

[H.A.S.C. No. 116-91]

**MODERNIZATION OF THE
CONVENTIONAL AMMUNITION
PRODUCTION INDUSTRIAL BASE**

HEARING

BEFORE THE

SUBCOMMITTEE ON TACTICAL
AIR AND LAND FORCES

OF THE

COMMITTEE ON ARMED SERVICES
HOUSE OF REPRESENTATIVES

ONE HUNDRED SIXTEENTH CONGRESS

SECOND SESSION

HEARING HELD
SEPTEMBER 22, 2020



U.S. GOVERNMENT PUBLISHING OFFICE

SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

DONALD NORCROSS, New Jersey, *Chairman*

JAMES R. LANGEVIN, Rhode Island
JOE COURTNEY, Connecticut
RUBEN GALLEG0, Arizona
SALUD O. CARBAJAL, California
ANTHONY G. BROWN, Maryland
FILEMON VELA, Texas
XOCHITL TORRES SMALL, New Mexico,

Vice Chair

MIKIE SHERRILL, New Jersey
JARED F. GOLDEN, Maine
ANTHONY BRINDISI, New York

VICKY HARTZLER, Missouri
PAUL COOK, California
MATT GAETZ, Florida
DON BACON, Nebraska
JIM BANKS, Indiana
PAUL MITCHELL, Michigan
MICHAEL R. TURNER, Ohio
DOUG LAMBORN, Colorado
ROBERT J. WITTMAN, Virginia

ELIZABETH GRIFFIN, *Professional Staff Member*

JESSE TOLLESON *Professional Staff Member*

CAROLINE KEHRLI, *Clerk*

CONTENTS

	Page
STATEMENTS PRESENTED BY MEMBERS OF CONGRESS	
Hartzler, Hon. Vicky, a Representative from Missouri, Ranking Member, Subcommittee on Tactical Air and Land Forces	2
Norcross, Hon. Donald, a Representative from New Jersey, Chairman, Subcommittee on Tactical Air and Land Forces	1
WITNESSES	
Daly, GEN Edward M., USA, Commanding General, Army Materiel Command	4
Jette, Hon. Bruce D., Assistant Secretary of the Army for Acquisition, Logistics and Technology, Department of the Army	5
APPENDIX	
PREPARED STATEMENTS:	
Jette, Hon. Bruce D., joint with GEN Edward M. Daly	33
Norcross, Hon. Donald	31
DOCUMENTS SUBMITTED FOR THE RECORD:	
[There were no Documents submitted.]	
WITNESS RESPONSES TO QUESTIONS ASKED DURING THE HEARING:	
Mr. Bacon	50
Mrs. Hartzler	49
Mr. Norcross	49
QUESTIONS SUBMITTED BY MEMBERS POST HEARING:	
Mr. Golden	53

**MODERNIZATION OF THE CONVENTIONAL AMMUNITION
PRODUCTION INDUSTRIAL BASE**

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ARMED SERVICES,
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES,
Washington, DC, Tuesday, September 22, 2020.

The subcommittee met, pursuant to call, at 1:05 p.m., in room 2118, Rayburn House Office Building, Hon. Donald Norcross (chairman of the subcommittee) presiding.

OPENING STATEMENT OF HON. DONALD NORCROSS, A REPRESENTATIVE FROM NEW JERSEY, CHAIRMAN, SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

Mr. NORCROSS. The hearing will come to order.

Before the hearing officially begins, we have a few housekeeping notes. Even though right now nobody is participating remotely, we still want to make sure that the rules are set out and we have a full understanding.

Those who are joining remotely must be visible on screen for the purposes of identity verification, establishing and maintaining a quorum, participating in the proceeding, and voting. Those members must continue to use the software platform video function while in attendance unless they experience connectivity issues or other technical problems that render them unable to participate on camera. If the member experiences technical difficulties, they should contact the committee staff for assistance.

Video of members' participation will be broadcast in the room via television and internet feeds. Members participating remotely must seek recognition verbally, and they are asked to mute their microphones when they are not speaking.

Members who are participating remotely are reminded to keep the software platform's video function on the entire time they attend the proceedings. Members may leave and rejoin the proceeding. If Members depart for a short while for reasons other than joining a different proceeding, they should leave the video function on. If members will be absent for a significant period or depart to join a different proceeding, they should exit the software platform entirely and then rejoin if they return.

Members may use the software platform's chat feature to communicate with the staff regarding technical or logistical support issues only.

Finally, I have designated a committee staff member to, if necessary, mute unrecognized members' microphones to cancel any inadvertent background noise that may disrupt the proceedings.

Now we can begin.

Today, the Tactical Air and Land Subcommittee meets in a hybrid session to receive testimony from Army witnesses on the state of the Nation's conventional ammunition production and efforts to modernize that process.

The topic of today's hearing is intended to be a start, an assessment, where we are, what I hope will be a productive conversation between the committee and the Army on improving the state of conventional ammunition production facilities across the country.

The ammunition that our Army trains and takes into combat comes from production lines scattered across the great heartland of this Nation. In fact, most of it is manufactured in the same facilities that produced the ammunition used to bring victories to the allies in World War II—shocking to me and certainly anybody listening. Those facilities look, operate much like they did in the 1940s.

Producing ammunition is no easy task. Often, it is a job that—very careful and steady attention to detail. Obviously, the downsides are tremendous. You are dealing with explosives and chemical components. In order to ensure safety and security for the workforce, they must be supported with modern facilities that can do the job. Modern production processes are available. We need the will to assess and to do it.

Many of the materials going in the ammunition production are foreign-sourced or single-sourced or sometimes both. Supply-chain disruption is an unacceptable risk, and we can't do it.

So why, then, are fundamentally essential functions of the defense manufacturing done in museum-like conditions? What needs to be done is to improve this process. We will have that discussion. How can Congress assist the Army in this task? And how would these facilities meet the needs of a military in a true national emergency? These questions will be the focus of today's discussion.

Today, we are pleased to have once again Dr. Bruce Jette, the Assistant Secretary of the Army for Acquisition, Logistics and Technology, as well as General Edward Daly, Commanding General of Army Materiel Command. We look forward to their observations, their ideas on how to modernize and improve reliability on the ammunition production.

But, first, I turn to my friend, the ranking member for the TAL [Tactical Air and Land Forces] Subcommittee, Mrs. Hartzler, for any opening remarks.

[The prepared statement of Mr. Norcross can be found in the Appendix on page 31.]

STATEMENT OF HON. VICKY HARTZLER, A REPRESENTATIVE FROM MISSOURI, RANKING MEMBER, SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

Mrs. HARTZLER. Thank you, Mr. Chairman.

Conventional ammunition and associated industrial base have tended to be an afterthought at times when discussing the defense budget, and we have seen where ammunition procurement accounts have been used as bill payers in the past. There is a tendency to take for granted that we will always have a responsive and resilient ammunition industrial base capable of rapidly surging to meet operational demands.

The COVID-19 [coronavirus disease 2019] pandemic has amplified a problem that has been prevalent for quite some time: that the defense industrial base, especially at the supply-chain level, is fragile and may not be as resilient as we need it to be. This includes the Army ammunition industrial base, where we see many single points of failure and supply-chain dependency on overseas sources for many critical materials.

So I am very pleased that the chairman is holding this hearing today so that we can better understand what actions the Army is taking, as the single manager of conventional ammunition, to modernize this critical industrial base.

I want to work with you both to ensure we have a resilient ammunition industrial base that is modernized and affordable, as well as ensure we have a healthy stockpile that can serve as insurance for Army readiness and credible deterrence.

Today, I plan to focus primarily on the status of the government-owned, contractor-operated Army ammunition plants. There are five of these critical facilities; that includes Lake City, located in Independence, Missouri. These plants are vital to nearly all munition programs, and most have been around, like the chairman said, since World War II, and many are considered to be single points of failure.

Over the past 3 years, the Army budget request has averaged approximately \$455.6 million per year to address modernization efforts for all five of these facilities. Despite this increase and steady-state funding, there still appears to be significant upgrades needed for manufacturing, safety, and environmental issues, among others.

I am wondering if there is a significant discrepancy between documented need and planned investment to sufficiently address all five facilities. And I expect our witnesses today to address this concern.

So, in closing, I want to thank our witnesses for their dedicated service to this Nation, for your support of every soldier and each of their families, and I look forward to hearing your testimony.

And I would add, in reading your biographies, I am sure West Point is very proud of both of you. So thank you for your longtime service to this Nation.

I yield back.

Mr. NORCROSS. Thank you.

Interesting, in my district, directly across from downtown Philadelphia, the Delaware River, and we were home to three manufacturers from DuPont, who made all the powders back during the Second World War. They have all long since shut, and they have a legacy issue there that is just millions to clean up. So we have to take care of what we have.

Obviously, when they built buildings back in the 1940s, they didn't know of many of the contamination issues that we are being faced with today. But it is also how we store it, how we transport it, the production. These are all things that we are looking to hear your views on.

So I understand our witnesses have prepared a joint statement. Without objection, we will make that part of the record.

I also understand, at the Army's request, General Daly will open with summary remarks. If we can keep it somewhere around 5 minutes, because I think we are still at 2 o'clock for votes.

General DALY. Absolutely, Mr. Chairman.

Mr. NORCROSS. Terrific. General Daly, the floor is yours.

**STATEMENT OF GEN EDWARD M. DALY, USA, COMMANDING
GENERAL, ARMY MATERIEL COMMAND**

General DALY. Thank you, Mr. Chairman.

Good afternoon, Chairman Norcross, Ranking Member Hartzler, and distinguished members of the subcommittee. I appreciate the opportunity to testify on the Army's ammunition organic industrial base, the OIB.

On behalf of Secretary McCarthy and General McConville, thank you for your strong support and continued commitment to our soldiers, our Department of Army civilians, families, and veterans. And I can tell you that I am honored to be here today with Dr. Jette.

Today's ammunition OIB includes 16 plants, centers, and depots, split between GOGOs [government-owned, government-operated] and GOCOs [government-owned, contractor-operated], down from the height of 64 locations during World War II, and with plans to decrease to 14 in the next few years. With a workforce of more than 11,000 skilled artisans, these sites produce, store, distribute, surveil, and demilitarize conventional ammunition for the joint force.

As you know, the purpose of the ammunition OIB is to support current munitions readiness, maintain surge capacity and capability, and modernize to support future weapons platforms. And we are successfully meeting requirements in all three areas.

Army senior leader priorities are clear: People are the centerpiece by which we achieve readiness, modernization, and reform. And, unequivocally, our ammunition industrial base is tied to each of the Army priorities.

I take my roles and responsibilities very seriously based on the command authorities given to me through title 10, by the Secretary of the Army, through Army regulations, which include distribution, storage, surveillance, de-mil, as well as mission command of depot infrastructure and energy and environmental programs across the ammunition OIB.

My relationship with Dr. Jette in support of his designated roles both as the Army's acquisition executive and the senior manager for conventional ammunition, the SMCA, is critical. Together, we work collaboratively on manufacturing and production. Dr. Jette and I are 100 percent synchronized in support of the Army priorities in our roles and responsibilities and authorities. There is no daylight between us.

As you will see in our 2020 SMCA report, which will follow later this year, we have continued success in production and industrial base management, stockpile management, and distribution management.

With respect to the industrial base modernization, we have made significant investments—more than \$3.2 billion since 2009—in upgrades to facilities, infrastructure, and operations equipment.

