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HEARING
ON
NATIONAL DEFENSE AUTHORIZATION ACT
FOR FISCAL YEAR 2022
AND
OVERSIGHT OF PREVIOUSLY AUTHORIZED
PROGRAMS
BEFORE THE
COMMITTEE ON ARMED SERVICES
HOUSE OF REPRESENTATIVES
ONE HUNDRED SEVENTEENTH CONGRESS
FIRST SESSION
SUBCOMMITTEE ON TACTICAL AIR
AND LAND FORCES HEARING
ON
**FISCAL YEAR 2022 ARMY AND
MARINE CORPS GROUND SYSTEMS
MODERNIZATION PROGRAMS**

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FISCAL YEAR 2022 ARMY AND MARINE CORPS GROUND SYSTEMS MODERNIZATION PROGRAMS

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ARMED SERVICES,
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES,
Washington, DC, Monday, June 7, 2021.

The subcommittee met, pursuant to call, at 3:00 p.m., via Webex,
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. The Tactical Air and Land Forces Subcommittee meets today to review the Army and Marine Corps ground modernization program for fiscal year 2022 budget request. Excuse me.

I would like to thank our witnesses for being with us today and for the work done to put in together this year's budget request to Congress.

Following a year of unprecedented challenges, the committee is eager to hear details from today's witnesses on how the service budget request will satisfy the equipment requirements in the Army and Marine Corps both today and into the future.

The subcommittee will closely examine the choices made for modernization, as well as how those choices are preserved and reduce risk in our defense industrial base.

Certainly this year, COVID pandemic has elevated our concerns for the successful management of the risk in the industrial base. I am grateful to both Army, Navy, Marine Corps, and senior leadership for their openness with this.

I also want to add for those men and women working throughout the Nation at the depots, at the factories, during the pandemic, we really appreciate what you have done, and it is incredibly important to our country.

We are going to look at the following impacts on both the military and civilian fronts, supporting their management through this pandemic, and now look forward to restoring the workforce to a safe, efficient operation.

The goal for both services is always to achieve a modern ground force that can match or exceed our peer and near-peer potential adversaries. Services must realistically assess their requirement and make those tradeoffs at an acceptable risk between investment priorities, current and future capabilities, and the industrial base security and stability.

Across the past three budget cycles, Army and Marine Corps have made significant changes and tough choices with respect to their plans to develop, produce, and field future capabilities. An essential matter of congressional oversight, we must have the confidence that the Army and Marine Corps modernization strategies are realistic, achievable, and affordable.

We understand that the services' budget request and modernization plans, that many of the high-priority development programs will soon enter low-rate initial production, complete operational testing, and, if testing successfully, start full-rate production.

The number of systems entering these phases at this time creates a bow wave of new procurement funding that if not budgeted means that the modernization strategy is not achievable.

Today we will ask each of the witnesses to state for the record that given the 2022 budget request and the assumed or planned funding levels over the next 5 years, all priority ground modernization programs are affordable and achievable.

The distinguished Army, Navy, and Marine Corps leaders before the subcommittee today, as well as being qualified, they are going to have to explain their modernization budget requests.

I would like to welcome Mr. Doug Bush, Acting Assistant Secretary of the Army for Acquisition, Logistics and Technology; General John Murray, Commanding General, Army Futures Command; Mr. "Jay" Stefany, Acting Assistant Secretary of the Navy for Research, Development and Acquisition; and Lieutenant General Eric Smith, Commanding General, Marine Corps Combat Development Command and the Deputy Commandant for Combat Development and Integration.

We look forward to your testimony and discussing these topics. But before we begin, I would like to turn to our ranking member from the great State of Missouri, Mrs. Hartzler, for any comments she has.

[The prepared statement of Mr. Norcross can be found in the Appendix on page 37.]

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

Mrs. HARTZLER. Thank you, Mr. Chairman.

I would first like to thank our witnesses for being with us today and for the hard work that you put in this year's budget request to Congress. We have a lot to cover today, and I look forward to having a healthy discussion with our distinguished panel of witnesses, some of whom have testified before us on these topics just over a year ago.

And what a year it has been, full of extraordinary challenges, uncertainty, and transitions for everyone, none more so than for our military and its supporting industrial base.

