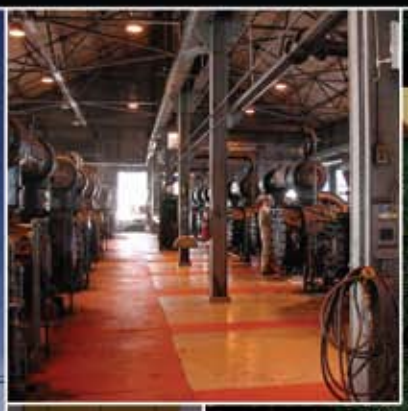
RADFORD ARMY AMMUNITION PLANT

THE HEART OF THE US AMMUNITION SUPPLY CHAIN



EXECUTIVE SUMMARY

Nothing is more important to the effectiveness, security and survival of men and women in combat than their supply of ammunition. This truth was brought home to the U.S. military in Operations Iraqi Freedom and Enduring Freedom when soldiers and Marines repeatedly found themselves in intense firefights, using up prodigious amounts of ammunition. Moreover, not only combat units but rear echelon forces were coming under attack. This created a requirement that all soldiers and Marines be well-qualified with their weapons. Faced with an adversary different from the ones the military had planned for, they discovered that it had not correctly anticipated its ammunition requirements which were ballooning.

The U.S. ammunition industrial base rose to the challenge. For example, within a few years the Lake City Army Ammunition Plant increased its production of small-caliber ammunition from 300 million rounds to over 1.2 billion rounds per year. Other facilities more than doubled the production of medium-caliber ammunition, the kinds used primarily by helicopter gunships, fighter aircraft and infantry fighting vehicles.

The increased production of ammunition would have been impossible without the products made at the Radford Army Ammunition Plant (RFAAP). This is a unique facility that produces the basic constituent materials that go into virtually every small-, medium- and large-caliber projectile and rocket made by the U.S. ammunition base. Without RFAAP, the U.S. military would be entirely dependent on foreign sources of supply for critical materials.

The U.S. military was fortunate to have retained a working ammunition industrial base. However, that base is old and desperately in need of modernization. The 11 facilities that constitute the core ammunition industrial base were built at the start of World War II; much of the machinery and virtually all the infrastructure at these facilities date to this time. Keeping the plants operational is a huge challenge.

The Army and the various private companies that manage most of the ammunition plants have been funding a number of modernization efforts. At RFAAP, the Army has modernized the power plant, built a state-of-the-art water treatment facility and broken ground on a new acid concentrator. The plant's private operator, Alliant Techsystems, has invested its own resources in RFAAP, brought in new ammunition operations and supported commercial activities at the facility.

The Army has plans and, most important, the funds, to complete the needed critical modernization at RFAAP. However, it has delayed moving ahead on this effort pending the award of a new contract to a private firm to manage the facility. This could take as long as a year. In the meantime, the military risks having its supply of ammunition virtually halted should there be a breakdown in any of a number of critical systems at RFAAP. Rather than waiting, the Army needs to move ahead expeditiously to begin the final phase of its modernization effort. Lives are potentially at stake.

This study was written by Dr. Daniel Goure of the Lexington Institute.

AMMUNITION IS THE WARFIGHTER'S LIFEBLOOD

In order to live, the human body needs a constant supply of blood. It is the blood that provides each cell of the human body with the oxygen and food it needs to survive. Keeping the blood flowing is the heart. The human body holds about five liters of blood of four basic types (O, A, B and AB). The heart pumps an average of 72 times a minute, 24/7/365 for decades. Over an average person's life, the heart may have beat more than 3.5 billion times and pump about 250,000 gallons of blood. Any interference with the flow of blood throughout the body and functions diminish, organs are damaged and the individual can die. The most serious danger is a heart attack, a condition when that central organ in the blood supply system fails to function.

As important as a continuous and reliable supply of blood is to every human being, so too is a continuous and reliable supply of ammunition to the warfighter. When all is said and done, the expenditure of ammunition is the principal means by which the warfighter achieves his mission, whether it is capturing an objective, neutralizing an enemy or suppressing hostile fire. The availability of reliable ammunition in the quantity needed can mean life itself to those in combat. The lack of ammunition, like the lack of blood flow to critical organs in the body, can result in death.

