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U.S. Military Has Explosives Problem

Sole domestic maker of crucial type of gunpowder blew up two years ago

BY GORDON LUBOLD

MINDEN, La.—Nearly two years ago, an errant spark inside a mill caused an explosion so big it destroyed all the building's equipment and blew a corrugated fiberglass wall 100 feet.

It also shut down the sole domestic source of an explosive the Department of Defense relies on to produce bullets, mortar shells, artillery rounds and Tomahawk missiles.

The ramshackle facility makes the original form of gunpowder, known today as black powder, a highly combustible material with hundreds of military applications. The product, for which there is no substitute, is used in small quantities in munitions to ignite more powerful explosives.

No one was hurt in the June 2021 blast. But the factory remains offline, unable to deliver its single vital component to either commercial or Pentagon customers.

Military suppliers consolidated at the Cold War's end, under pressure to reduce defense costs and streamline the nation's industrial base. Over the past three decades, the number of fixed wing aircraft suppliers in the U.S. has declined from eight to three. During the same period, major surface ship producers fell from eight to two, and today, only three American companies supply over 90% of the Pentagon's missile stockpile.

Lower-tier defense firms are often the sole maker of vital parts—such as black powder—and a single crisis can bring production to a

standstill.

Today that's emerging as a gnawing problem for the U.S., whether in supplying weapons and ammunition to Ukraine or in restocking reserves to prepare for a potential confrontation with China in the new era of great-power competition, according to U.S. military officials, defense experts and congressional staffers.

After months of supplying Ukraine with Stingers, howitzers, anti-armor systems and artillery ammunition, stocks are low in both the U.S. and its NATO allies, especially in 155mm howitzer shells, an ammunition that has been crucial to pushing back Russian forces.

"Can you imagine what would happen to these supply chains if the U.S. were in an actual state of active war, or NATO was?" said Jeff Rhoads, executive director of the Purdue Institute for National Security, a defense-research institute at Purdue University. "They could be in trouble very quickly."

Black powder

The "incident," as the Minden explosion has become known, is a pointed example of the risks facing America's military. The blast that wrecked a World War II era building in a remote compound 30 miles from Shreveport has extinguished all production of black powder in North America.

with a $3.5 million investment in mill upgrades under the Defense Production Act, which provides funding for national defense, part of a larger program designed to alleviate the problem of having critical resources produced in far-flung, sometimes unreliable places.

After refurbishing the mill, Estes Energetics, spun off from Estes Industries, is scheduled to relaunch production and restart supplies to military contractors by this summer. Estes Industries also supplies students and hobbyists with model rockets, kits and accessories, and the small quantities of black powder used in old-fashioned weapons for re-enactors and hunters.

In the meantime, U.S. military contractors who use black powder have been drawing on stockpiles, according to people familiar with the matter and U.S. officials. Other producers of black powder exist in Germany, Poland, Switzerland, Brazil and China.

Chokepoints are one of a number of weaknesses in the U.S. military's supply chains. Others include a lack of skilled workers in casting and forging, shortages of infrastructure for battery technology and periodic shortages of advanced microchips. Some domestic suppliers have quit unprofitable businesses altogether, leaving it to both allies and adversaries to supply commodities such as the rare earth minerals used in state-of-the-art technology. The Pentagon has invested more than $100 million in the mining and processing of such minerals in the U.S. after American companies ceded production to China.

The result is that the military is "increasingly reliant on a smaller number of contractors for these critical capabilities," said Halimah Najieb-Locke, deputy assistant secretary of defense in charge of the industrial base, at a recent seminar. "That impacts everybody's ability to ramp production."

'Last Supper'

The roots of the current crisis can be traced back three decades, to a 1993 dinner at the Pentagon often referred to as the "last supper," when Secretary of Defense Les Aspin invited the CEOs of the top 15 defense companies and warned that the Pentagon couldn't sustain them all. They would need to consolidate.

The number of major arms suppliers for the Pentagon went from dozens in the 1990s, down to just five, known as primes, who typically bid for major weapons programs today. A similar contraction took place among lower-tier suppliers.

Overall, the defense industrial base shrank to 55,000 vendors in 2021, down from 69,000 in 2016.

Despite consolidation, the networks of companies remain large. The average American aerospace company relies on hundreds of first-tier subcontractors, according to Defense Department statistics, and thousands in the second and third tiers below that.

That scope presents its own problems. The network is so vast, the military has limited visibility, according to a Pentagon report, and "does not track these vulnerabilities as they impact weapons programs." A failure down the supply chain can go unnoticed for

The Pentagon has identified 27 critical chemicals with no U.S. production.

Nonexplosive testing materials being loaded into a press at the black powder factory in Minden, La., above, in February; conveyor belts are used to move materials into a separate room to be packed by remotely operated equipment, below left; mixing nonexplosive materials, below right. COOPER NEILL FOR THE WALL STREET JOURNAL (3)

The accident was part of what Labor Department records show is the mill's history of explosions and fatalities under various owners in recent decades. The mill traces its origins to the 19th-century Du-Pont chemicals empire, and at the time of the blast was owned by Hodgdon Powder Co.