And now the President's fiscal year 2022 budget request asks the Department of Defense and the industrial bases which support it, to do even more with less. I, like many of my colleagues, am deeply concerned about the proposed top line and that it does not adequately resource the 2018 National Defense Strategy and further places military leadership in an untenable position of having to

make impossible choices between near-term operational readiness, the sustainment of enduring capabilities, and long-term modernization priorities.

Today is an opportunity for our witnesses to address these concerns. As we discuss the future modernization of the Army and Marine Corps ground programs, I expect the witnesses to identify what risk the Army and Marine Corps are accepting in the short-term in order to keep planned modernization programs affordable and on course to meet the mid- to long-term defense requirements of creating a more lethal, resilient, and agile force, able to compete, deter, and win against future threats from both peer competitors and rogue actors.

I commend our military leaders for their dedication and hard work to continuously reassess modernization investment priorities and reallocate already limited resources to fund the development and procurement of essential defense requirements and capabilities necessary to build a more lethal defense force.

The Army, in particular, has terminated or reduced 310 existing programs in the last 3 years, including the elimination or delay of 37 programs in fiscal year 2022 alone to meet this end state.

I am interested in the Army and Marine Corps assessment of how a flat top line and the resulting imposition of cuts and decreases to lower priority programs and investment accounts affect the health and stability of the industrial base.

Cutting plans and funding for development and procurement programs creates vendor uncertainty, workforce disruptions, and a lack of predictability over time. Doing so also increases unit cost and risks the loss of industrial capacity, capability, and resilience when minimum sustaining rates are not met.

Finally, I want to stress the importance of jointness between the Army and the Marine Corps. I would like our witnesses to discuss how they are continuing to communicate and coordinate on critical modernization programs that could address similar operational requirements such as body armor, long-range precision fires, and next-generation small arms weapons.

I thank the chairman for organizing this important and timely hearing, and I yield back.

Mr. NORCROSS. Thank you.

Next, we understand that each Army witness will provide short opening remarks, starting with Mr. Bush, followed by General Murray; then Mr. Stefany will provide their perspective from the Marine Corps.

Without objection, each of the witnesses' prepared statements will be included in the hearing record.

So ordered.

Mr. Bush, welcome and please start.

STATEMENT OF DOUGLAS R. BUSH, ACTING ASSISTANT SECRETARY OF THE ARMY FOR ACQUISITION, LOGISTICS AND TECHNOLOGY, DEPARTMENT OF THE ARMY

Mr. BUSH. Thank you, sir. Chairman Norcross, Ranking Member Hartzler, distinguished members of the House Armed Services Committee on Tactical Air and Land Forces, good afternoon. Thank you for the invitation to appear before you to discuss the Army's

ground modernization program and the resources requested in the President's budget for fiscal year 2022.

I am pleased to be joined today by my teammate, General Mike Murray, as well as our Navy and Marine Corps counterparts. We appreciate your making our written statement part of the record for today's hearing.

Mr. Chairman, Army Acquisition, Logistics and Technology, and Army Futures Command's shared mission is to make sure that the Army continues to achieve overmatch against all potential adversaries, ensuring that our Army can fulfill its mandate to compete successfully, deter, and if necessary, fight and win our Nation's wars as part of the joint force. We support the Army's transformation through modernization in order to meet future challenges.

Even during a global pandemic, this past year has been one of dramatic change, rapid innovation, shared challenges, and significant progress with an unprecedented unity of efforts across the Army modernization enterprise.

I would like to next answer the committee's specific questions provided in the invitation we received to testify.

First, the committee asked us to provide, quote, major plan changes to the modernization and equipping strategy and an explanation of any new modernization—major new modernization initiatives between fiscal year 2021 and fiscal year 2022.

The answer to those questions is that, first, the Army has no major planned changes and, second, that there are no new major modernization initiatives.

Second, the committee asked us to provide justification for, quote, unfunded priorities, major equipment shortfalls, or unacceptable risk. With regard to unfunded priorities, I would refer members to the Army Chief of Staff's unfunded priorities list.

In addition, I am not aware of any major equipment shortfalls or unacceptable risks in my area of responsibility.