WHAT IS AMMUNITION?

Ammunition consists of projectiles, such as bullets and/or missiles, together with their fuses, primers and propellants that can be fired from guns or otherwise propelled. Ammunition is divided into three basic categories:

- Small-caliber ammunition is used in pistols, rifles, automatic weapons and machine guns. It ranges in size from 5.56mm to .50-caliber.
- Medium-caliber ammunition is used in light cannons and ranges in size from 20mm to 57mm.
- Large-caliber ammunition is used in tank cannons, mortars, and land and sea-based artillery pieces. It is typically 60mm or greater in size.

Unlike the human blood supply, which is uniform, the supply of ammunition required by the warfighters can vary over time. In wartime, the demand for ammunition rises, often dramatically. Moreover, ammunition, unlike human blood, comes in many types and varieties. For example, the U.S. military currently uses 85 different types of small-caliber ammunition from blanks used in training to armor piercing in 11 different sizes. There are also multiple types and sizes of medium- and large-caliber ammunition. In addition, the military is seeking to transition its ammunition supply to advanced types of propellants and explosives requiring new manufacturing procedures.

Maintaining an adequate supply of reliable ammunition is challenging under the best of circumstances. In wartime, the challenge becomes exponentially greater as demand increases and pre-war production capabilities are stressed.

AMMUNITION AND THE GLOBAL WAR ON TERROR

The importance of an adequate supply of ammunition to the success and well-being of the warfighter was underscored by the experiences of Operations Enduring Freedom (OEF) and Iraqi Freedom (OIF). Early in both campaigns, U.S. forces went into combat with an inadequate supply of small- and medium-caliber ammunition. Erroneous expectations regarding the duration, severity and basic character of the conflicts caused military planners to underestimate the amount of small- and medium-caliber ammunition U.S. forces would require. Military leaders had forgotten the lessons of unconventional warfare in which close combat required the expenditure of prodigious amounts of ammunition. By some estimates, U.S. forces expended nearly 250,000 bullets for every Iraqi insurgent killed.[1]

Demand for small-caliber ammunition, such as the .50-caliber ammunition shown above, escalated dramatically due to requirements from the field and from the training base.

Prior to 9/11, the annual demand for small-caliber ammunition was approximately 300 million rounds a year. Moreover, since the end of the Cold War, ammunition stockpiles had been depleted and what remained was often not suitable for combat use. Within a short period of time, it became evident that this was not sufficient to meet both the demand from the field and from the training base. The demand for 5.56mm, 7.62mm and .50-caliber rounds was especially great; these categories represented more than 95 percent of ammunition usage.[2] The Army's demand for small-caliber ammunition has soared from 426 million rounds in 2001 to 1.5 billion rounds in 2006.[3]

In addition, the military quickly realized that in order to meet the challenge of the Global War on Terror (GWOT) it was necessary that every soldier and Marine be proficient with his or her individual weapon. This meant expending large amounts of ammunition on training. As a result, the demand for ammunition exploded.

> The Department of Defense's increased requirements for small- and medium-caliber ammunitions have largely been driven by increased weapons training requirements, dictated by the Army's transformation to a more self-sustaining and lethal force – which was accelerated after the attacks of 11 September, 2001 – and by the deployment of forces to conduct recent U.S. military actions in Afghanistan and Iraq.[4]

In the same time period the demand for medium-caliber ammunition also more than doubled. Additional production lines were established to meet the increased production requirements.

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[1] Andrew Buncombe, "US forced to import bullets from Israel as troops use 250,000 for every rebel killed," *The Independent*, September 25, 2005, p. 1.
[2] Katherine Peters, "Biting the Bullet," *Government Executive*, July 15, 2004.
[3] "War's demand for ammunition causes up to year-long backlog in U.S., 1.5 billion rounds used by Army in 2006," *Houston Chronicle*, May 21, 2007, p. 1.
[4] General Accountability Office, *DOD Meeting Small and Medium Caliber Ammunition Needs, but Additional Actions Are Necessary*, GAO-05-687, July 2005, p. 8.

