see app. III). The usable inventory of 3.4 million projectiles was greater than the Marine Corps' requirement of about 2.3 million projectiles. The inventory included seven projectile types for which the Marine Corps no longer has a requirement. As shown in table 1, the inventory for five other projectile types is below the Marine Corps' stated requirements.

Table 1: Marine Corps' Inventories, Requirements, and Shortfalls for Five Types of Artillery Projectiles

	Inventory			
Item description	**Usable**	**Unusable**	**Requirement**	**Shortfall[a]**
155-mm M864 Baseburner projectile	165,611	1	426,529	260,918
155-mm M549 high-explosive, rocket-assisted projectile	128,484	66,938	272,736	144,252
155-mm M825 white phosphorus smoke projectile	96,685	20,126	98,769	2,084
155-mm M712 Copperhead projectile	1,873	894	2,230	357
155-mm M7 dummy projectile	67	0	279	212
Total	**392,720**	**87,959**	**800,543**	**407,823**

[a]Difference between usable inventory and requirement.

Although the Marine Corps has shortfalls for these five projectile types, the Army's inventories for the two with the largest shortfalls—the 155-mm

M864 Baseburner projectile and the 155-mm M549 projectile—exceed the Army's requirements. Therefore, the Army could satisfy the Marine Corps' requirement from its inventory.

Army's Production Capacity for Artillery Projectiles

The Army has load, assemble, and pack production lines for artillery projectiles at nine locations: the Iowa, Kansas, Lone Star, Longhorn, Louisiana, Milan, and Mississippi Army Ammunition Plants; the Crane Army Ammunition Activity; and the Pine Bluff Arsenal. The Army has laid away production lines at the Mississippi plant and is in the process of laying away some parts of the production lines at the Kansas, Longhorn, and Louisiana plants. The Army plans to keep the production lines at the other locations active to meet projected artillery projectile requirements. The five plants to remain active (Iowa, Lone Star, Milan, Crane, and Pine Bluff) have a combined capacity to load, assemble, and pack 867,000 artillery projectiles a month during three 8-hour shifts each day for 5 days a week. According to Army officials, this capacity is sufficient to meet projected replenishment requirements for all artillery projectiles.

Only three artillery projectile types—two 155-mm and one 105-mm—are currently in production, and the Army received fiscal year 1995 funds to begin low-rate initial production of two other 155-mm artillery projectiles.[3] The 155-mm M864 Baseburner projectile is being produced at the Milan plant, and its production is scheduled to be completed in April 1996. The other 155-mm projectile, the M825 smoke round, is being produced at the Pine Bluff Arsenal. Production is scheduled to be completed in August 1997. The only 105-mm artillery projectile currently being produced is the M913 high-explosive, rocket-assisted (HERA) round, which is being produced at the Iowa plant. Its production is scheduled to be completed in the third quarter of fiscal year 1997. Twenty-five other types of artillery rounds were last produced in fiscal year 1994 and prior years.

The artillery projectile metal parts production base includes Army and contractor production lines. The Army's Louisiana, Mississippi, and Scranton plants[4] have a combined production capacity of 437,600 metal parts a month (based on a schedule of three shifts a day for 5 days a week), and three contractors have a production capacity of 26,100 metal

[3]The Army received fiscal year 1995 procurement funds for XM898 Sense and Destroy Armor and M795 high explosive projectiles. These items are not yet in production.

[4]The Louisiana and Mississippi plants have the capability to load, assemble, and pack artillery projectiles and produce projectile metal parts, while the Scranton Army Ammunition Plant only produces metal parts.

parts a month (using the same schedule). The Army has laid away the Mississippi plant, is laying away the Louisiana plant, and plans to operate the Scranton plant under a facility use contract. According to Army officials, the production lines at the Mississippi and Louisiana plants are no longer needed to meet projected replenishment demands. According to an Army official, future production of metal parts for existing artillery projectiles may be done at Army ammunition plants or procured from commercial sources, but no decision has been made.

Plans for Procuring New Artillery Projectiles and Their Metal Parts

The Army has four 105-mm and 155-mm artillery rounds in various stages of development at the U.S. Army Armament Research, Development and Engineering Center in Dover, New Jersey. In addition, in October 1994, the Army completed development of a fifth round. The new advanced artillery rounds include (1) the 105-mm M927 HERA projectile; (2) the 105-mm XM915 dual-purpose, anti-personnel, anti-materiel projectile; (3) the 105-mm XM916 dual-purpose, anti-personnel, anti-materiel projectile; (4) the 155-mm XM898 Sense and Destroy Armor (SADARM) projectile; and (5) the 155-mm XM982 extended range artillery (ERA) projectile.