Finally, the committee asked for a, quote, assessment of risks associated with major program terminations or reductions between fiscal year 2021 and fiscal year 2022.

My assessment is that the small number of programs terminated or cancelled and the larger number of program reductions do not create unmanageable risks.

Overall, I think the fiscal year 2022 budget request for Army modernization reflects continuity and the Army's continued commitment to its high-priority modernization programs.

While members will find that adjustments were made to some programs, I believe that the fiscal year 2022 budget request of \$34.1 billion for Army research, development, and acquisition, reflects careful choices and supports continued progress on the Army's top modernization priorities.

Army modernization also includes a commitment to reform. We are grateful to you and your colleagues on the committee for reform initiatives that have been instrumental to our efforts to streamline and gain efficiencies in the acquisition process and accelerate the delivery of capability to soldiers.

This includes our use of middle-tier acquisition authority for rapid prototyping to accelerate select efforts linked to our modernization priorities, including the extended-range cannon artillery, in-

tegrated visual augmentation system, and next-generation squad weapon, among others.

We have also used other transactional authority, or OTAs, to help us streamline acquisition research initiatives, prototype projects, and follow-on production efforts. In both of these areas, you have my commitment that the Army will use these authorities conservatively and only when needed to accomplish Army modernization objectives.

You also have my commitment to ensure that appropriate internal Army oversight measures are in place to monitor the use of these authorities.

Let me close by saying the realization of our modernization efforts is highly dependent on what is in the Army's fiscal year 2022 budget request. Investments in this budget request complement and reinforce Army modernization efforts that you have so steadfastly supported.

The key is predictable, adequate, timely, and sustained funding to ensure the United States Army is the best equipped land force in the world. I sincerely appreciate your time today, and I look forward to your questions. Thank you.

[The joint prepared statement of Mr. Bush and General Murray can be found in the Appendix on page 39.]

Mr. NORCROSS. General Murray.

**STATEMENT OF GEN JOHN M. MURRAY, USA, COMMANDING
GENERAL, ARMY FUTURES COMMAND**

General MURRAY. Chairman Norcross, Ranking Member Hartzler, and distinguished members of the Tactical Air and Land Subcommittee, thank you for the opportunity to testify about Army ground modernization programs on behalf of the soldiers and civilians of Army Futures Command.

These men and women are working hard each and every day to modernize our Army. And it is an honor to join Mr. Doug Bush as well as Mr. Stefany and Lieutenant General Smith here today, and I would just note that the partnership between AFC [Army Futures Command] and ASA(ALT) [Assistant Secretary of the Army for Acquisition, Logistics and Technology] was strong in the past, and it remains strong under Mr. Bush's dedicated leadership.

The Army is in the midst of a transformational change. This change is necessary to maintain our global competitive edge and to deter future conflict, and to fight and win if called upon as part of the joint force.

The Army is transforming how we fight, what we fight with, how we organize, how we do business, and who we are. Budget convergence, the Army's campaign of learning and experimentation, is informing all of these aspects of transformation, and I would like to say a word about each of them in turn.

First, we are transforming how we fight. The Army's current concept is Multi-Domain Operations, our contribution to the developing joint warfighting concept. Right now the Army's Training and Doctrine Command is in the process of transitioning Multi-Domain Operations, the concept, into the next Army doctrine.

At the same time, Army Futures Command's Future Studies Program is bringing together our concept writers, intelligence profes-

sionals, and S&T [science and technology] experts with leading thinkers from academia, industry, and other communities to build our next concept.

Second, we are transforming what we fight with. Our materiel modernization includes the “31+4” signature efforts based upon our 6 consistent modernization priorities. Our fiscal year 2022 request includes \$11.3 billion to support these signature efforts.

Thirty-one of these efforts are led by powerful teams comprised of our cross-functional teams, program executive offices, and program managers, and four of these efforts are led by the Army’s Rapid Capabilities and Critical Technologies Office.

Twenty-two of these capabilities are projected to be ready to begin fielding over the next 4 years.

Third, we are transforming how we organize. The multi-domain task force will enable convergence, the integration of effects across all domains for joint force commanders to create multiple dilemmas for our adversaries.