The problem was not simply one of firing up a robust ammunition industrial base. Without the steady demand from the military, the Cold War-era ammunition industrial base – much of which actually dated back to World War II – was allowed to atrophy.

The ammunition industrial base responded extremely well to the rising demand occasioned by the GWOT. The U.S. military was extremely fortunate that it had a viable, if aged, ammunition industrial base on which to rely. It was also fortunate to have a set of private contractors operating most of its facilities – contractors who were committed to meeting the new demands and willing to invest their own resources.

There is a lesson in this for the future. Much of the ammunition industrial base is antiquated; only limited modernization has occurred. Next time, we might not be so lucky. As the Nation plans for a reduced tempo of operations in the GWOT consistent with a phased withdrawal from Iraq, the demand for ammunition is expected to decline. Unless measures are taken now to maintain an adequate, modernized ammunition industrial base, the next time a crisis occurs and the demand for ammunition spikes that industrial base may not be able to respond.

Many factors can temporarily impede the flow of ammunition to the warfighter, much like a blood clot or wound can interfere with the flow of blood to a portion of the body. Much more dangerous to the warfighter is a failure of the ammunition industrial base to produce an adequate supply of ammunition. Such an event could prove fatal to those dependent on ammunition for their survival and catastrophic to the operations of the U.S. military.

In Afghanistan, Army soldiers prepare 155mm artillery for a training exercise. Having enough ammunition available for training is vital to the success of our military forces in completing their missions.

THE AMMUNITION INDUSTRIAL BASE

At the height of World War II, the United States ammunition industrial base consisted of some 34 facilities, virtually all brand new, that together produced annually tens of billions of rounds of ammunition and millions of bombs, torpedoes and explosive devices. Today, that once-mighty national asset has been reduced to 14 aged production plants, 11 of which are government-owned but contractor-operated (GOCOs) and three of which are both government-owned and -operated (GOGOs).[5] Three of the 11 GOCOs – Lake City (Missouri), Milan (Tennessee), and Radford (Virginia) – are producers of the Department of Defense's (DoD) small- and medium-caliber ammunition. The other facilities make a range of products from large-caliber ammunition, aerial bombs, pyrotechnics, demolitions and explosives. The 2005 Base Closure and Realignment (BRAC) Commission recommended closure of 4 of the 14 facilities: Kansas City, Lone Star, Mississippi and Riverbank. Critical activities and production lines at these facilities will be transferred to the remaining plants. Also, the Louisiana plant has been transferred to the National Guard. As a result, the remaining base will consist of nine facilities (see Figure 1).

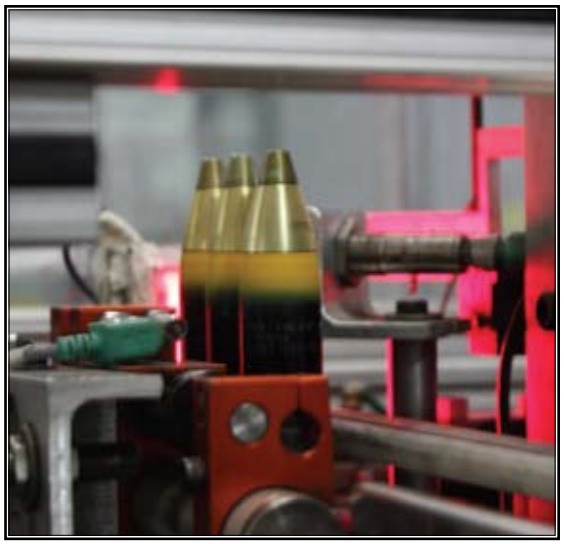
FIGURE 1: ARMY AMMUNITION PLANTS (POST 2005 BRAC)		
GOGOs		
	Crane	Demolitions, detonators, ordnance components
	McAlester	Air-delivered weapons
	Pine Bluff	Incendiaries, chemical weapons demilitarization
GOCOs		
	Iowa	Large-caliber ammunition, mines, missile warheads
	Holston	Explosives
	Lake City	Small-caliber ammunition
	Milan	Medium- and large-caliber ammunition
	Radford	Propellants, powders, medium-caliber ammunition
	Scranton	Large-caliber ammunition

The government-owned ammunition industrial base exists to ensure the ability to meet critical defense requirements, particularly in wartime. The base produces items and materials that are not available in the commercial sector and maintains the capability – demonstrated in the current conflicts – to produce quantities of ammunition that would be unavailable from commercial sources.