For a millennium, black powder was a crucial material for both military and commercial uses. Today, it is a specialty commodity with few commercial applications— mostly for rocket hobbyists— but it's still used in more than 300 munitions, from cruise missiles, to bullets for M16 rifles, to the vital 155mm shells.

In each case, a small amount of black powder is used to detonate a more powerful explosive packed in the same bullet or missile. A 155mm shell for a howitzer, for example, will use half an ounce of black powder, lodged next to 26 pounds of a more powerful explosive.

Sales volume is limited and that means profits can be too thin to support more than a single production facility. This type of vulnerability is so common, the Pentagon describes it as the "single source" problem. Only one foundry in the U.S. makes the titanium castings used in howitzers, and only one company makes the rocket motor used in the Javelin antitank weapon widely used in Ukraine.

Part of the problem is that the Pentagon can be a fickle customer. Orders can surge or plummet depending on inventory levels, the state of U.S. military engagements or budget priorities. This posed a challenge for the operators of the black powder mill, who also faced costly regulations.

Hodgdon, which bought the Minden powder mill in 2009, said military purchases at that time represented significant sales. But over time, they "slowed in both frequency and volume," said Aaron Oelger, spokesman for Hodgdon. He said no one with the company now was there at the time of the explosion.

Hodgdon decided to get out of the business after the explosion, and sold the mill last year to one of its shortlist of commercial customers, a model-rocket maker in Penrose, Colo., named Estes Industries. The Pentagon helped the transition

months by prime contractors such as Boeing Co. or Lockheed Martin Corp., let alone the Pentagon.

The Minden mill, as a fifth-tier supplier, was deep down the defense supply chain. Given black powder's importance, the Army in this instance noticed right away, according to people familiar with the matter. It still took months for the new owner to take over, and by the time Estes began refurbishing the mill, yellow wildflowers had sprouted in the factory yard.

Black powder is made essentially the same way it was 200 years ago. Some of that rusticity, using huge 6-ton metal and wooden wheels and grinders and sifters, is by design. The parts minimize the sparks that caused the accident in 2021 in the mill, where the fine powder is compressed into cakes and crushed into various sizes, and shut down the plant.

There are few computers near production areas at the Minden facility because electronics pose sparking dangers. Workers wear special shoes and floors are covered in paint that prevents the accumulation of static electricity. Cotton clothes also help mitigate the risk of sparks. Employees operate machinery much like a dentist takes an Xray, standing outside the production room to stay safe.

The explosive properties of black powder, a simple mixture of sulfur, charcoal and potassium nitrate, were first discovered in 9th-century China, and it was widely used for centuries.

In the 20th century, smokeless gunpowder, made with different materials, became the preferred propellant— the explosive pushing a projectile out of a gun or cannon barrel—because it was more powerful, produced less smoke and left less residue. It was also somewhat safer to produce.

After World War II, the black powder business declined, and the main customers used black powder in fireworks, model rockets or muzzleloading historic guns. The DuPont conglomerate sold its last remaining black powder mill in Pennsylvania in 1971.

The Minden mill, above left, is being rebuilt after the 2021 explosion; U.S. Army soldiers working on a M777 howitzer in a joint military drill between South Korea and the U.S. in March. FROM LEFT: COOPER NEILL FOR THE WALL STREET JOURNAL; AHN YOUNG- JOON/ AP

After an explosion killed two employees, its new owners moved it to Minden in 1997, in part because Louisiana's humid weather could reduce sparks. "Humidity is a powder man's best friend," Anita Vincenti, a Minden mill worker who moved with the plant from Pennsylvania, said this fall.

The Pentagon's $3.5 million investment in mill upgrades after the recent shutdown is part of an effort by the Biden ad-ministration to strengthen the industrial base. It is working with suppliers to address similar weaknesses in munitions, forging and casting, batteries and microelectronics.

Late last year, the Defense Department identified 27 critical chemicals that have no U.S. production and are sourced from places, including Russia and China, considered adversaries of the U.S.

The Pentagon expects to spend more than $207 million to bring production of materials back to the U.S. as soon as possible.

A handful of critical materials used by the U.S. are only produced inside war-torn Ukraine, said Anthony Di Stasio, a senior Pentagon official in charge of prioritizing and investing in defense production.

Stimulating the marketplace to bring production to the U.S. is doable, he said. "I'd be really surprised if we couldn't get this done within the next three years," Mr. Di Stasio said, of the overall effort.

In February, Estes company officials touring the facility pointed to upgrades to the mill. It now has a new, state-of the-art fire suppression system, a shiny network of metal pipes and water guns aimed at the points of production vulnerable to the sparks that caused the 2021 accident.

The previous month Estes had restarted production of an inert black powder substitute as a safety test, before it resumes production of the real thing. The launch has been delayed a number of times, once recently when a water main broke in the middle of the factory grounds.

"Whenever you turn on old machinery that has stood for a while, [there] tends to be something that breaks," said Karl Kulling, chief operating officer of Estes Energetics. "So we've gone through basically each machine and fixed up things here, there and everywhere."