Security Force Assistance Brigades foster close partnerships with host-nation ground forces in critical locations. They give us a strong foundation in competition and a head start in crisis and conflict.

Fourth, we are transforming how we do business. Soldier-centered design puts technology and prototypes in the hands of soldiers from the operational force early, so we can learn. Learning early changes how we generate requirements and how we partner with both traditional and nontraditional industry.

Our Army Applications Lab is spearheading effective ways to work with nontraditional innovators, leveraging existing authorities to make it easier for them to work with the Army.

Fifth, we are transforming who we are. We are exploring how to best find, train, utilize, and keep the tech talent we know we will need for a future fight.

Our Artificial Intelligence Integration Center works with Carnegie Mellon University to offer data science courses, to grow software designers and engineers and to foster a more technology-savvy workforce. Our software factory takes soldiers from any career field with the right aptitude and grows them into skilled coders.

We are in the process of transforming almost every aspect of our Army. There are, however, two key things we are holding on to—that would be our purpose and our most precious resource, our soldiers.

Our fiscal year 2022 request builds on the consistent priorities and strong momentum of our fiscal year 2021 request. Stable and consistent funding from Congress supports our ability to serve our Nation, take care of our people, and continue the momentum of our modernization efforts.

Thank you for your consistent support of our Army and our families, and thank you for having me here today. It is an honor to lead and represent the soldiers, civilians, and families of Army Futures Command, and I very much look forward to your questions. Thank you.

Mr. NORCROSS. Thank you, General.

Mr. Stefany, you are recognized.

STATEMENT OF FREDERICK J. STEFANY, ACTING ASSISTANT SECRETARY OF THE NAVY FOR RESEARCH, DEVELOPMENT AND ACQUISITION, DEPARTMENT OF THE NAVY; ACCOMPANIED BY LTGEN ERIC M. SMITH, USMC, COMMANDING GENERAL, U.S. MARINE CORPS COMBAT DEVELOPMENT COMMAND, AND DEPUTY COMMANDANT FOR COMBAT DEVELOPMENT AND INTEGRATION

Mr. STEFANY. Yes, sir, Chairman. As you mentioned, we have a single statement for General Smith and myself.

Chairman Norcross, Ranking Member Hartzler, distinguished members of the subcommittee, on behalf of myself and Lieutenant General Eric Smith, the Deputy Commandant for Combat Development and Integration, thank you for the opportunity to appear before you today to address the Department of Navy's fiscal year 2022 budget request for Marine Corps ground modernization programs. We are pleased to testify alongside our Department of the Army colleagues.

Marines traditionally serve as soldiers of the sea, capabilities that are closely aligned to those of our Army brethren. We continue to collaborate and are supporting interconnected programs as the Department of the Navy integrates with the joint force across our ground modernization portfolio.

The Marine Corps is transforming warfighting capabilities to provide an organized, trained, and equipped force, postured for competition and to respond to crisis in a contested maritime space.

As we focus on the pending threat presented by our strategic competitors, we thank Congress and this subcommittee for your leadership and your support.

The President's fiscal year 2022 budget request for Marine Corps ground modernization takes a full step out of the Commandant's Planning Guidance and Force Design 2030 Strategic Initiative.

The budget supports the vision for distributed maritime operations and focuses on capabilities our forward-deployed forces need to deter conflict with an emphasis on long-range precision fires, resilient communication, and training.

Ground modernization programs referenced in our written statement are affordable, executable, and on schedule. The fiscal year 2022 request prioritizes investments that maximize naval contributions to the joint force, while reducing risk in programs of record and accelerating capability delivery to Marines in the field.

The request represents the deliberate and informed development of a modernized, integrated, all-domain naval force for the future that requires us to think differently, move faster, and prioritize every dollar to meet an uncertain and complex environment. The Marine Corps ground modernization portfolio aims to do just that.

The lieutenant general and I look forward to your questions. Thank you, sir.

[The joint prepared statement of Mr. Stefany and General Smith can be found in the Appendix on page 55.]

Mr. NORCROSS. Thank you. I appreciate it. I just want to drop back as the foundation for the hearing that I had asked the question for the record, that given the 2020 request, the planned funding levels over the next 5 years, all the priority ground moderniza-

tion programs are affordable and achievable. Mr. Bush, would you agree with that statement?