There are three basic stages in the ammunition supply chain. The first is the production or acquisition of basic materials, mostly energetics (propellants and explosives) but also metal parts, detonators and fuses, etc. There are many different types of propellants (e.g., single-, double-, triple-base gun propellants; and a number of rocket propellants) and explosives, each of which requires its own production line. The second step is the loading, assembling and packaging (LAP) of munitions which takes place at virtually all of the ammunition plants. Even for small-caliber ammunition, the LAP process can be extremely sophisticated and

[5] There are five additional storage sites.

requires the integration of the many parts that make up a single piece of ammunition, cannon round or shell. The final step is either storage of the munitions or delivery to the warfighter.



Medium-caliber ammunition is used in light cannons and ranges in size from 20mm to 57mm. The basic constituent materials that go into virtually every medium-caliber projectile and rocket made by the U.S. ammunition base are produced at Radford Army Ammunition Plant.

Although shrinking in size and aging overall, the ammunition industrial base has managed so far to meet the Nation's newfound demands. In 2001, only the Lake City Army Ammunition Plant (LCAAP) produced small-caliber ammunition. Fortunately the plant and its contracted operator, Alliant Techsystems (ATK), were able to respond to the challenge of the GWOT; due in part to investments made by ATK in the facility. The most notable improvement was acquiring and moving to that facility the only surviving line for the production of the links to create belts for 5.56mm, 7.62mm and .50-caliber machine guns. After 9/11, as demand for small-caliber ammunition went through the roof, Lake City increased its production from 300 million rounds a year to 1.2 billion. So great was the demand for ammunition that the Army was temporarily forced to buy from foreign suppliers. Several years of effort and hundreds of millions of dollars were required to increase the capacity at LCAAP. Now the plant is capable of producing up to 1.6 billion rounds of ammunition per year.[6]

Production at other facilities such as McAlester, Milan, Radford, and Holston also increased to meet the new demand. McAlester provided most of the air-delivered munitions used in Iraq and Afghanistan. It also produced new products such as the 15-ton Massive Ordnance Air-Delivered Bomb. Milan and Radford upgraded their production lines to meet the increased demand for medium-caliber shells. Holston responded to OIF and OEF by ramping up production of explosive materials. Meeting the surge in demand for the Joint Direct Attack Munition required a 150 percent increase in the production of the critical explosive component of that weapon. Over the same period, production costs at Holston have been reduced by approximately 50 percent. At Radford, the production cost for a pound of nitrocellulose has been reduced by over 40 percent.

RADFORD: THE AGING HEART OF THE AMMUNITION INDUSTRIAL BASE

The heart of the U.S. ammunition industrial base is the Radford Army Ammunition Plant (RFAAP). All the Services, not just the Army which owns the facility, are dependent on the products that come from RFAAP.