A few key examples include: an investment of nearly \$400 million in a new nitrocellulose facility at Radford, which is a base ingredient in the majority of DOD [Department of Defense] propellants; more than \$200 million in a new nitric acid facility at Holston that recycles and reconstitutes critical materials used in insensitive munitions explosives; and at Lake City, upgrades for processes for primers, cartridges, and bullets, with 21st-century technology such as computer program logic, robotics, maintenance analytics, and prognostic sensors; and continuing planning for the new construction in support of the Next Generation Squad Weapon.

The bottom line is that, while these facilities are successfully meeting our current requirements, we must continue to invest in modernization now to ensure our ability to meet future large-scale combat operation requirements.

Dr. Jette and I are absolutely committed to a comprehensive, revolutionary, holistic, 15-year modernization strategy across our ammunition plants and facilities. And although we have made significant progress in investments, we still have a \$14 billion to \$16 billion cost to fully modernize our ammunition OIB to a 21st-century capability.

We are refining our priorities that focus our modernization efforts on those projects that are most critical to support current readiness and posture capabilities for 2035 and beyond. Safety is one of our top priorities, and our envisioned end state is state-of-the-art manufacturing processes and machinery that have built-in safety standards across the ammunition industrial base. We are also committed to a protection of our critical capabilities and reducing our single points of failure as well as decreasing reliance on foreign suppliers.

Distinguished members of the subcommittee, thank you again for allowing me to appear before you. Your continued support is enabling the Army to maintain and modernize our ammo facilities and deliver readiness to the joint force.

I look forward to your questions. Thank you.

Mr. NORCROSS. Thank you.

Dr. Jette.

STATEMENT OF HON. BRUCE D. JETTE, ASSISTANT SECRETARY OF THE ARMY FOR ACQUISITION, LOGISTICS AND TECHNOLOGY, DEPARTMENT OF THE ARMY

Secretary JETTE. Chairman Norcross, Ranking Member Hartzler, and distinguished members of the Subcommittee on Tactical Air and Land Forces, good afternoon. Thank you for your invitation to discuss the modernization of the Army's conventional ammunition production industrial base.

I sincerely appreciate General Daly's opening remarks and am in complete agreement. I take very seriously the acquisition and logistics responsibilities of my job as ASA(ALT) [Assistant Secretary of the Army for Acquisition, Logistics and Technology] As such, I believe there is a real opportunity to better relate these two facets of this position within the Army ammunition enterprise.

As General Daly has mentioned, today's Army ammunition production capability is comprised of a network of government-owned, contractor-operated, GOCOs; government-owned, government-oper-

ated, GOGOs; and contractor-owned, contractor-operated, COCOs, ammunition sites.

I would like to focus my brief remarks on the challenges we face in the Army's GOCOs ammunition production capability in the United States and related supply-chain issues, though, as General Daly mentioned, most of what I will talk about in the GOCO sense also applies in the GOGO sense.

As you know, most of today's GOCO buildings and infrastructures were built and produced during World War II. And across many decades and administrations, the concept of modernizing these facilities has stayed within the limits of keeping production capabilities safe within specific established procedures and sustaining the operations within an existing footprint.

This is understandable, as ammunition production is a dangerous endeavor, and the safety of our workforce has been and will continue to be our highest priority. I think that, given that, we have been reticent to bring our production facilities into the 21st century. But we are at an inflection point, knowing that technology offers true modernization pathways that can significantly improve both safety and transform the production capability.

Funding new facilities that are designed to embrace today's technology will improve workforce safety, enable environmental compliance—water, energy efficiency, conservation and resiliency—and establish more efficient and effective production capacity, resulting in a greater return on investment. To that end, we have embarked on an aggressive endeavor to establish a new, transformational vision to reset our modernization of the GOCOs.

We must also address our reliance on foreign supply for many materials which support ammunition production, some of which are sourced from China or locations that supply lines can be threatened by adversaries.

As part of developing an updated GOCO modernization strategy, we are conducting in-depth analysis into sources of supply, assessing single points of failure, and determining whether it is in our collective national interest to invest in secondary sources of supply, whether that be domestic production or through international partners or both.

Mr. Chairman, General Daly and I are completely in sync on the need to shift our thinking on how we modernize the Army ammunition plants. Although it is difficult to modernize the ammunition industrial base while maintaining production continually to meet our current warfighter needs, there is greater risk in not doing so.

There will be costs and regulatory implications we will need to navigate. This strategy will require sufficient, predictable, sustainable, and timely funding to ensure a successful outcome, and we look forward to working with Congress to realize this vision.

Thank you for your support of the Army and its Army ammunition industrial base for both our current investment as well as as we transform to modernize for the future. We look forward to your questions.

[The joint prepared statement of Secretary Jette and General Daly can be found in the Appendix on page 33.]

Mr. NORCROSS. Thank you.

General, you mentioned something in your remarks, that you were closing some facilities. Without even going into why you might be closing them, if we are looking at a single point of failure and we are narrowing where these facilities are by number, doesn't that increase some of the risk?

General DALY. Mr. Chairman, so there are two facilities, as you know, in particular, that we are closing. One is based on BRAC [Base Realignment and Closure]. But we have looked at that, and we don't think that, based on the critical capabilities that reside in the organic industrial base, that the closure of those facilities will affect our vulnerabilities or increase our vulnerability with regard to ammunition.

Mr. NORCROSS. So is it the production capacity or the amount of stockpiled material that is the bigger issue?

General DALY. So one of the locations that we are closing was not a production and manufacturing facility; it was just a storage facility. And it is in mothballs and has been for the last couple years.

The second one, based on BRAC, is related to chemical munitions stockpile reduction. And so, once that mission is complete, that will close in 2023.

Mr. NORCROSS. So if you could just walk us through how you diffuse the risk when the production facility is there and the raw material, which some of it, very hazardous and explosive. How do you diffuse that from that single point of failure?

Because, back in the 1940s, some of the things that we were concerned about overhead are now readily available for those who might want to disrupt it. Stockpiles, foreign material, how do you address that?

Secretary JETTE. So, Mr. Chairman, let me address some of the single point of failure.

There are risks of concentrating particular production at a particular facility, in a single facility alone. Holston, for example, is the primary place where we produce most of our explosives used in bombs and other similar things. The facility itself is designed in such a manner that the production lines are tolerant. If one is damaged and incapable of producing, other lines can pick up some of the load. And there is enough space to produce additional lines at that facility. It still does have all of the production capability concentrated in one place.

We have a similar issue for propellant, which is the material that goes into bullets and ultimately also into rocket engines and motors.

So Radford, Holston, those two plants, in particular, are the single points of failure if they were to be limited in some capacity. But the historic approach has been to save money overall in the defense industrial base and reduce the number of places. As we said, from World War II, there were 70-some facilities, and now we are down to 14.

The only way to get around that is to return other places to production. And, in that case, we are not going to be necessarily as economical as we are trying to be right now to keep our production numbers up.

Mr. NORCROSS. So you talked about \$3.2 billion as your capital plan moving forward. I am not sure how many years. I assume that

means there was an assessment done across the board. What year was the last assessment made that you are driving the plan off of?

Secretary JETTE. So, Mr. Chairman, the base plan is the United States Army Ammunition Industrial Base Strategic Plan 2025. It was published in February of 2016.

The plan's fundamental approach to the problem is to take a look at the production requirements of the Department of Defense, what the responsibilities are of those facilities, and then to try and make sure that those facilities stay, number one, safe—because if capabilities go downhill and we do find that there are procedures that are not as safe as we think they should be, we should fix those.

So there are various things we do to make the plants better, but we don't deviate a great deal from the methodologies we have used in the past. So we are just improving what we have been doing essentially since World War II in those plants. That is the plan. That is the one we are working to. That is the one that is POM'ed [program objective memorandum].

What we have done in this past year is take a more reflective view of things. And I know I have had an opportunity to talk separately to a number of your staff after some visits to those facilities and say: We have technologies which are not part of improvements—for example, right now, people still handle munitions by hand, whereas we can use robotics and automation and other methodologies to handle them. We can get people separated from the explosives. They are doing it safely. We are improving the safety conditions by those methods, but we have the technology to get them out of the facilities.

So the question then becomes, how do we improve the plants in such a way that it becomes more dependable, more reliable, and, above all, safer for the operations by the people who can transform from handlers of munitions to technicians at the facilities?

Mr. NORCROSS. Thank you.

Just one comment, and then we will turn it over to Mrs. Hartzler.

The idea of making it safer for the workers, there is no question about that. But because these plants have grown up since the 1940s, they have a great relationship with their employees. You eliminate many of those jobs, there is a potential of that support also going there.

Mrs. Hartzler.

Mrs. HARTZLER. Sure.

Well, surge capacity is very, very important. And I know it is tricky, as you manage the ammunition plants, because you have to have the capability to surge but, at the same time, you may not need it all the time. And so I guess my first question is, what actions are you taking to improve the surge capacity and resiliency of the ammunition production industrial base?

And then, secondly, can you walk us through the extent to which the industrial base is dependent on overseas sources for ammunition material?

You mentioned in your opening remarks that you are currently doing an assessment to look at the vulnerabilities. We were provided with some slides ahead of time. This is just showing, in China, all the different chemicals and source items that originate

and how they are used in various aspects of ammunition production.

So if you could kind of expound on where you are at in that assessment and when you think you will be able to make those decisions and secure those secondary sources for those.

And just in your testimony, written testimony, twice you mentioned, at the same time, we must implement a strategy to reduce single-point failures, reduce dependence on international, sole-source suppliers, some of which are not our allies, and develop international partnerships.

So I guess my question is, along with this, is there a strategy? Are you in the process of just kind of assessing things and then you are going to write the strategy?

So thank you.

Secretary JETTE. Let me see if I can get this in before my clock stops.

So the first question about—

Mrs. HARTZLER. Surge.

Secretary JETTE [continuing]. Surge production. The largest challenge to surge production that we have had so far and recently was because the Air Force, in its engagements with ISIS [Islamic State of Iraq and Syria], used quite a few more bombs they had.

So the first place we went is, the Air Force uses something called AFX [Air Force Explosive] in the bombs. It is a form of RDX [Research Department Explosive]. RDX is produced at Holston. And we had a capability to do 8 million pounds of it. And what we realized is we—that was our surge level, and really now our surge level is 15 million pounds. So we have invested a significant amount of money to increase that facility and be able to bring that production capability up to the 15 million pounds.

To compensate for that, rather than impact the operational capabilities—we want to keep the RDX in the bombs that the Air Force is using; it is a safer munition—we have—you can also use TNT [trinitrotoluene]. TNT and RDX are similar performers. The problem is, TNT is not as safe in operation as is RDX. So the TNT is used in more benign training environments now. So the bombs—we mitigate the quantity problem right now by the use of TNT as a substitute for training bombs, and we use the RDX for the actual operational materials.

So it gives us a breather. We haven't missed any of our production requirements. And we are continuing to meet the Air Force needs and the operational needs.

For overseas sources, I would like to offer an opportunity, if possible, with the committee to have a classified discussion separately on some of the details of that, because—

Mrs. HARTZLER. Uh-huh. Uh-huh.

Secretary JETTE [continuing]. I really think that some of those details probably should not be discussed in open forum.

But, on the other hand, I will tell you that we have detailed analysis down to sub-sub-suppliers, four and five layers in some cases, knowing exactly where all of the components for our munitions are coming from. It is really impressive, how good the ammunition enterprise has gotten into trying to work this.