Mr. BUSH. Sir, I would, with an important caveat, that the administration has only presented the fiscal year 2022 numbers at this point.

Mr. NORCROSS. Absolutely. General Murray, would you concur?

General MURRAY. I concur with Mr. Bush's caveat, sir.

Mr. NORCROSS. Thank you. Thank you and Mr. Stefany for addressing that.

General Smith, would you agree with that?

General SMITH. Mr. Chairman, I do, in concert with Secretary Stefany, yes, sir.

Mr. NORCROSS. Terrific. Thank you. You know, 3 years of night court, the constant review, reallocation of money, this is a major shift. Mrs. Hartzler talked about the industrial base and uncertainty, so the risk in each of these can be significant.

But one of the items I want to touch base on now is with the reorganization of the Army related to research, development, and acquisition, financial management of programs as we see the erosion of civilian responsibility and authority for control and oversight.

Mr. Bush, what is your assessment of the status and the plans for change, if any, regarding the distribution of responsibilities and authority for oversight of the Army modernization and the relationship between acquisition community and Army Futures Command?

Mr. BUSH. Mr. Chairman, the law is crystal clear in this regard, if you look at title 10, with regard to how responsibility is allocated to civilians for acquisition and research and development.

That being said, the Army does have flexibility within the law to task, organize, and assign responsibilities across the Army and the Army staff. So I am comfortable with the law and the way it works, and the Army will follow the law, and I see no current issues in that regard.

The teamwork is necessary to make everything happen, so the Army modernization cannot be accomplished by my organization alone, nor by General Murray's or anybody else's. But right now, I am comfortable with what the law says, sir.

Mr. NORCROSS. So you have that independent authority necessary to approve, modify, prohibit, reverse actions, everything you need to research and development to acquisition recommendations, decision or action, is it inconsistent or contrary? Do you feel you have that authority and control?

Mr. BUSH. I do, sir, if necessary, derived from the Secretary of the Army's ultimate authority with regard to such matters.

Mr. NORCROSS. Terrific. Certainly a lot of discussion has been going on. It just didn't start this year.

This is for General Murray and then you, Mr. Bush. Subcommittees pay particular attention and are generally supportive of the Army's ambitious modernization strategy. I talked about that just a moment ago.

But the consideration and technical achievability, the risks, the affordability in the 2022 budget request for research, development, and acquisition is an 11 percent decrease as compared to last year's enacted amount.

This does not inspire confidence in the stability of your programs, given the evidence of a likely procurement bow wave. We talked about that a few minutes ago. When expensive systems are in development, they rarely get cheaper, and obviously that up ramp is one of our biggest concerns.

Understanding the Army's modernization strategy was perhaps—and some have suggested—never realistically affordable, and that your plans are unachievable without additional funding from your current and likely top lines.

We talked about reallocation of dollars, but there has been suggestion that you are not going to be able to do that just with the allocations, that you are going to need a plus-up. How are you going to deal with the flat lines this year, perhaps future, in achieving those goals that are your number one priorities.

Mr. BUSH. Mr. Chairman, I will start, and I would like General Murray to also fill in here given his many years of experience. I would first point out that the Army's overall budget is \$173 billion. The portion we are here to testify about today is \$34 billion, or only about 20 percent of that.

So, in the future, Army leaders do have an ability to, if they chose to, allocate additional resources to this area of the Army's budget that would affect the affordability calculations you mentioned, sir.

The second thing I would point out there is, other things can change, and that is, the Army does have dials it can turn regarding the pace of acquiring new systems. The force structure of the Army could change, which would result in changes to what we are required to produce. And other factors.

So, at this point, sir, fiscal year 2022, the Army was able to maintain sufficient funding for its highest priorities to keep them on their current paths. That is obviously not a hundred percent guarantee of success in the future.

But the fiscal year 2022 request, sir, I thought was balanced appropriately. In future years, decisions will be made at the appropriate time.

General MURRAY. And I would just add, Mr. Chairman, that in addition to what Mr. Bush has said already, is, we go through a process in front of the 5-year defense FYDP [Future Years Defense Program] bill—we call it a SPAR [strategic portfolio analysis and review]—where we sit down and look at exactly what you are talking about, even outside of the FYDP, the 5-year defense plan, to ensure that we begin to look at resources in the outyears to make sure that we can afford to do exactly what you are talking about.