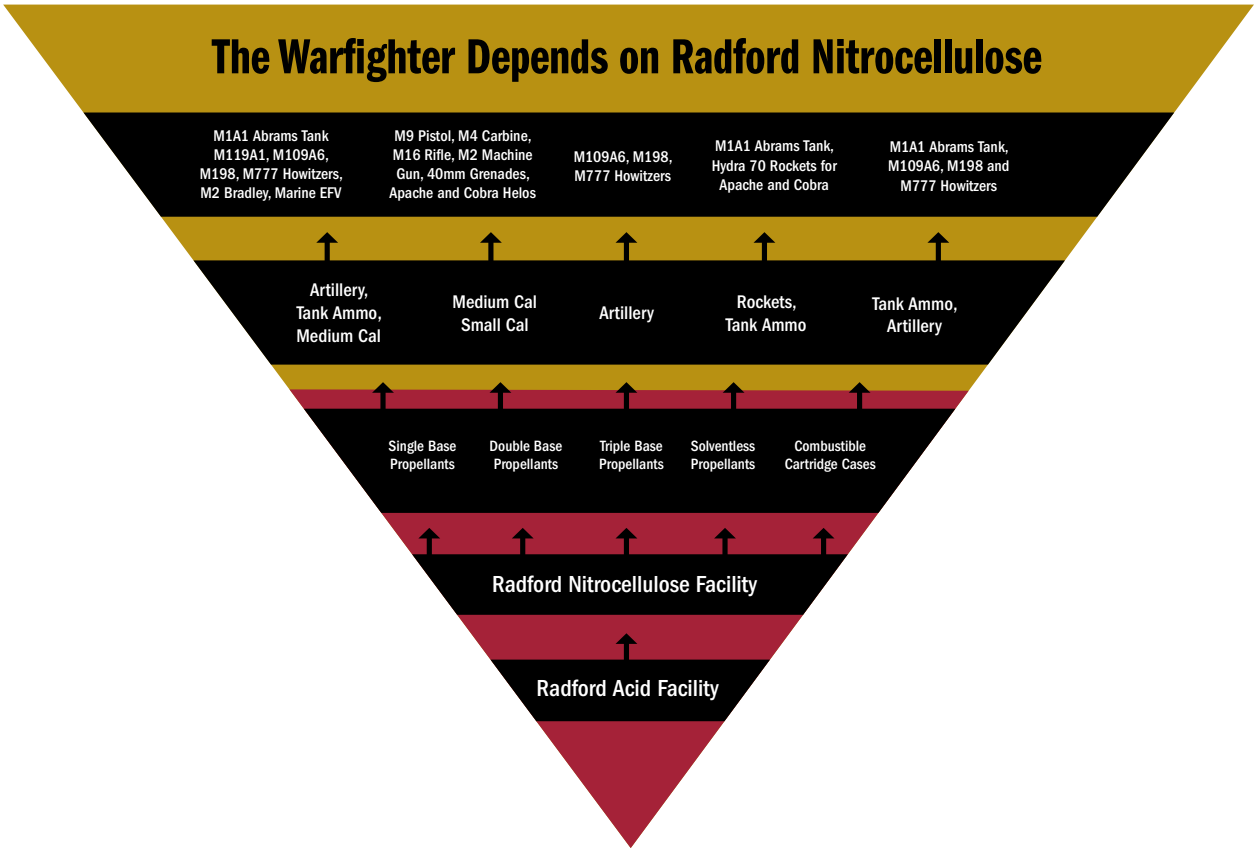
RFAAP is a unique facility. It alone among the 14 existing plants has an acid concentrator facility that produces the nitric and sulphuric acids which, when combined with cellulose in a one-of-a-kind facility at RFAAP, make nitrocellulose, the essential ingredient for all propellants and explosives used throughout the Army's ammunition industrial base. RFAAP is a primary producer of gun propellants, and the only producer

[6] The Army created a second source producer of small arms ammunition. The second source, a team led by General Dynamics, produces 300 million rounds per year with the possibility of an additional 200 million.

of the special solventless propellants employed in some tank shells and rocket motors. Finally, the RFAAP medium-caliber ammunition line LAPs 25mm, 30mm and 40mm cannon shells used by all the Services and can also produce 40mm shells, if required.

Since acid is a critical constituent of nitrocellulose, were the acid plant to fail, nitrocellulose production would also fail and there is no alternative domestic source for this material. It is also uncertain whether environmental regulations would permit movement of the waste acid volumes across the country. The inability to produce nitrocellulose would cripple the domestic production of ammunition, placing the warfighters at risk and making the United States completely dependent on limited foreign sources. A failure of any of the production lines at RFAAP, but particularly those for solventless propellants or medium- and large-caliber ammunition, would be catastrophic for such weapons systems as the Abrams tank, Bradley Fighting Vehicle, Apache helicopter and virtually all Navy and Air Force fighters.