However, that is fine, but we have two paths forward that we are working on for these unique materials, and one of them is alternatives. So I will give you a simple example: lead-based primers, primers used to cause the detonation of the rounds. Lead was in the primers. It is not much. They are small. When you fire a gun, you are in close proximity, you have lead in the vaporous air, you are inhaling lead dust.

So, for health reasons and various other reasons, we decided we wanted to get away from lead-based primers and find an alternative. So Picatinny did extensive work and is continuing to do work on alternatives to lead-based primers so that we can still accomplish the same purpose as a primer but without using the same materials.

What we are doing is trying to take a look to the list that you have in front of you and others, we are trying to do the same thing by having the people who are the experts in the chemistry and the objectives of the given chemistry we use, find alternative methodologies to achieve the same outcome, and then make sure that that is done with materials that we can source from the United States.

A second approach is that some of the materials can be sourced in the United States. It is a rather lengthy discussion we should have about the challenges of producing materials. DNAN [2,4-Dinitroanisole] is a fundamental component to the artillery shells. We don't source any of it in the United States. And we could, but we are not set up to do that right now. It would take a decision to go on that path to make sure that we can transition to it.

Let me hit the last one real quickly, the single point of failure worldwide. So we have two approaches to this that we are taking.

The fundamental approach is that I have asked the program executive office [PEO] to work with all of the DOD staff, and AMC [Army Materiel Command] in particular, on alternative sources worldwide. So take a map, look at where we may have challenges if we had to deploy forces, determine what other ammunition sources of various types and calibers we might be able to find.

Because ammunition is sourced elsewhere in the world by other forces and would work well with our munitions requirements. The problem is, we don't have contracts in place for small quantities, where we can hold those potential alternative manufacturing facilities accountable for the quality standards that we want on our munitions.

So I have the PEO mapping that out right now so that it comes to current, real, full-up rounds—artillery shells, bullets, bombs, et cetera.

The second thing is that we are looking at those single points of failure and determining how we can find alternative sourcing methodologies here in the United States and what it will take. And I think that that is part of this transition plan, transformational plan, is to generate an ability to produce some of these chemicals which are not being produced in the United States.

And this is where, in my comments, in my opening comments, I said it will take financial decision making and regulatory decision making. There is a balance. Most of the reasons we don't make them have to do with regulatory requirements that make it very

onerous and the financials that it would take to be able to produce them here in the United States.

Mrs. HARTZLER. Great. Thank you.

I yield back.

Mr. NORCROSS. Mr. Carbajal.

Mr. CARBAJAL. Thank you, Mr. Chair.

Dr. Jette, in your testimony, you state that over 80 percent of Army Class A mishaps involving a fatality or property damage greater than \$2.5 million are the result of human error.

What trends have you identified that contribute to these errors? And while I understand there are long-term solutions that include automation, in terms of automating the handling of dangerous materials, what short-term steps are being taken to address these errors?

Secretary JETTE. This is one of the most important areas, I think, that we really need to address, is making sure that we take all the possibility of human error out of the equation.

As I said, we are essentially making the explosives in a manner very much like we did in World War I, World War II in some—World War I in some cases, World War II in others. We literally have people standing under machines that are full of 1,500 pounds of molten explosive, drooling it into artillery shells to fill them up, and then they push the carts out of the way. We don't have automation. We don't have robotics systems.

The people have developed and the Ammunition Safety Board have developed methodologies—tactics, techniques, and procedures—to make sure that it is done as safely as possible under those given design considerations. We do consistent and continuous reviews of those processes and procedures. It doesn't mean that there is not an unforeseen problem that we couldn't encounter that could cause injury or death.

The vast majority—and I went back to see exactly—asked my staff, tell me exactly what some—you know, we had a number—we had 13 people injured at Radford last year. What does that mean? Because, I mean, it could be anything from a slip and fall to a serious injury that didn't cost a life but was close. The vast majority of the injuries tend to be standard industrial injuries. I am not diminishing that we need to improve that—trips, falls, et cetera. That is part of the old facilities that we have that make it difficult to avoid those things.

The second piece is, we have been, I think, while not good enough, consistently fairly good in trying to make sure that we don't have any deaths in the facilities. We have had three deaths on all of our facilities in the last 10 years.

One was due to—there was a backhoe operator who was working in a pond for the Department of Energy that happened to be on our facility. He somehow turned the backhoe upside-down on himself, and he drowned. It didn't have anything to do with the operation of the plant.

The other two, one had to do with clearing a vessel, because we do these melt batch systems. He was clearing a vessel with a wooden paddle, which had been done for years, and it detonated—

Mr. CARBAJAL. Dr. Jette, I do appreciate the level of detail you are giving me.

Secretary JETTE. Yes, sir.

Mr. CARBAJAL. I am going to delve into my second question, because I have limited time.

Secretary JETTE. Okay.

Mr. CARBAJAL. The ongoing challenge facing government-owned, contractor-operated Army munition plants, also known as GOCOs, is that the specialized workforce is aging. This challenge is not new or unique to ammunition production, as we see it affecting shipyards and maintenance across the Department.

Dr. Jette, how do we better recruit the future specialized workforce? How are we connecting with technical schools that produce the men and women who have the needed specialized skill set?

Secretary JETTE. Let me pass, if I could. The GOCOs are fundamentally operated by General Daly, so if I could pass to him.

General DALY. Congressman, thank you for that question.

First of all, I have to tell you that we appreciate Congress' support in terms of direct hire authorities. Quite frankly, that has been game-changer in terms of bringing younger skilled workers into the workforce to posture for the future.

In terms of as we modernize, the skill sets will migrate to more technical in nature. So it won't be a reduction in workforce, but it will be a change in the skill sets—an artisan workforce that, quite frankly, was much more manual labor.

And based on the investments that we have made—to your point about safety, we have made some significant investments, and we continue to do so—but robotics, computer program logic, sensors, et cetera, will change the skill set that we need.

I feel very, very comfortable that we have the authorities. And we are starting to look at partnerships with industry, partnerships with academia to get interns in, to hire them, so that they can be with us for decades to come, and it will reduce the average age of the workforce.

Mr. CARBAJAL. Thank you, General.

I yield back.

Mr. NORCROSS. Mr. Bacon.

Mr. BACON. Thank you, Mr. Chair. Appreciate both of you being here today.

My first question—I am going to try to do four quick questions here—is for General Daly.

I understand, you know, we have this World War II ammo production infrastructure. What does a modernized infrastructure here look like to you?

General DALY. Congressman, thank you so much for that question.

So, quite frankly, what we have done to this point—and, as I mentioned in my opening statement, we have made significant investments. But, quite frankly, I think, in terms of revolutionary change, to make them 21st-century, what I would envision—and we have done some of this, but it has been more discrete than holistic—and that is really computer program logic; it is robotics; it is maintenance analytics and predictive sensors on equipment so we know when that equipment is going down; continuous process management to get at quality; and, in addition, plant layout and design, as Dr. Jette mentioned earlier.

Mr. BACON. Uh-huh.

General DALY. All that, in my mind, leads to improved quality, increased production capability to get at the surge point that Ranking Member Hartzler talked about, and then also safety of the workforce.

Mr. BACON. Thank you. I appreciate you putting a little meat on the bones there.

And, Dr. Jette, you talked a little bit already with Mrs. Hartzler on how China has some of these critical materials for our ammo production. How hard is it going to be to diversify to ensure that our supply base doesn't run strictly through China?

Secretary JETTE. Sir, we are in the throes of trying to see what it would take to be able to wean ourselves from all of the materials.

The materials that we do get from China are not large-volume materials. For example, the DNAN I spoke of earlier, we get millions of pounds of that. That tends to come from India, not China. However, there are small materials in detonators and in pyrotechnics, these types of things.

In some cases, the sourcing is because that is where God put the stuff. And so we don't dig much of it up here. They dig it up over there. We have to bring it here, or we have to find an alternative.

And, to this point, the price model has said there is no reason to do this research. This is one reason why I think we need some degree of a revitalization of our research and development activities specifically with respect to our energetics and our pyrotechnics.

That is not the nice solid answer I have given you—I got it down in 5 years. We are having to chip through each one of these and look at these: Can I source it somewhere else? Why don't we produce it here? That generally is because of facilities that don't exist or because it is going to be so expensive to meet the pollution-abatement requirements that it is unaffordable at the prices I can currently get it from from overseas sources.

Mr. BACON. Uh-huh.

Secretary JETTE. So we are having to work through those issues in all of them.

Mr. BACON. Well, we are glad you are digging through it, because it is an important question. We don't want to be dependent there in a time of crisis.

What is your mindset on depleted uranium? You know it is very important for some of our ammos. Are there smart alternative, or is this the best alternative?

Secretary JETTE. So I am deviating a little bit. This is a little bit outside of the ammunition per se. But I do understand—being a materials scientist, I understand a bit about depleted uranium. And if you really want to go into detail, we probably need to go to a different setting as well.

Mr. BACON. Uh-huh.

Secretary JETTE. Uranium is a hard material. Crystalline structure makes it very strong. It is a high-temperature material, so it is very good at penetrating a lot of mass. You can get a lot of energy in that rod when it hits a target, and it gets a great deal of penetration.

At the same time, it has toxicity issues. Radiation is generally not a really relevant issue with depleted uranium. You have re-

moved the radioactive components from it. Though it is, to a minor degree, present.

Tungsten and some other refractory materials provide similar capability, and we have been looking at how we can employ those in an alternative fashion to do them. We have sort of started there, came over to DU [depleted uranium], and now we are sort of looking back again at those.

And we can probably give you a little bit more detailed discussion in a different forum.

Mr. BACON. Okay. I will come back to you. It is an interesting subject.

It is going to be hard to get this in in 30 seconds, but I will give it a quick stab.

I know that we are trying to put as much lethality on an individual warfighter that we can. Do we have the requirements for the Individual Assault Munition solidified? It is pretty much having a better weapon for a single soldier, shoulder-fired. Have we solidified those requirements?

Secretary JETTE. To give you a clean answer, I am going to come back to you with one for the record. I don't believe that there has been a significant change to the requirement—

Mr. BACON. Okay.

Secretary JETTE [continuing]. As I know it right now, and I will just have to check on that.

[The information referred to can be found in the Appendix on page 50.]

Mr. BACON. Okay. Thank for your time.

Mr. Chair, I yield.

Mr. NORCROSS. Mr. Brown.

Mr. BROWN. Thank you, Mr. Chairman. Thank you, gentlemen, for being here.

Sir, in your written testimony, you say that, to fully modernize, improve, upgrade technology, et cetera, between fiscal year 2021 and 2035, it would be roughly \$14 billion to \$16 billion. Back of the envelope, that is about \$1 billion a year.

You mentioned earlier in your testimony today that, I think, a strategy was outlined in 2016. What has been the annual authorization and appropriation for ammunition modernization to date, or at least since 2016 to date, roughly?

General DALY. Congressman, to this point, what has been appropriated from 2016 to now between both the GOGOs and GOCOs, it has been just under \$2 billion.

Mr. BROWN. Under \$2 billion, 4 years, so considerably less than the \$1 billion per year.

Now, has that appropriation, has that been, to your knowledge, above, the same, or below the President's budget request?

General DALY. So, Congressman, quite frankly, that has been right about what we have asked for in the President's budget.