M927 Projectile

The 105-mm M927 HERA projectile was developed as a replacement for the M548 rocket-assisted projectile. Although the Army approved the M927 projectile for troop use in October 1994, it has no current plans to procure the round for its own use. However, Army officials indicated that the Army may produce the projectile for foreign military sales to South Korea and Canada.

XM915 and XM916 Projectiles

The 105-mm XM915 and XM916 improved conventional munitions rounds are being developed to replace the older 105-mm M444 round. Both projectiles are currently in engineering and manufacturing development and are scheduled to be approved for low-rate initial production in the fourth quarter of fiscal year 1996. The Army plans to procure components for these rounds from commercial sources and to load, assemble, and pack the projectiles at the Lone Star plant.

XM898 Projectile

The 155-mm XM898 SADARM projectile is in engineering and manufacturing development. It is being developed to provide unique counterbattery capability and is scheduled to be approved for low-rate initial production in April 1995. The Army plans to procure projectile components from

commercial sources and to produce the projectile metal parts at the Scranton plant. The completed round is to be loaded, assembled, and packed commercially.

XM982 Projectile

The 155-mm XM982 ERA projectile is currently a technology base program. It is being developed to replace the M864 Baseburner projectile, is scheduled to enter engineering and manufacturing development in fiscal year 1997, and is not expected to be approved for troop use until fiscal year 2000. Production is scheduled to begin in fiscal year 2001. According to Army officials, metal parts are to be procured commercially and the complete round is expected to be loaded, assembled, and packed at the Lone Star plant.

Scope and Methodology

During our review, we examined Army and Marine Corps documents on artillery projectile inventories, requirements, and production schedules. We also examined Army documents on production capacities for artillery projectiles and plans for laying away production lines. We did not verify the accuracy of the data the services provided, such as inventory levels, but compared such information with data provided in prior years to evaluate its reasonableness.

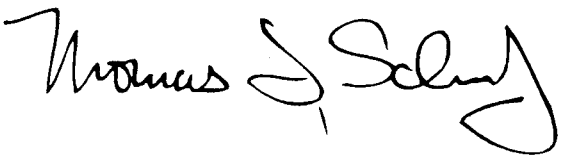
In conducting our review, we interviewed and obtained documents from officials in the Department of the Army and Marine Corps headquarters, Washington, D.C.; the U.S. Army Armament Research, Development and Engineering Center, Dover, New Jersey; the U.S. Army Armament, Munitions and Chemical Command, Rock Island, Illinois; and the Indiana and Mississippi Army Ammunition Plants.

We did not obtain fully coordinated Department of Defense comments on this report. However, we discussed the results of our work with Office of the Secretary of Defense, Army, and Marine Corps officials. They generally agreed with our findings and conclusions, and we have included their comments in this report where appropriate. The Marine Corps provided updated inventory and requirements information.

We conducted our review between August 1994 and March 1995 in accordance with generally accepted government auditing standards.

As agreed with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 15 days from its issue date. At that time, we will send copies to the Chairmen and Ranking Minority Members of the Senate Committees on Armed Services and Governmental Affairs and House Committees on National Security and Government Reform and Oversight; the Director, Office of Management and Budget; the Secretaries of Defense and the Army; and the Commandant of the Marine Corps. We will also make copies available to others on request.

Please contact me at (202) 512-4841 if you or your staff have any questions concerning this report. The major contributors to this report are Raymond Dunham, Antanas N. Sabaliauskas, and David A. Bothe.



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Abbreviations

HERA	high-explosive, rocket-assisted
SADARM	Sense and Destroy Armor
ERA	extended range artillery

Worldwide Inventories of Army Artillery Projectiles

Item description	Inventory as of November 15, 1994 Usable	Unusable	Total
105-mm projectiles:			
M1 HE without fuze	8,946,616	34,274	**8,980,890**
M314 illuminating	287,669	3	**287,672**
M60 smoke, WP with point detonating fuze	275,994	0	**275,994**
M548 HE rocket assisted	24,308	0	**24,308**
M760 HE extended range	99,242	794	**100,036**
M84A1 HC	112,070	0	**112,070**
155-mm projectiles:			
M692 ADAM-L	32,971	0	**32,971**
M731 ADAM-S	120,271	0	**120,271**
M718 RAAMS-L	62,926	3,676	**66,602**
M485 illuminating	253,676	0	**253,676**
M116A smoke HC	19,349	0	**19,349**
M741 RAAMS-S	137,259	7,070	**144,329**
M712 Copperhead	16,095	0	**16,095**
M804 practice	97,530	0	**97,530**
M741A1 RAAMS	44,889	0	**44,889**
M718A1 RAAMS	21,096	0	**21,096**
M825 smoke WP[a]	284,619	2	**284,621**
M107 HE	2,936,484	1,138	**2,937,622**
M110 smoke WP	127,658	0	**127,658**
M449 HE ICM SE	490,642	0	**490,642**
M483A1 DPICM	3,958,149	324,662	**4,282,811**
M549 HE RAP	372,649	0	**372,649**
M864 Baseburner[b]	147,003	0	**147,003**
8-inch projectile:			
M650 HE RAP	113,622	0	**113,622**
M509A1 DPICM	544,715	0	**544,715**
M106 HE	861,222	1	**861,223**
M404 ICM	39,037	0	**39,037**
Total	**20,427,761**	**371,620**	**20,799,381**

[a]The inventory does not include 15,821 projectiles in production but not yet delivered.