FIGURE 2



Speaking about past efforts to modernize the base, Dennis Dunlap, Director of Industrial Support for the Joint Munitions Command, pointed out that:

> . . . our focus has been primarily in modernizing the production facilities and equipment. We had never really modernized the underlying infrastructure: the water lines, the electrical system, and so on. And so, as we came into this current OIF/OEF surge, we were finding ourselves unable to keep up with demand.[7]

RFAAP, like all the plants that make up the ammunition industrial base, was built at the start of World War II. The size and layout of the facility made sense then and reflected the state of technology nearly 70 years ago. Today, RFAAP's infrastructure is aging and requires constant repair. There have been previous investments in modernization, associated with other conflicts, but there has never been a comprehensive effort to rationalize and modernize the facility. Like the other plants in the ammunition industrial base, the basic infrastructure of pipes, sewer lines and water mains dates back to the early 1940s. As a result, RFAAP remains a facility designed for a different age. Meeting modern, evolving environmental standards is a constant challenge.

It is ironic that RFAAP, so critical to national security, is at great potential risk. This is particularly the case in the period of reduced defense budgets that is likely to ensue. For many years DoD did not to make the proper investments in maintaining and modernizing the facility. Failure to complete the modernization efforts begun after 9/11 might result in a failure of critical production capabilities at RFAAP sometime in the future that could place the nation's security at risk. Equally important, steps need to be taken to anticipate the move to new kinds of ammunition products and in doing so, to develop a new business model for RFAAP that will lower the costs of ammunition provided to the warfighters.

The Radford facility is unique in its ability to make nitrocellulose – an essential ingredient for propellants and explosives. There is no alternative domestic source for this material should an element of this process fail, such as the blenders pictured above.

IMPROVEMENTS TO THE AMMUNITION SUPPLY CHAIN

Allowed to atrophy in the years following the end of the Cold War, the state of the ammunition industrial base was uncertain, at best, when the nation was confronted by new threats after 9/11. Since then, the Army and the private contractors managing the GOCOs have collaborated to make substantial improvements to the ammunition industrial base.

Early in the effort to mobilize resources in response to the demands of the Iraq and Afghanistan wars, the Army recognized the need for a plan that addressed the deficiencies in the ammunition industrial base. The Army's agent in charge of ammunition, the Single Manager for Conventional Ammunition, published the

[7] Mr. Dennis Dunlap, cited in Scott R. Ghourley, "Modernizing the Ammunition Industrial Base," U.S. Army Material Command, Faircount Media Group, 2008.

Modernizing the acid plant at Radford is key to its ability to ensure production of nitrocellulose.

Industrial Base Strategic Plan: 2015, which laid out a long-term approach for rationalizing and upgrading the ammunition industrial base.[8]

As part of this plan, the Army has made significant investments in the last seven and a half years on improvements to the ammunition industrial base. For example, the Army has committed to an investment of $242 million in improvements at LCAAP. In some instances, entire production lines in the plant have been redone to improve efficiency and reduce production times. Additional computerization and robotics were added to some of the production lines and World War II-era presses and stamping machines were refurbished.

Similar investments have been made at other facilities to ensure that the critical underlying infrastructure continues to function. At the Holston Army Ammunition Plant, the Army made investments in improved processes, equipment, and infrastructure. The nation's only agile manufacturing facility for energetics was created. Upgrades were made to the chemical transfer lines and the railroad tracks serving the facility. The Iowa Army Ammunition Plant saw modernization in process and production to enhance that facility's ability to produce the next generation of insensitive munitions (IM) and allow the flexible production line to use IM in all its products. At the Milan Army Ammunition Plant, the focus of modernization has been on the production lines. However, additional attention has been given to making the production facilities capable of handling IM.

The Army is committed to improving RFAAP. It has already invested nearly $100 million in power plant upgrades, water treatment facility and extensive infrastructure maintenance. Over the past two years alone, the Army has provided some $148 million to help modernize RFAAP. This funding has been directed at critical modernization projects, the most significant of which is the completion of the design and construction of the new acid concentrator facility. The funding will also support the development of a new solvent recovery system, water distribution system repairs, and additional powerhouse repairs.