When we talk about the \$14 billion to \$16 billion going forward, as Dr. Jette mentioned, we are in the process of refining that to focus on the most critical projects that will yield the effects in the organic industrial base and bring them into the 21st century and, as mentioned earlier, that focus on reducing the vulnerabilities at

our single points of failure and, quite frankly, also at improving the capabilities that are unique to the organic industrial base.

So I see that number refining over time, but that just gives you a ballpark on what it had been as we take this new approach.

I don't necessarily think it is going to get more—be more expensive. I think it is more a case of a focused investment strategy that we will bring forward through the Army leadership into the President's budget.

Mr. BROWN. Focused, a little bit more expensive than what we have been paying to date, but—and I get it, but let me ask you this question.

So, you know, I am hearing about technological—incorporating better technology into the plants. It sounds like there is some facility, in terms of realty upgrades. I am assuming there is some workforce training that goes with that.

So can you briefly describe to the committee—I see two of the three, sort of, critical players here, and the other one being the Assistant Secretary for Installations, Environment and Energy. Can you briefly describe to us how you worked together to develop that master plan, that modernization strategy?

General DALY. So, Congressman, great question.

I will tell you that, not only is there a great linkage between Dr. Jette and I, but also there is an inextricable link between the both of us and Honorable Beehler in his role as the Assistant Secretary of the Army for Installations, Energy and Environment.

And, quite frankly, Honorable Beehler is in the process of working an Army-wide installation strategy for the future that tackles energy, environmental programs. When you juxtapose what we are trying to do with the organic industrial base with what he is doing, that will be linked in.

And the great thing, quite frankly, is that the Army senior leaders have given to Dr. Jette, myself, and Honorable Beehler the funding stream recommendations to them on how we move forward in this holistic approach. So it is not just on facilitization of the organic industrial base; it is really focused on this piece like you mention—protection, energy, environment, et cetera.

Mr. BROWN. And let me just, with the last minute and 20—and maybe it is picking up where Representative Bacon left off. But, you know, I think about the Army modernization priorities under the Futures Command. And, specifically, I think about long-range precision fires and soldier lethality, the new Next Generation Squad Weapon.

Are any of the activities in those lanes influencing what you need to do in the ammunition modernization strategy?

Secretary JETTE. Yes, sir.

So let's take the last example that you raised. We have Next Generation Squad Weapon, next-generation soldier weapon. The caliber is going to be 6.8. We don't produce 6.8 right now. So we are going to have to have a facility to be able to produce 6.8-caliber munitions.

There are three vendors that are competing. Two of the vendors have a polymer case. One vendor is a brass case, as we currently produce. And keeping my acquisition hat on here, I am not choosing anything, but if it is the brass case, for example, Lake City has

a facility already capable. We retool them, and we could have one line producing 6.8 in a few months.

If one of the polymer cases take place, what we are likely going to do is use their facilities to produce our interim supplies while we develop in-house production capabilities, and they become an ability for surge at a later date.

But it will require retooling and, frankly, refacilitization, for which we have put in our POM funding to this point. So we are working towards it. Just waiting for the solution.

Mr. BROWN. And I assume, for long-range precision fires, we will take that up in a classified setting?

Secretary JETTE. Yes, sir.

Mr. BROWN. All right.

Secretary JETTE. But in some aspects of it, it is very much the issue of the fillers. But, again, it goes back to, if I have to go farther, I tend to have less filler; if I have to go with less filler, can I move to a more energetic material as a filler? And we are still working those issues.

Mr. BROWN. Thank you.

Thank you, Mr. Chairman. I yield back.

Mr. NORCROSS. Thank you.

Just a followup clarification: Retooling is difficult, but it is cut-and-dry. Are the base materials changing? So if you are looking at stockpiling, you know, that would change the formula and then expirations?

Okay.

Mr. Wittman.

Mr. WITTMAN. Thank you, Mr. Chairman.

Dr. Jette, General Daly, thanks so much for joining us.

I wanted to refer to a lot of the work the committee has done on the Small Multipurpose Equipment Transport, better known as SMET.

We know these robotic mules can do a lot to help folks in the infantry. We know, too, as we are asking our soldiers in the infantry to do a lot, we are asking them to carry particularly heavy loads, lots of equipment, we know the biggest weight component of that is ammunition. And we know, of the ammunition component, brass makes up a really, really big part of that.

I do know that the Army has had a lightweight ammunition requirement for about 40 years, and it hasn't gotten any lighter.

So I understand there are a lot of strides that have been made in polymer-cased ammunition. In fact, I have had the opportunity to shoot some, both here in the range in Rayburn and then elsewhere. Pretty amazing ammunition. This 30 percent reduction I think goes a long way to increase mobility and the flexibility that folks in the infantry have.

Dr. Jette, could you provide us an update on where the Army is in filling this requirement? And how far out do you think we are from fielding the next-generation ammunition? And is the polymer-cased ammunition the direction that you believe things are going based on the technology and the research?

Secretary JETTE. Let me touch the last question first so that I stay out of trouble on the first set. Because it is an ongoing acquisi-

tion, I would prefer not to interject my personal opinion as to which way might be a better way to go.

Mr. WITTMAN. Uh-huh.

Secretary JETTE. What I can do is I can describe the circumstances around this. And it is a great question.

I will tell you that I was a tanker for 28 years in the Army. I spent 2½ years in Afghanistan and Iraq while in uniform, and I never was on a tank; I had to walk everywhere. And I really have a great sympathy for infantrymen and all the stuff they have to carry.

At one point, I was also the program executive officer, or PM at the time, but the PEO—what is now PEO Soldier. So I had all of those uniforms, guns, equipment, et cetera. It has been my objective to try and find a way to lighten that soldier's load from the very beginning.

If I have my basic load, it is 220 rounds. If I fire those rounds, I have 11 pounds of debris at my feet.

Mr. WITTMAN. Yeah.

Secretary JETTE. That means, in order to get 220 rounds' worth of munitions downrange, I've got, only 2 pounds of it is effective munitions. The rest of it is packaging.

Mr. WITTMAN. Right.

Secretary JETTE. It has been a significant problem with trying to find an alternative that has been acceptable in all environments. It has to be able to withstand cold. It has to be able to withstand shock. It has to be able to—wind, cold, getting dropped, does it crack, things like this.

Mr. WITTMAN. Right.

Secretary JETTE. When it tries to get jammed into a gun, does it crack open if it doesn't get in there just exactly right?

So there are real issues with trying to go to polymer casing. But where it was in 1998, when I was the PM for all of these systems, is different than where it is today. So I do believe that we are making significant headway in having alternatives to brass casings alone.

Reducing that by one-third, frankly, my experience with the infantry means that they will add one-third more ammo. And I believe that this goes exactly to my issue about trying to enhance our ability and our research and development aspect of things. Because I think that polymer casings may be—may be—an intermediate state in going to perhaps even caseless ammunition.

Mr. WITTMAN. Gotcha. Yeah, I think that is a great point. We have had a chance to look at both the polymer case, the caseless ammo. Obviously a lot of development areas there.

Let me ask this. We currently, in producing ammo, as it stands today, we have government-owned, government-operated facilities and government-owned, commercially operated facilities. If we were to transition to the next generation of ammo, a lighter ammo, obviously a massive change in manufacturing in the large scale. Tell me, what would the effects be in transitioning that? Would we have a proper transition to make sure that the industrial capacity there that we have, that we need, that we have heard about can be maintained and transitioned to this new technology?

Secretary JETTE. Yes, sir. The critical aspect of being able to go to an alternative structure, polymer case, that type of thing, is tied up into the IP [intellectual property]. These companies develop them on their own nickel; they own the IP. They will have production facilities, and we will be able to buy from those production facilities as well, because they will probably extend them into the commercial marketplace.

But the other side of things is that, as part of our solicitations, nailing down the ability to use that IP in our own facilities and them assisting us in facilitating those facilities is essential.

Mr. WITTMAN. Thank you, Mr. Chairman. I yield back.

Mr. NORCROSS. Ms. Sherrill.

Ms. SHERRILL. Thank you both for being here today.

Just to take it back a step, as we are talking about all the money we are going to spend on modernization, we are talking about government-owned, contractor-operated facilities. So I am wondering what the tradeoffs are of having an industrial base that is in an industry with no consistent year-on-year manufacturing requirement.

What risk does the government take on versus what risk do contractors take on? And, specifically, is there room for contractors to pay more into this modernization effort, or do we feel that, given their current profit margins, we would drive them to discontinue supporting the effort?

Secretary JETTE. Thank you. That is a great business question.

I have taken a look at some of the motivations, trying to drive vendors to put their own money into the facilities themselves. Generally, what ends up happening is that they put money into the facilities, but it ends up on some of their calculation sheets later on, and I am paying for it over longer term periods. So they justify a larger G&A [general and administrative] or overhead rates, and I end up paying not just on that facility but the rate gets justified across the industry.

And I also find that I am not sure that I see them investing effectively in the things that make a difference to me; they make a difference to their profit margins.

So my view of this is: It is our facility. We should have a good plan. We should decide on what we want to invest in. And then we—this is the United States military's, the Department of Defense's industrial base for munitions. We need to own that. Not have anything beholden, IP-wise or any other way, to the defense industry or any other supplier.

Ms. SHERRILL. But is there room to raise the rent on some of our contractors?

Just because I'm just wondering—I just don't know enough about how much money they are making off these enterprises and how much the U.S. Government is supporting that profit. And so do we need to take a look at what more some of our contractors could be doing to pay into the system? Because we have a heavy burden to modernize these facilities.

Secretary JETTE. Yeah, no, that is a great question.

So we have begun looking at—I have begun looking at the contracting methodologies we are applying to these facilities. It is basically, we keep buying and selling to ourselves. And we do that be-

cause we think that that is an easy way to manage the overall pricing structure.

The problem with that is, at the far end, we are always trying to push the price down, which means it cascades back down through the prices that are proposed to us by the industrial base, the contractors. And the end state of that is, they are always trying to save money on their margins. We really can't see in it, because we just bid prices at both ends, and the end state of that is the lawns don't get mowed, the fire departments don't get done right.

So what we have begun to do is, starting with Radford, take a specific look at the contracting methodologies we have put in place there and then follow—you know the old saying—follow the money: Who buys what materials at what point? How does that fit into the contract? How do we need to modify the contract so the government gets a better position on that?

I want industry to want to work with us, but what I don't want to do is have a blind eye towards the potential areas where they can make unexpected profits. When they finish a material, I want to make sure that I know where it is going, who is selling, who they are selling to, who they are buying from.

In Lake City, for example, 50 percent of the facility's production capability is dedicated to commercial products, because we have this surge capability, and that is part of the deal. I am not sure that we are breaking even-steven on that. So we are doing an investigation to determine whether or not the government is fundamentally subsidizing commercial production or not.

So it is a good question. I wish I could give you the concrete answer with footnotes, but we are in the middle of trying to determine it right now.

Ms. SHERRILL. Great. That is good to hear you are looking into it.

And then you were speaking earlier about some single-source materials that we don't produce here, and we have chosen at this point to import them rather than produce them here. And when you said it was a regulatory issue, especially for some of our chemical materials, when you are talking regulatory, are those environmental regulations?

Secretary JETTE. Yes, ma'am, the vast majority of them are environmental.

In production of DNAN, you start with benzene; you go through several intermediate states. Some of those materials have a great deal of controls on these intermediate materials. We wouldn't leave them there, but just the fact that we produce them, you have to have a lot of environmental controls, which impacts the cost of the facility production.