[b]The inventory does not include 226,077 projectiles in production but not yet delivered.

Location of Army's Worldwide Inventory of Artillery Projectiles

Location	Inventory as of November 15, 1994		
	Usable	Unusable	Total
United States:			
McAlester Army Ammunition Plant, Okla.	1,853,700	39,880	**1,893,580**
Red River Army Ammunition Plant, Tex.	1,447,010	33,718	**1,480,728**
Hawthorne Army Ammunition Plant, Nev.	1,173,403	30,188	**1,203,591**
Crane Army Ammunition Activity, Ind.	712,015	43,946	**755,961**
Anniston Army Depot, Ala.	658,692	26,793	**685,485**
Lexington Blue Grass Army Depot, Ky.	594,753	31,880	**626,633**
Tooele Army Depot, Utah	643,376	16,086	**659,462**
Sierra Army Depot, Calif.	528,033	41,980	**570,013**
Seneca Army Depot, N.Y.	298,494	664	**299,158**
Letterkenny Army Depot, Pa.	245,748	20,296	**266,044**
Savanna Army Depot Activity, Ill.	256,659	7,941	**264,600**
Lone Star Army Ammunition Plant, Tex.	240,368	0	**240,368**
Pine Bluff Arsenal, Ark.	233,739	0	**233,739**
Iowa Army Ammunition Plant, Iowa	94,472	312	**94,784**
Milan Army Ammunition Plant, Tenn.	44,990	39,026	**84,016**
Longhorn Army Ammunition Plant, Tex.	9,272	0	**9,272**
Louisiana Army Ammunition Plant, La.	96	0	**96**
Kansas Army Ammunition Plant, Kans.	61	0	**61**
Prepositioned ships			
Jeb Stuart	353,806	0	**353,806**
Green Harbour	348,946	0	**348,946**
Green Valley	150,423	2	**150,425**
Cape Horn	3,130	0	**3,130**
Cape Hudson	3,130	0	**3,130**
Cape Decision	3,122	0	**3,122**
Foreign countries:			
Korea (6 locations)	8,731,636	4,776	**8,736,412**
Japan	1,752,600	34,132	**1,786,732**
Italy	46,089	0	**46,089**
Total	**20,427,761**	**371,620**	**20,799,381**

Inventories and Requirements of Marine Corps Artillery Projectiles, as of March 1, 1995

Item description	Inventory			Requirements
	Usable	Unusable	Total	
105-mm projectiles:				
M1 HE without fuze	448,283	230,103	**678,386**	229,155
M327 HEP-T	0	12	**12**	0
M314 illuminating	97,661	18,677	**116,338**	13,923
M84A1 HC smoke	40,081	4,341	**44,422**	4,160
M548 HE rocket assisted	0	12	**12**	0
XM629 CS tactical	18	372	**390**	0
M60 WP smoke	124,467	30,224	**154,691**	23,408
155-mm projectiles:				
M692 HE ADAM	30,664	1,225	**31,889**	29,768
M731 HE ADAM	62,306	3,804	**66,110**	35,450
M718 RAAM-L	30,359	14,264	**44,623**	21,456
M485 illuminating	218,094	8,555	**226,649**	45,493
M116A HC smoke	1,587	792	**2,379**	0
M741 RAAMS-S	56,352	2,208	**58,560**	12,010
M712 Copperhead	1,873	894	**2,767**	2,230
M823 training	37	3	**40**	0
M825 WP smoke	96,685	20,126	**116,811**	98,769
M107 HE	800,429	47,140	**847,569**	493,603
M110 WP smoke	81,701	4,015	**85,716**	46,966
M7 dummy	67	0	**67**	279
M449A1 ICM	10,498	1,590	**12,088**	0
M483A1 DPICM	960,945	130,406	**1,091,351**	527,007
M549 HE RAP	128,484	66,938	**195,422**	272,736
M864 Baseburner	165,611	1	**165,612**	426,529
8-inch projectile:				
M106 HE	58,728	26,260	**84,988**	0
Total	**3,414,930**	**611,962**	**4,026,892**	**2,282,942**