But the Army alone could not have kept the ammunition industrial base working. The private companies that have managed the GOCOs have shown themselves to be very responsible when it comes to sustaining the Nation's ammunition industrial base. ATK played a significant role in modernization efforts at RFAAP both through its own activities and in partnership with the Army. Managing ammunition plants requires special skills. ATK brought to RFAAP a wealth of experience that served that facility and the ammunition industrial base well.

[8] Single Manager for Conventional Ammunition (SMCA), I*ndustrial Base Strategic Plan: 2015*, Program Executive Office Ammunition SFAE-AMO Picatinny, NJ, November 3, 2003 (Update November 2004).

As is quite common in the GOCO environment, the private sector makes significant investments in upgrading activities at the facilities they manage. For example, ATK also invested in improvements to the operations at RFAAP. It has spent some $40 million over the past five years on a variety of projects at the plant, including the modern energetics facility. It relocated some of its other ammunition production contracts to RFAAP, as well as additional defense and non-defense activities by other private companies, helping to spread the indirect cost of the facility more broadly. Similarly, BAE Systems has invested some $21 million since fiscal year 2000 at Holston on a refurbished power plant, enhanced laboratories and modernized production facilities.

WHAT STILL NEEDS TO BE DONE

In the National Defense Authorization Act for Fiscal Year 2009, the Senate Armed Services Committee noted the absence of long-range planning for the recapitalization and modernization of Army ammunition plants and arsenals nationwide. It declared that, "in many cases, these ammunition plants and arsenals, operating in facilities that have not been upgraded in decades, serve as the sole producer of critical components that are absolutely essential to the mission of the Department of the Army." The Committee required the Secretary of the Army to develop a comprehensive long-range plan for each ammunition plant and arsenal.

The Army is planning now for the likely downturn in defense budgets and the resulting reduction in funding for ammunition. It has set very sensible goals for this sector of the defense industrial base. First, ensure an adequate stockpile. Second, modernize and, to an extent, diversify the industrial base. Third, advance the basic science of small-caliber ammunition. Finally, protect core capabilities from the inevitable downturn in funding.[9]

The loading, assembling and packaging process can be extremely sophisticated and requires the integration of many parts that make up a single piece of ammunition, cannon round or shell.

[9] Daniel Goure, "In the End, It's All About Ammunition," *Army*, September 2006.

To these goals another should be added. This is to prepare the ammunition industrial base to produce the next generation of products such as advanced energetic materials, IM, and even “green” ammunition. Energetic materials are the critical constituents that provide the power behind propellants and explosives. Advanced energetics has more power per unit than current products. An IM will not detonate under any conditions other than those associated with its intended mission. It will not detonate if subjected to extremely high temperatures, hit by a bullet or shell fragment or impacted by explosive forces. Advanced energetics that are also insensitive to external shocks are becoming commonplace in the commercial explosives industry. “Green” ammunition would have reduced toxic content such as “reduced lead” bullets, “reduced smoke” grenades and rockets or bombs with fewer toxins.

Looking to the future, the Army needs to do more than merely assure the survival of RFAAP. The plant needs additional modernization. Tolerating rising costs for ammunition in a time of budgetary retrenchment is the wrong way to do business. Also, the nature of the ammunition business is changing with new processes, products, environmental and security requirements emerging. The Army needs to equip the entire ammunition industrial base, but RFAAP in particular, to deal with these changes.

Radford is a one-of-a-kind facility that must be kept functional. Therefore, it is vital that work proceed on facility modernization. The first steps in this direction have already been started with the modernization of the power plant and the construction of a new acid concentrator. The next critical project is modernization of the nitrocellulose plant. In addition to that, RFAAP must take steps to meet new environmental standards that are likely to affect complex chemical processes such as those associated with the production of energetics most dramatically.

The control room for the Ammonia Oxidation Plant where dilute nitric acid is produced and is later concentrated in another part of the plant.

Also, in order to lower costs and prepare for the future, new work must be brought into RFAAP. The Army should begin now to invest in the production of advanced energetics and IM explosive ingredients. Adding these capabilities to RFAAP would spread fixed costs over more lines of business, thereby lowering ammunition costs to all consumers. With the RFAAP management contract about to be recompeted, this is a time to see what the competing companies bring to the table for modernization.