There are alternative methods of producing them, but then the price of the materials go up. So that is the challenge that we are dealing with. And then we try to compete against the price that is half the price if I buy it.

And I think we need to make a hard determination as to what percent of our supply needs to be unquestionably domestic and what our surge capacity needs to be.

Ms. SHERRILL. And then, finally, as the Army seeks to modernize both the process and the facilities for producing munitions and the

actual conventional munitions being produced, what is your vision for the development—and we have spoken a little bit—and manufacturing of the next-generation, 21st-century, small-caliber munitions?

Secretary JETTE. So the facility we would produce the small caliber, such as the 6.8, would be at Lake City. And it all depends on which direction we go. If we go the brass casing, we have some very modern production lines that are at Lake City. They are very high-speed, very fast in production. We retool them and we can add additional lines for relatively small expense. And that would be one direction, if we have the brass case.

If we don't, as part of their development effort, the two that are building the polymer cases are also building the technology to produce the polymer cases. And then that is part of this issue of us ensuring that we have a license to be able to use those technologies and have them help us establish our own production capability.

Ms. SHERRILL. And a final, just real quick: And what did you say the timeline was of brass? You thought you could do that in what timeframe versus the polymer in what timeframe?

Secretary JETTE. Brass is changing tooling. A few months?

Ms. SHERRILL. Uh-huh.

Secretary JETTE. Whereas—if I wanted to get quickly into production, a few months on a production line, because I would just have to retool and change jigs. If I am going to the polymer casings, I am going to have to build a new facility.

But, in the end, we expect to build a new facility in either case.

Mr. NORCROSS. Thank—Ms. Sherrill, are you finished?

Ms. SHERRILL. I yield back.

Mr. NORCROSS. We will have another round, if you want to hang on.

I want to follow up with exactly what she is talking about. The single source you have identified as a major concern. The tooling we talked about.

So the base material across many of the lines has been there since the 1940s. There are some new ones. So you lay that up against where it is coming from and the risk associated with it.

So the question that I think of is stockpiling. Well, it sounds good, but there might be an expiration date to, literally, the amount that goes there. But that minimizes your single source, particularly if you can do quite a bit, just like our national oil reserves.

Do you have faith in the materials that are most at risk that you could build up a stockpile, or is there a reason why we cannot?

Secretary JETTE. Mr. Chairman, I am going to share the answer here, because I think General Daly can contribute as well.

We do stockpile. We do stockpile precursor materials, and we do stockpile end-state items, to include materials that are of importance for us that are sourced from elsewhere.

Mr. NORCROSS. Uh-huh.

Secretary JETTE. Right now, we believe we are probably in an acceptable mode for our ongoing consistent production, and in some cases there is enough material for some surge capacity. But if you

have any sort of a protracted operation and you had your supply cut off, eventually you run out.

So, in the end, I believe that you really want to be able to have an alternative source—either an alternative product that does the same function or an alternative source that is either domestic or within your ability to access in an operational environment.

Mr. NORCROSS. So private industry, in many ways, steps up to the plate, but it is particularly difficult here. Why we have our own.

Have you been approached by some unique manufacturers on a single line of munitions that they think they can do better than you are? Or is it the uniqueness of what we are building that they are unable within a price point to come in?

Secretary JETTE. Mr. Chairman, I will give you a—I will take that question for the record. I don't believe anyone has ever come to us, but that doesn't mean I know about all potential approaches. But I will come back to that.

[The information referred to can be found in the Appendix on page 49.]

Secretary JETTE. Given that I am pretty confident that we haven't been approached there, the fundamental—it goes back to these hurdles. You have three hurdles at hand. One, the capital investment that is necessary in order to make a facility that can actually meet all the EPA [Environmental Protection Agency] and other standards, safety and EPA standards, is expensive. The second one is these EPA standards, so that we make sure that we—and operation, so that we don't have pollution in these intermediate materials. And the third one is the fundamental cost of the material at the far end.

Oh, I am going to add one more: liability. If I put that plant—these are explosives. If I put that plant in a place—I have to put that plant in a place where I have some indemnification from possible liability should the plant blow up.

What we have actually begun taking a hard look at is whether or not we might solicit companies to use our land, much like we have done with the housing side of things.

Mr. NORCROSS. Uh-huh.

Secretary JETTE. We have the land. You get a long-term lease. We will give you the lease. We will indemnify you. You are on our facility. And, oh, by the way, you build it, and we will buy it from you, and here is our long-term plan.

So we are looking at trying to do something like that. That starts eating away at a number of these issues. But I think we still have an issue associated with the capital investment at the front end to get into the business and the potential challenges of trying to meet all the EPA standards.

Mr. NORCROSS. One last question for each of you.

General, in what we are talking about today—pretty wide-ranging—what keeps you up at night? What is that one item?

General DALY. Mr. Chairman, thank you for that question.

I will tell you that our focus, based on the Secretary of the Army and the Chief of Staff of the Army's priorities, five areas. And because we focus on them all the time, I don't know that I stay up

at night thinking about them, because we are giving it the right focus right now.

The first is that we meet not only current but future ammunition requirements in support of the National Defense Strategy.

The second is that we modernize appropriately. So all the things we talked about, plus multipurpose facilities, et cetera.

The third is that we protect our organic industrial base assets, because they are vulnerable, as you mentioned.

And the fourth has to do with reducing the single points of failure and the reliance on the 55 foreign suppliers that we can trace to at this point.

And then the last is always focusing on our people and safety and the workforce of the future, as, especially on the GOGO side, the aging workforce.

I think, if we continue to focus on those five areas, we will be successful for the future. Thank you.

Mr. NORCROSS. Thank you.

Dr. Jette.

Secretary JETTE. Sir, mine is very similar to General Daly's. Fundamentally, I think we are meeting our obligations and are in a good position to meet any current needs and foreseeable surges. So that is not keeping me up at night.

I do probably worry most about the safety aspects of our current facilities, primarily because I think that our current approach is to improve good safety facilities, safety within the facilities we have, but that is not what is possible.

And what is possible—as I said earlier, three deaths in the last 10 years on our facilities. Two of them were related to the manufacturing process. That is two too many.

Mr. NORCROSS. Uh-huh.

Secretary JETTE. And we don't need to have that circumstance happen anymore. So I do not want to be the ASA(ALT) and get a phone call that there is another death on something I could have provided an improvement to.

From the national defense, I am meeting the requirement. I have it safely operating. I need to fill this hole called "supply chain." I need us to not have a supply problem from anywhere outside the United States.

Mr. NORCROSS. Thank you.

Mrs. Hartzler.

Mrs. HARTZLER. I appreciate your focus on safety of the people as being the most important thing as we look at the challenges and providing the ammunition to our warfighters. And I want to mention my constituent Lawrence Bass, who lost his life there at Lake City in an explosion 3 years ago.

And I am excited about the modernization efforts and appreciative of it so that that doesn't happen in the future. But when that happened—talk about single point of failure—Lake City was shut down for many months as, first of all, accident reviews were underway, trying to figure out what happened and what could be done to avoid this in the future, and then rebuilding the explosive area.

And just wanted you to expound a little bit on the contingency plans that you have. You say you have identified the single-point-

of-failure places in our industrial complex here, but what are the contingency plans?

I know, if I remember right from Lake City, we were able to call upon some industry, some private industry, to help backfill some of that material that is needed. But could you expound a little bit on the contingency plans you have in place?

General DALY. Ranking Member Hartzler, so I will defer to Dr. Jette on the suppliers, but, in terms of Lake City—in fact, I just visited Lake City last week. And so, as you mentioned, a tragedy that occurred in April of 2017. And that was related, as you know, to mixing of tetrazine for primers.

So the way forward is, we have relooked the way we manufacture the primers and have adjusted internal to the plant. And then getting at, as we modernize, making sure we have multipurpose facilities so that every line can do different functions. So it is just not 5.56 millimeter on one line and 7.62 millimeter on a second line, but they are multipurpose so that we have flexibility on an installation.

And then, to Dr. Jette's point, looking more holistically, where we can get efficiencies and additional capability in other locations, not just in the organic industrial base, but with private industry.

Secretary JETTE. Yes, ma'am. And, you know, I didn't—Lawrence Bass's death was tragic and should not have occurred. I am not sure that we—we thought we were doing the right thing. He was performing duties in accordance with what the procedures were. The problem was the procedures didn't account for all possible outcomes.

And so that is one of the reasons why, you know, his death is, in fact, a catalyst to my insistence upon transforming our approach as opposed to modernizing under the current circumstances.

He should never have been in that close proximity, where that event could have happened. And should it have happened with a machine, I can buy another machine.

Mrs. HARTZLER. Yeah.

Secretary JETTE. So, while tragic, it has been a motivator. And I am just totally in line with what General Daly said about this.

From the aspect of can we find commercial alternative sourcing for some of the manufacturing capabilities, it depends on where we are in the line, as to whether or not that would be easily done in alternative facilities in the commercial sector.

Munitions manufacturing, bullet manufacturing—if they are basic bullets, then there are alternative sources within the United States that we could go to. If we start going to unique materials, like explosive rounds, 30 millimeters, armor-piercing fin-stabilized discarding sabots, not too much of that in the commercial sector, nor is there equipment set up to be able to handle that.

That is why I have gone back to the program executive officer. We have a new program executive officer, and I specifically told him his job is: find alternative sources worldwide that we have that can guarantee us to be able to produce these.

If we need to establish a contract with another source—I was in a factory in Korea. They used to supply us basically 50 caliber and below. We stopped it. They have full capability to do so again, and that would give us a chance to ensure that they are meeting our

quality standards and could then have a supply that is assured in Korea. Should something occur here, we can ship it from Korea to here.

So that is probably—U.S., Canada, Mexico, then overseas, that is the order of sequence we have going right now, where there are no alternative manufacturing facilities in the United States.

Mrs. HARTZLER. I think that is really smart. And I appreciate your efforts there. That makes a lot of sense.

Speaking of Lake City again, I know that we are investing—there are 12 modernization projects there, and they are receiving quite a bit of funding. So can you walk me through some of the facility modernization projects that are going on there?

Secretary JETTE. Sorry. I haven't memorized them all.

Mrs. HARTZLER. That is a big book.

Secretary JETTE. Lake City.

So we have a primer component wash system update. It is a \$2.8 million effort. In that facility, when you create the primer, you have to rinse out some of the chemicals and then recover the primer material itself from that. So this is a facility upgrade so that we can recover more of the primer material and decrease our output pollution.

Mrs. HARTZLER. Okay.

Secretary JETTE. 5.56 clip line upgrade, which is \$7.7 million. If you have 5.56 in a clip so that we can feed it through a machine gun, we have to have all those clips produced and then be able to snap them together in an automated fashion. So it is just an enhancement to the current facility.

Safe pack unload, 2.5. This, again, is just an upgrade to the 5.56 production capability at that facility. \$8.45 million.

By the way, the 5.56 is—tremendously interesting to watch the machines. And if any of the committee members would like to go out, I would like to extend an invitation to come to any of these facilities and see what we are talking about.

There are two lines at Lake City that are really interesting. They happen to be—I am not sure if they are 5.56 or they are 7.62, but one line is literally the one that produced the—with the machines from World War II. It is still functioning today. That is a big factory that produces a quantity of them.

In the other facility, we have several lines that produce an equal round today on a totally different production capability. Those lines—one line produces what that other building produces in a day.

So the technology difference and what we have an opportunity to do is tremendous. That is why improving our 5.56—I have to tell you, I don't know what an "AD BAAP facility upgrade" is, but I will find out for you.

Neutralization upgrades.

I am just going to go down this and make sure that I give you the more detailed answers.

Mrs. HARTZLER. Well, yeah, why don't you just get back with me? I know time with our other members and stuff. But I sure appreciate it. Thank you.

And I had another question, if we will have time at the end, but I yield back. Thank you.

[The information referred to can be found in the Appendix on page 49.]

Mr. NORCROSS. Ms. Sherrill.

Ms. SHERRILL. No questions, Mr. Chairman.

Mr. NORCROSS. Mrs. Hartzler.

Mrs. HARTZLER. Sorry. Yes, I will ask my last question.

General Daly, in the written testimony, you talk about the 2019 Single Manager for Conventional Ammunition annual report and the performance measures, and I found this very fascinating.

As far as the acceptance test, a 99.4 percent pass frequency, which is important. If you get a bullet, you want to make sure it's going to work. 99.6 percent as far as inventory accuracy count, physical inventory, so what is actually there versus what is in the inventory. I mean, that is amazing. 98.6 percent of the orders filled, perfect orders, for distribution management category.

The one that I was curious about, though, is acquisition management category, where it was only an 84 percent on-time rate. And that deals with delivery dates. So why do we have a discrepancy there in our delivery dates being only on time 84 percent?

General DALY. So, Ranking Member Hartzler, three of the four, as you mentioned already—Dr. Jette, I don't know if you want to take this piece on acquisition management. Because, really, the metric is associated with suppliers to the organic industrial base and the timeliness for them to supply to support production and manufacturing. So—

Mrs. HARTZLER. Okay.

General DALY. And, again, the 2020 report is forthcoming, and, quite frankly, we are going to fall short again on acquisition management.

Secretary JETTE. Yes, ma'am. So there are two pieces that I am trying to get a better handle on.

One of them is the supplier delivery schedule. It appears that the delivery schedule—even with COVID, we were pretty good at keeping up with the delivery schedule or compensating with our current on-hand stocks.

Another thing that contributes to that and our late deliveries is late arrival of money. And so, if I get an order from the Air Force and I don't get the money until a little bit later, it slows down the process. But they usually tie their delivery date to the order date, not delivery date to the funding date. So—

Mrs. HARTZLER. So is that a function of Congress? Is it because of us? We are late in getting approval of the budget, and so that is why there is no money? Or is it just a problem within the Air Force or some other Pentagon function that they are not sending the money out?

Secretary JETTE. So I think—so this was an interesting—great question.

So I went back to the staff when I rooted this out, and I said, well, you know, why are we waiting? Don't we have investment? And I started thinking about it. This is an acquisition, so it is a procurement action. Well, I can't spend procurement dollars until I have the procurement dollars.

But that is not the case in all cases for how we manage all things. For example, General Daly has an AWCF, a working capital

fund. So he knows he is going to have demand of a certain type; he just doesn't know exactly when the date is going to occur. So he can expend some of his working capital fund in order to procure items that have long lead times prior to the order coming in and the funding coming in. It smooths things out.

And I said, why don't we have a working capital fund for munitions? And the answer I got back was, well, we used to, and there were some problems with how it was managed, and so we got rid of it.

And so I have told my staff—and I have asked General Daly to help, since he does manage effectively a working capital fund—I think that we need to revisit that, as to whether or not to reestablish a working capital fund, put in enough funding to level out these shortcomings as funding and orders flow on different dates. And I think that that may have a significant improvement to our late delivery schedules.

Whenever somebody tells me that you cancel something because somebody mismanaged it, then fix the mismanagement. Don't eliminate the methodology.

Mrs. HARTZLER. Yeah.

Secretary JETTE. That is what I think we are trying to do.

Mrs. HARTZLER. Sounds good.

General DALY. Ma'am, if I could. So Dr. Jette and I are 100 percent synched on this. And I think what we have had is a self-constrained firewall between GOCOs and GOGOs. And what we are pledging, going forward, is this comprehensive approach where maybe some of the things we are doing in the GOGOs can be used at the GOCO level and vice versa. And this gets at the efficiencies to really go after modernization for the future.

Mrs. HARTZLER. Sounds good. Thank you.

I yield back.

Mr. NORCROSS. Well, I didn't hear anybody take you up on watching the bullet machine, but "How It's Made" is one of the best shows on TV. Just the ingenuity of engineers and builders in this great country; 1940, your buildings are still working, maybe not as efficient, but they know how to do it.

I would like to thank the witnesses for coming by today. There are a couple items we will follow up with. But we are adjourned.

[Whereupon, at 2:29 p.m., the subcommittee was adjourned.]

A P P E N D I X

SEPTEMBER 22, 2020

PREPARED STATEMENTS SUBMITTED FOR THE RECORD

SEPTEMBER 22, 2020

**Statement of the Honorable Donald Norcross
Chairman, Subcommittee on Tactical Air and Land Forces
“Modernization of the Conventional Ammunition
Production Industrial Base”**

September 22, 2020

The hearing will come to order.

Before our hearing officially begins, a few housekeeping items:

Members who are joining remotely must be visible onscreen for the purposes of identity verification, establishing and maintaining a quorum, participating in the proceeding, and voting. Those Members must continue to use the software platform’s video function while in attendance, unless they experience connectivity issues or other technical problems that render them unable to participate on camera. If a Member experiences technical difficulties, they should contact the committee’s staff for assistance.

Video of Members’ participation will be broadcast in the room and via the television/internet feeds. Members participating remotely must seek recognition verbally, and they are asked to mute their microphones when they are not speaking.

Members who are participating remotely are reminded to keep the software platform’s video function on the entire time they attend the proceeding. Members may leave and rejoin the proceeding. If Members depart for a short while, for reasons other than joining a different proceeding, they should leave the video function on. If Members will be absent for a significant period, or depart to join a different proceeding, they should exit the software platform entirely and then re-join it if they return. Members may use the software platform’s chat feature to communicate with staff regarding technical or logistical support issues only.

Finally, I have designated a committee staff member to, if necessary, mute unrecognized Members’ microphones to cancel any inadvertent background noise that may disrupt the proceeding.

And now – we can officially begin:

Welcome. Today, the Tactical Air and Land subcommittee meets in open, hybrid session to receive testimony from Army witnesses on the state of the nation’s Conventional Ammunition production and efforts to modernize that process.

The topic for today’s hearing is intended to start, what I hope will be, a productive conversation between our committee and the Army on improving the state of conventional ammunition production facilities across the country.

The ammunition with which our Army trains and takes into combat comes from production lines scattered across our nation’s heartland.

In fact, most of it is manufactured in the same facilities that produced the ammunition used to bring victories to the Allies in World War II.

What is shocking to me, and what should be shocking to anyone listening, is that those facilities look and operate much like they did in the 1940s.

Producing ammunition is no easy task – often it’s a job that involves careful and steady attention to detail around dangerous explosives, and chemical components.

In order to ensure safety and security for the workforce, they must be supported with the best facilities and modern production processes available.

Many of the materials that go into ammunition production are foreign sourced, or single sourced – or sometimes both. Supply chain disruption is an unacceptable risk.

Why then is this fundamental, essential function of defense manufacturing done in museum-like conditions? What needs to be done to improve this process? How can Congress assist the Army in this task? And how would these facilities meet the needs of the military in a national emergency?

These questions will be the focus of today’s discussion.

Today we are pleased to once again welcome Dr. Bruce Jette, Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)) as well as General Edward M. Daly, Commanding General of Army Materiel Command. We look forward to their observations and ideas on how to modernize and improve ammunition production.

I now turn to my friend and ranking Member of the Tactical Air and Land Forces subcommittee, Mrs. Hartzler for any opening remarks she would like to make.

33

RECORD VERSION

STATEMENT BY

THE HONORABLE BRUCE D. JETTE, PhD
ASSISTANT SECRETARY OF THE ARMY
FOR ACQUISITION, LOGISTICS AND TECHNOLOGY
AND ARMY ACQUISITION EXECUTIVE

AND

GENERAL EDWARD M. DALY
COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND

BEFORE THE

SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES
COMMITTEE ON ARMED SERVICES
UNITED STATES HOUSE OF REPRESENTATIVES

ON

MODERNIZATION OF THE CONVENTIONAL AMMUNITION
PRODUCTION INDUSTRIAL BASE

SECOND SESSION, 116TH CONGRESS

SEPTEMBER 22, 2020

NOT FOR PUBLICATION UNTIL RELEASED BY THE
COMMITTEE ON ARMED SERVICES

Introduction

Chairman Norcross, Ranking Member Hartzler, and distinguished Members of the Subcommittee on Tactical Air and Land Forces, thank you for this opportunity to discuss the Army's plans to modernize production of conventional ammunition across the industrial base. On behalf of the Secretary of the Army, the Honorable Ryan McCarthy, and the Chief of Staff of the Army, General James McConville, we thank you for the invitation to join you today and look forward to a productive discussion.

The Secretary of the Army and the Army's Chief of Staff priorities are People, Readiness, Modernization and Reform. The foundation of the Army is its People. People are the Army's centerpiece and they define who we are.

People

Protecting the health and safety of our extremely skilled and dedicated workforce and the environment in which they operate is paramount. Munitions and the associated materials, including energetics, explosives and acids are inherently dangerous. Over 80 percent of Army Class A mishaps involving a fatality or property damage greater than \$2.5 million are the result of human error. Human handling of these materials must be replaced with process automation or other technology solutions, freeing the workforce to focus on technical oversight. Our envisioned end-state is state-of-the-art manufacturing processes and machinery that have safety standards built in, this not only improves safety for the workforce, but makes production more efficient and effective while reducing risk to production, should an accident occur.

Readiness

As readiness is one of the Army's priorities, the health and vitality of the ammunition industrial base, as based on our Title 10 roles and responsibilities, is critical

to enable our support to Combatant Command (COCOM) requirements and ensure the success of our Joint Warfighters in support of our National Defense Strategy. The ammunition industrial base must be postured to support current readiness, surge capabilities, and future modernization efforts.

The Army's ammunition industrial base is currently composed of a network of Government Owned, Contractor Operated (GOCO); Government Owned, Government Operated (GOGO); and Contractor Owned, Contractor Operated ammunition industrial sites that have evolved over time. In the 1940's, the Army had 84 ammunition plants to accomplish this mission. Today, the Army has 16 ammunition installations and is on a path to reduce to 14 through divestiture decisions.

Since 1977, the Army has been the Single Manager for Conventional Ammunition (SMCA) for the Department of Defense (DoD), providing central management of conventional ammunition for all the Services to ensure superior products and reliable sources of supply, as well as economies of scale and other managerial efficiencies. The Army continues to make progress across the spectrum of functions required to deliver world class ammunition and sustainment support to the Joint Warfighter. To date, there has been no significant shortfall in conventional ammunition production by the ammunition industrial base, thus enabling Joint Warfighters to execute their worldwide contingency missions. The 2019 SMCA annual report demonstrates that the Army is successfully executing its Title 10 responsibilities per the agreed-upon performance measures in accordance with Joint Conventional Ammunition Policies and Procedures, Implementing Regulations and Assessment.