The Army needs to consider investing in modern industrial technologies to support the development of advanced production capabilities at its critical ammunition plants. The Navy's approach to management and modernization of the Allegheny Ballistics Laboratory (ABL) is one the Army should consider emulating. ABL produces a variety of products, including some types of ammunition. At ABL, the Navy and ATK have invested $589 million on a renovation and modernization program. As part of this investment, an automatic fiber placement production facility was built that is now being used to produce the composite pivot shaft assembly for the F-22 fighter. Modernization funds were also applied to the relocation of new production activities such as advanced proximity fuzes to ABL.

ATK has successfully operated ABL for 50 years, and has a long contract (24 years), which allows it to recoup the costs associated with investments in the facility. In addition, ATK pays a lease fee that is a percentage of revenues; these funds are used primarily for facility improvement projects on the installation, including building and equipment renovations. ATK also manages a range of programs associated with the operations of ABL, such as security, with an eye towards reducing costs.

The Army has a plan to enhance the operation of RFAAP. Some $350 million has been identified and set aside to complete the modernization effort at RFAAP, which is not a lot of money when the future of the entire U.S. ammunition industrial base is on the line. This investment would ensure the physical modernization of RFAAP's critical infrastructure and provide the basis for bringing additional work to the plant.

However, the Army has decided to delay spending the RFAAP modernization funds in anticipation of the recompeting of that facility's basic management contract. The current plan is to have the new management contract in place when the old one expires at the end of March 2010 and subsequently invest the modernization money.

Delaying the completion of the RFAAP modernization program is a major mistake. Delay is costly in many ways. Most obviously, something could go wrong with the aging infrastructure at RFAAP. In addition, the Army is taking a risk waiting for the new management contract to be awarded. The contracting process is often lengthier than anticipated, which would delay both the awarding of the management contract and the investment of the modernization funds. Also, given downward pressure on the defense budget, the money may not be there in a year.

At LCAAP, the Army decided that delaying modernization to await a new management contract would be a mistake. Indeed, the Army extended the current contract until the modernization effort was completed.

RECOMMENDATIONS

Overall, the Army has successfully managed its effort to modernize the ammunition industrial base. It should finish the process it began after 9/11. With respect to that most critical of links in the chain of facilities producing ammunition for U.S. warfighters, RFAAP, the Army should take the following steps:

- Commit available funds now. Waiting not only increases risk, but the cost of RFAAP's products. In effect, the Army should decouple the two efforts, the basic management of RFAAP and that facility's modernization.

- Consider options for managing modernization while planning a recompete. The Army should consider repeating the decision it took with respect to modernization at Lake City.

The approach described above has several features to recommend it. First, it ensures that the money will be spent as intended, rather than being diverted to other uses. Second, by spending the modernization money now, the process is accomplished in an expeditious fashion. Third, this will make the recompete easier; the contract will be more attractive to bidders if they know that the facility they will manage is being modernized. Finally, modernization will make the products produced by the ammunition industrial base better and cheaper. This is a win for everyone.

RFAAP, the old heart of the U.S. ammunition industrial base continues to function. But like the human heart, if not properly cared for, it can stop working. The warning signs are abundant, like a bad electrocardiogram. Action needs to be taken now to prevent a major disruption in the vital supply of ammunition to the warfighters.

GLOSSARY:

ABL	Allegheny Ballistics Laboratory
ATK	Alliant Techsystems
BRAC	Defense Base Closure and Realignment
DoD	U.S. Department of Defense
EFV	Expeditionary Fighting Vehicle
GOCO	Government-Owned, Contractor-Operated
GOGO	Government-Owned, Government-Operated
GWOT	Global War on Terror
IM	Insensitive Munitions
LAP	Loading, Assembling and Packaging
LCAAP	Lake City Army Ammunition Plant
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
RFAAP	Radford Army Ammunition Plant

It is essential that modernization of Radford move ahead. The military is at risk of having its supply of ammunition virtually halted should there be a breakdown in any of a number of its critical systems.

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