The following are examples of metric data that drove Fiscal Year 2019 (FY19) ratings; FY20 annual report is yet to be published:

1. **Production and Industrial Base Management:** Of the 3,196 ammunition lots tested, 3,177 passed the initial acceptance test, receiving a 99.4 percent pass frequency.
2. **Stockpile Management:** Over 184,470 physical inventory accuracy counts were completed with an overall accuracy frequency of 99.6 percent.
3. **Distribution Management:** Of the 23,437 Continental United States storage depot shipments requested by the Military Service customer, 98.6 percent of the orders filled were considered "Perfect Orders."
4. **Acquisition Management:** Of the 778 orders delivered, 657 met the Customer Required Delivery Dates, resulting in an on-time rate of 84 percent.

Army Organic Ammunition Industrial Base

While currently meeting the needs of our Joint Warfighters and Coalition Partners, the Army is simultaneously modernizing our plants to address aging conditions and meet future capabilities.

The Army's buildings and infrastructure that support the ammunition industrial base average 58 years old, exceeding their expected useful service life of 50 years. More than half of these (54 percent) were built prior to 1945 and must be modernized to meet the evolving capabilities required.

As facilities that support the ammunition production mission become less capable, there is an increased risk to Army readiness and the safety of its personnel. Facilities with the appropriate size and configuration, utilities and technology for the capability, availability of adequate equipment necessary to perform the work required,

environmental conditions suitable for personnel to safely perform the work, and the availability of skilled labor with the unique industrial competencies are all required.

Since 2009, more than \$3.2 billion of taxpayer dollars has been invested in modernizing ammunition production capability, making these facilities more mission capable, sustainable and safer. Environmental upgrades for water treatment and contaminated waste water purification are also underway.

As mentioned earlier, the Army's organic ammunition industrial base consists of 16 installations. Two of those installations perform chemical weapons destruction; four primarily perform demilitarization, storage and distribution functions; and ten installations are primarily dedicated to ammunition production.

Chemical Weapons Destruction

Both Blue Grass Chemical Agent Pilot Plant and Pueblo Chemical Agent Pilot Plant are on pace to complete chemical weapons destruction in advance of the December 31, 2023 treaty deadline with projected completion of Pueblo in April 2023 and Blue Grass in August 2023. After destruction operations are completed, it will take 18 to 24 months to destroy the main plant and support structures and remediate all toxic waste associated with chemical agent processing and neutralization.

Demilitarization, Storage and Distribution Installations

The complete list of demilitarization, storage and distribution installations includes:

- Anniston Munitions Center, Anniston, Alabama (GOGO)
- Blue Grass Army Depot, Richmond, Kentucky (GOGO)
- Hawthorne Army Depot, Hawthorne, Nevada (GOCO)
- Letterkenny Munitions Center, Chambersburg, Pennsylvania (GOGO)
- Tooele Army Depot, Tooele, Utah (GOGO)

Ammunition Production Installations

The Army's organic ammunition production industrial base consists of ten facilities: seven GOCO facilities and three GOGO facilities. They are:

1. ***Crane Army Ammunition Activity*** (GOGO) in Indiana performs explosive loading (cast cure, press, and extrusion) and Load, Assemble, and Pack (LAP) of Navy gun ammunition, candles and pyrotechnics. The installation is currently executing five modernization projects valued at roughly \$15 million, which includes a state-of-the-art plating facility based on current industry standards, the Crane Flexible Manufacturing Complex to improve the melt core process, and upgrading the shipping and receiving facility to enhance ammunition outload capabilities. Future plans are to improve the rail holding area, construct a new machine shop, construct a pyro complex and potentially construct a tetranitrocarbazole, or TNC, facility.
2. ***Holston Army Ammunition Plant*** (AAP) (GOCO) in Tennessee produces almost all of the explosives used in nearly every lethal system within DoD from bombs and missiles to hand grenades, mortars, tank and artillery ammunition. Enhancements for Warfighter safety at Holston AAP includes the introduction of Insensitive Munition Explosives, or IMX, to reduce the chance of inadvertent detonation while in storage or during transport. At present, the plant is executing 19 modernization projects valued at more than \$530 million. In support of the U.S. Air Force, the primary effort is expansion of Research Department Explosive, or RDX, explosive capacity from 8 million pounds to 15 million pounds annually.

3. **Iowa Army Ammunition Plant** (GOCO) provides nearly all of our artillery LAP production capability for 40mm, tank, mine clearing and demolition munitions, as well as loads warheads for missiles. The installation is currently executing 18 modernization projects valued at nearly \$100 million, including design efforts in support of artillery melt-pour explosive loading. The plant has initiated a working group to devise a more fully autonomous, new melt-pour artillery production line that would incorporate extensive automation to minimize human interaction with explosives and minimize explosive yield concentrations.
4. **Lake City Army Ammunition Plant** (GOCO) in Missouri produces 85 percent of DoD's small caliber ammunition (less 9mm ammunition), as well as metal parts for 20mm ammunition. The plant is executing quality of work-life improvements such as the addition of major heating, ventilation, and air conditioning systems, which also increases the reliability of electronic machinery. It is also currently modernizing small caliber production equipment. Twelve modernization projects valued at roughly \$165 million are currently ongoing and plans are underway to construct a new production capability for the Next Generation Squad Weapon 6.8mm ammunition. This would be the first, new small caliber production capability since the 1940s, incorporating the latest advancements in technology, automation and ergonomic designs to enable increased worker safety and productivity.
5. **McAlester Army Ammunition Plant** (GOGO) in Oklahoma performs mixing operations for both cast cure and melt-pour explosive formulations, as well as LAP operations of all penetrator, general purpose and inert (practice) bombs

(500 pounds – 30,000 pounds) for the U.S. Air Force and U.S. Navy. The installation is currently executing a \$1 million new x-ray capability project, as well as a design project for a \$35 million multipurpose demilitarization facility. Future plans include an ammunition multipurpose demolition shop project to improve demilitarization capabilities. This project relocates operations and personnel out of World War II era bomb production facilities that were not designed with proper ventilation to accommodate munition demilitarization processes and rectifies employee exposure hazards (documented anemia cases) by providing a properly designed facility that limits worker exposure to explosive and chemical health hazards. This project will also improve material handling and ergonomics.

6. **Milan Army Ammunition Plant** (GOCO) in Tennessee is no longer required for mission needs and is being prepared for divestiture. The Army is currently executing projects to demolish environmentally hazardous buildings at this plant.
7. **Pine Bluff Arsenal** (GOGO) in Arkansas produces and performs LAP operations of various smoke, incendiary and riot-control ammunition (artillery projectiles, mortar cartridges, grenades and 40mm cartridges) filled with white phosphorus, illuminating candles, smoke, compound 2-chlorobenzalmalononitrile, the defining component of tear gas, red phosphorus and incendiary formulations. The installation is currently executing five modernization projects valued at roughly \$15 million, which includes upgrading natural gas lines and pyrotechnic production facilities.

8. **Quad Cities Cartridge Case Facility (QCCCF)** (GOCO) at Rock Island Arsenal in Illinois manufactures deep-drawn steel cartridge cases for use in 5-inch/54 caliber Navy guns and 105mm brass tank ammunition. They are preparing for \$2 million in safety and environmental upgrades in support of the U.S. Navy, which includes the relocation of a commercially-owned “deep draw” large-caliber case.
9. **Radford Army Ammunition Plant** (GOCO) in Virginia produces propellants and propellant ingredients used in rockets, tank ammunition and nearly all of our small caliber ammunition from 5.56mm to .50 caliber. The plant has a number of product quality improvements underway, including a new nitrocellulose facility, which uses the most modern and efficient manufacturing technologies to improve energy efficiency and provide better quality product. At present, the plant is executing 17 modernization projects valued at more than \$640 million, including a new \$114 million initiative to eliminate open burning and open detonation. Future plans are to construct new solventless and nitroglycerin production facilities that incorporate the latest technology to minimize human interaction with dangerous chemicals and energetics while increasing throughput and operating efficiencies.
10. **Scranton Army Ammunition Plant** (GOCO) in Pennsylvania provides metal forge capabilities critical to the production of mortar and artillery shell bodies used to supply the production process in Iowa. The plant is currently executing a project to repair exterior walls, columns and arches, and requires investment in a modern, flexible small-scale machining line in order to support the Army's Long Range Precision Fires modernization efforts.

Future Modernization Strategy

The Army's future modernization strategy is built upon an overarching holistic approach. This long-term (15 years) ammunition industrial base investment plan will consider emerging requirements for facilities and land, energy and water resiliency, equipment modernization, information technology and security, and human capital requirements. In order to support current readiness, future modernization and ensure surge capability, we are identifying and prioritizing our installation-specific requirements. To fully modernize, improve mission capability, facility sustainability and plant safety, the Army's ammunition industrial base will require between \$14 billion and \$16 billion from FY21 thru FY35. The investment plan will identify how we modernize our facilities: we will primarily focus on renovation versus new construction.

Challenges

Timely, adequate, predictable, and sustainable funding is necessary. In today's international security environment, it is essential that the ammunition industrial base be brought to 21st Century technological standards. In general, our existing facilities do not match the needs of the equipment or the people working in them. Although it is difficult to modernize the ammunition industrial base while maintaining production continuity to meet current Warfighter needs, there is greater risk in not doing so. Within available funding, we have and continue to prioritize projects across the enterprise that deliver readiness, build surge capacity, and modernize for the future force. We must also address the fiscal resources required to reduce our single points of failure, protect our industrial control systems from cyber threats, ensure energy resilience and eliminate reliance on international suppliers that are currently a part of our ammunition supply chain.

Funding new facilities that are designed to embrace current technology, rather than trying to retrofit 20th Century facilities, will enable predictive analysis, environmental compliance (water, energy efficiency, conservation and resiliency), improve workforce safety, and enable more efficient and effective production capacity resulting in a greater return on investment.

Finally, energy resilience is also a priority. The Army will need legislative support to allow DoD to receive the benefits of shale gas production on DoD lands in supporting the energy resilience and energy security of DoD installations. As an example, there are significant natural gas reserves in the shale deposits beneath McAlester Army Ammunition Plant. Allowing access to this natural gas would serve two key purposes: the natural gas could power the plant, enabling energy security and resilience, and the savings generated through utility cost reduction could be used to fund modernization initiatives across the organic industrial base.

Conclusion

Mr. Chairman, the Army's organic ammunition industrial base, its workforce and its products that support our Joint Warfighters and Coalition Partners are strategic, national assets that must be protected now for future generations. Although the Army is successfully supporting COCOM requirements and ensuring the success of our Joint Warfighters, we must modernize these plants with the latest technological advances, manufacturing processes and safety protocols to bring them to 21st Century standards. At the same time, we must implement a strategy to reduce single point failures, reduce dependence on international sole source suppliers, some of whom are not our allies, and develop international partnerships and strategic, reliable international second sourcing where necessary.

This modernized ammunition industrial base will be realized through a deep understanding of the production supply chain and potential worldwide alternative sources, continual criticality and fragility assessments, prioritization and management of vulnerabilities and risk, while capitalizing on opportunities for improvement and anticipating future needs.

Mr. Chairman and distinguished Members of this Subcommittee, we thank you for your steadfast and strong support of the outstanding men and women in uniform, our Army Civilians and their Families, and look forward to your questions.

The Honorable Dr. Bruce D. Jette
Assistant Secretary of the Army (Acquisition, Logistics and Technology) and
Army Acquisition Executive

Dr. Bruce D. Jette was confirmed by the United States Senate as the Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)) on December 20, 2017, and sworn into office on January 2, 2018. In this position, he serves as the Army Acquisition Executive, the Senior Procurement Executive, the Science Advisor to the Secretary of the Army, and the Army's Senior Research and Development official. He also has principal responsibility for all Department of the Army matters related to logistics.

Dr. Jette leads the execution of the Army's acquisition function and the acquisition management system. His responsibilities include providing oversight for the life cycle management and sustainment of Army weapon systems and equipment from research and development through test and evaluation, acquisition, logistics, fielding, and disposition. He is also responsible for appointing, managing, and evaluating program executive officers and managing the Army Acquisition Corps and Army Acquisition Workforce. In addition, he oversees the Elimination of Chemical Weapons program.

Prior to his confirmation, Dr. Jette served as President and Chief Executive Officer of Synovision Solutions, LLC, an innovative company he founded to provide management and technical consulting, engineering services, and project management in support of military and governmental agencies, as well as commercial industry.

A decorated veteran of 28 years of active duty, Dr. Jette retired as a Colonel following a career that included several armor and cavalry company commands, two overseas tours, various staff assignments at the battalion and brigade level, and over two years of operational deployments to Afghanistan, Iraq and Kuwait. Highlights of his previous acquisition service include founding the U.S. Army Rapid Equipping Force; serving as Program Manager for Soldier Systems which led to the establishment of Program Executive Office Soldier; and being honored as U.S. Army PM of the Year for his success as Product Manager for all Army airborne electronic warfare systems.

Dr. Jette is a graduate of the United States Military Academy with a Bachelor of Science degree in Nuclear Engineering and Chemistry. He also holds both a Master of Science degree and a Doctorate in Electronic Materials from the Massachusetts Institute of Technology. He was an Adjunct Professor at the Edmund A. Walsh School of Foreign Service Security Studies Program at Georgetown University.

His numerous military awards and commendations include the Distinguished Service Medal, Legion of Merit (3), Bronze Star Medal, Meritorious Service Medal (3), Army Commendation Medal, Army Achievement Medal (2), National Defense Medal (2), Operation Iraqi Freedom Campaign Ribbon, Operation Enduring Freedom Ribbon, Army Service Ribbon, Army Overseas Ribbon (2), Parachutist Badge, Army General Staff Award, and Order of Saint Maurice (Legionnaire).

General Edward M. Daly
Commanding General, U.S. Army Materiel Command

General Edward M. Daly assumed duties as the 20th Commanding General of the U.S. Army Materiel Command (AMC) 2 July 2020.

General Daly served three years as the Deputy Commanding General of AMC in his previous assignment. He managed the day-to-day operations of the Army's logistics enterprise, and also served as the Senior Commander of Redstone Arsenal, Alabama.

He served as the Commanding General of Army Sustainment Command at Rock Island Arsenal, Illinois, and as Army Materiel Command's Deputy Chief of Staff, overseeing the roles and functions of the Headquarters staff.

General Daly was the 37th Chief of Ordnance and Commandant of the U.S. Army Ordnance School. He also served as Executive Officer to the Deputy Chief of Staff, Army G-4; Commander of the 43rd Sustainment Brigade, 4th Infantry Division (Mechanized) at Fort Carson, Colorado, and deployed in support of Operation ENDURING FREEDOM, Afghanistan; Deputy Assistant Chief of Staff/Chief Plans Officer, G-4, North Atlantic Treaty Organization Rapid Deployable Corps based in Italy and deployed in support of Operations ENDURING FREEDOM and IRAQI FREEDOM; and Commander of 702nd Main Support Battalion, Division Support Command, 2nd Infantry Division, Eighth Army, Republic of Korea.

Earlier assignments as a company grade officer include various logistics and leadership roles with 1st Cavalry Division at Fort Hood, Texas; United States Army Europe; and Fort Bragg, North Carolina, where he deployed in support of Operation DESERT SHIELD/DESERT STORM. He also served as Assistant Professor of Military Science at Gonzaga University in Spokane, Washington.

General Daly was commissioned as a second lieutenant in the Ordnance Corps upon his graduation from the United States Military Academy at West Point in 1987. He earned Master's Degrees in Business Administration from Gonzaga University, and in Strategic Studies from the U.S. Army War College.

His awards and decorations include the Distinguished Service Medal, Legion of Merit, Bronze Star Medal, Defense Meritorious Service Medal, Meritorious Service Medal, Joint Service Commendation Medal, Army Commendation Medal, Army Achievement Medal, Combat Action Badge, and Parachutist Badge.

(July 2020)

**WITNESS RESPONSES TO QUESTIONS ASKED DURING
THE HEARING**

SEPTEMBER 22, 2020

RESPONSE TO QUESTION SUBMITTED BY MR. NORCROSS

Secretary JETTE. Numerous private ammunition producers, foreign and domestic, have approached the Army with unique capabilities. The Army has researched many of these and procured some to provide our Warfighters with the greatest available capability. Some examples include sniper ammunition, shoulder-launched munitions, advanced propellants, advanced artillery components, and potentially safer fuzing technology. Private industry is a key enabler in support of our Warfighter's lethality and is critical in meeting our National Military Strategy requirements.

Private industry is essential to our Assured Munitions approach. Domestic production is a combination of government and commercial production. Commercial entities produce many of the key feeder materials and participate in various intermediate steps in production such as milling of propellant and production of 155mm artillery casings. The Army also leverages direct commercial production for unique rounds such as sniper ammunition. While industry contributes to the Army's munitions production in this manner, none are situated to replace the full breadth or volume of the Army production requirements as the Single Manager for Conventional Ammunition. The Army's organic industrial base is a unique and essential capability. [See page 21.]

RESPONSE TO QUESTION SUBMITTED BY MRS. HARTZLER

Secretary JETTE. 1. Primer Component Wash System Upgrade (cost: \$2.80M): The legacy process uses approximately ~13M gallons of water annually and is manually executed by operators exposing them to harsh chemicals and detergents. These upgrades automate the cleaning process, increases process efficiency 50 percent (%), decreases wash time by 50%, and recycles 60% of chemicals and rinse water. Furthermore, citric acid replaces sulfuric acid, which reduces the risk of chemical burns to the operator and is more environmentally acceptable. These upgrades dramatically increase operator and environmental safety while dramatically decreasing water use.

2. 5.56mm Clip Line Upgrades (cost: \$7.70M): The legacy system has numerous maintenance issues and is obsolete as classified by the original equipment manufacturer. The replacement system produces at a similar rate, but utilizes robotics to pack rounds and advanced vision inspection technology to verify packing accuracies. This new system increases accuracy, reduces maintenance downtime and increases throughput with increased packaging efficiencies.

3. 5.56mm Safe Pack Unloader 2-5 (cost: \$8.45M): The legacy technique of bulk loading 2,000 primers resulted in a Hazard Classification of 1.1 (Mass Detonating). Safe Pack upgrades have significantly reduce the Hazard Classification to 1.4 (Moderate Fire) by separating primers individually in a plastic tray. The plastic trays enable the system to hold 2,013 primers per tray and ten trays per Safe Pack. This has resulted in a significantly safer operation.

4. Advanced Armor Piercing (ADVAP) Facility Upgrade (cost: \$9.74M): Established a new manufacturing area with the required security infrastructure upgrades to support manufacturing of classified small caliber ammunition items at a full production rate.

5. Advanced Armor Piercing (ADVAP) Long Lead Equipment (cost: \$9.36M): Procures a bullet assembly press, a cartridge loader, a vacuum propellant delivery system and a deluge fire suppression system that will be installed in the classified manufacturing area in support of ADVAP full rate production.

6. Building 81 Neutralization Upgrade (cost: \$15.50M): Building 81 supports the neutralization of energetic wastewater produced during the manufacturing of explosive materials. The legacy process is labor intensive and results in a significant hazard during the periodic cleaning of residual solids that accumulate in the tank. These facility upgrades automate the neutralization process with a Distributive Control System used to operate the existing energetic manufacturing process. Other hardware upgrades, such as the use of a round shaped tank vice a square shaped tank, effectively removes the operator from the neutralization and cleaning processes.

7. Prototype Energetic Capability (PEC) (cost: \$16.40M): Existing buildings are sited, through the Department of Defense Explosive Safety Site Plan process, that authorize production of specific items using specific quantities of energetic material. It is difficult to evaluate development items and energetic processes that fall outside of the approved site plan. Numerous energetic small caliber ammunition items are currently in development that will transition to LCAAP for full rate production. The Prototype Energetic Capability project establishes a facility at LCAAP that is sited (authorized) to conduct manufacturing studies on developmental energetic items and processes. It will act as an intermediary step between the research and development facilities where these items are developed, and the production locations on LCAAP.

8. Next Generation Squad Weapon 6.8mm Equipment/Planning (cost: \$40.0M): The outcome of this process will be an approved design package with related deliverables ready for future facility construction use.

9. Water Treatment Plant (cost: \$40.0M): Scheduled to be complete by April 2021 and will ensure LCAAP receives an uninterrupted supply of purified water required to support production. It was also ensure ancillary activities (i.e. steam generation) and the LCAAP workforce have potable water for use.

10. Building 3 Roof Replacement (cost: \$8.0M): Scheduled to be complete by December 2020; will replace a failing roof that is no longer safe to work under.

11. Covered Walkways in Explosive Phase I (cost: \$4.1M): Project was completed in August 2020 in order to protect explosive material as it is moved between adjacent buildings.

12. Primer Assembly Wing Building 35 Heating Ventilation and Air Conditioning (HVAC) design (cost: \$2.4M): Project was completed in August 2020 and replaced a 1970's era HVAC system that no longer controlled temperature and humidity at acceptable levels to meet explosive manufacturing standards. [See page 25.]

RESPONSE TO QUESTION SUBMITTED BY MR. BACON

Secretary JETTE. The Army approved the Individual Assault Munition (IAM) requirements in March 2016. The Army initiated the IAM program of record in June 2020 and plans to provide Soldiers with this capability starting in 4th Quarter Fiscal Year 2024. The program office has identified several production ready IAM candidates that could potentially meet the requirements, including lethality and weight parameters. The acquisition strategy will evaluate, through experimentation, several mature fielded systems in order to make an informed and affordable decision. [See page 14.]

QUESTIONS SUBMITTED BY MEMBERS POST HEARING

SEPTEMBER 22, 2020

QUESTIONS SUBMITTED BY MR. GOLDEN

Mr. GOLDEN. Dr. Jette, you spoke about the advantages of polymer casing ammunition, particular in terms of weight. I would note that in recent years, additive manufacturing has used advanced composite materials to make meaningful and promising contributions to the defense industrial base. As the Army looks forward towards modernization of its ammunition industrial base, what role do you think additive manufacturing will play? Do you believe Congress is adequately funding the research and development of this technology?

Secretary JETTE. Additive manufacturing is most appropriately suited to small runs due to the generally slow production rates. It is excellent for rapid prototyping. Advancement in polymer casing can benefit from but is not dependent on additive manufacturing. The Army continues to work with industry and its lab system for the benefits and maturation of polymer casing ammunitions.

Yes. Continued Congressional investment in the ammunition industrial base allows the Department of Defense (DOD) to realize the benefits of additive manufacturing and its impact on the production of ammunition and ammunition components. Future investments could include computing infrastructure, additive manufacturing enabling production processes, adaptive tooling and machining, design engineering, and digital engineering frameworks. Realizing the full benefits of additive manufacturing production will require a transformation of our legacy production processes, along with advances in additive manufacturing technology, to meet the high production rates associated with munitions.