And I mentioned upfront, 22 in the next 4 years, but some of these won't deliver and really go into full-rate production until late 2020s and even early 2030s, some of the programs. And so I do think that we take a hard look at that every year. The affordability piece of it is a discussion Mr. Bush and I have every year, with everybody that puts this plan together.

But I would just remind you that this is more than modernization for the Army. We call this a transformational change, which General McConville describes as once every 40 years. And, you know, the risk of not following through on the transformation we have started is our soldiers are going to have the same equipment

they have today 20 years from now. And I do think that will put them at a serious disadvantage on that future battlefield.

Mr. NORCROSS. So from what I hear, the suggestion that was made recently that plans for this production fielding is not achievable without additional funding, based on what you told me, you both disagree with that. Is that correct?

General MURRAY. I will speak first, sir. I do disagree with that.

Mr. NORCROSS. Very good.

Mr. Bush.

Mr. BUSH. Yes, sir, I also disagree.

There is always choices to be made within an entity as large as the Army in regards to the priority efforts. So it is up to the judgment of leaders to make those calls.

General MURRAY. And I would just add, sir, with risk.

Mr. NORCROSS. Informed risk. You do that every day, and that is certainly one of the challenges. Thank you.

I now recognize Mrs. Hartzler, our ranking member.

Mrs. HARTZLER. Thank you, Mr. Chairman.

Mr. Bush, I would like to start with you. I am deeply concerned about the budget request for the procurement of Army ammunition, and specifically the small- and medium-caliber request account. The fiscal year 2022 President's budget request reflects severe reductions in the budget request for the 5.56 millimeter, the 7.62 millimeter, and the .50 caliber ammunition.

The reductions from the fiscal year 2021 enacted levels equate to reductions of 26 percent, 28 percent, and 49 percent respectively for an overall reduction of approximately 30 percent in the small arms ammunition account.

This is concerning to me because last year's fiscal year 2022 FYDP reflected an increase for each of those accounts, and so we are not only not increasing them, but we have severe reductions. I am concerned that these severe reductions will affect the overall readiness of our ground forces and severely handicap their ability to train and to fight.

Additionally, the severity of these reductions will have an impact on the ability to sustain a workforce at the Lake City ammunition plant, the location of where the Army plans to build the 6.8 millimeter ammunition for the next-generation squad weapon.

With these proposed cuts, the Army is risking losing an experienced workforce which could take 9 months to years to restore, and the projection from the current contractor is that 500 to 700 employees would lose their jobs. And many of these employees are not only constituents of mine, but they have worked there for years and have this training and this capability that just can't be easily replaced or the spigot turned back on in 9 months.

So, Mr. Bush, why is the Army requesting such a large reduction from what was previously planned for small arms ammunition, and what solutions are being considered within the Pentagon to mitigate the risk to the health and resilience of America's critical defense industrial support base?

Mr. BUSH. Yes, ma'am. Thank you for the question. So I would start with—and I will let General Murray add on the requirements side here—the Army every year makes adjustments to its ammunition production in order to achieve stocks required for both training

and overseas contingencies and war plans. So year-to-year fluctuations do occur.

Those reductions that you noted do reflect a movement of funds away from those things to protect other things in the budget so they are part of that judgment call that was made.

I am not familiar, I apologize, with the specific potential workforce effects you are citing. I am happy to meet with you and your staff to discuss those to learn more about. I have not heard any numbers along those lines, ma'am, but I would be happy to learn more and work with you on how those are calculated or what the possible options might be to mitigate.

If you wouldn't mind, I would like General Murray to answer the requirements part if that is okay.

General MURRAY. Yes, ma'am, and thank you, Mr. Bush. Ma'am, that is part of what the chairman mentioned earlier in terms of the decrease in RDA [research, development, and acquisition] and procurement accounts. So \$4.2 billion, as we looked at that decrease across the board, where could we accept risk—what we consider to be an acceptable risk in order to account for that decrease in the RDA and procurement—and the procurement accounts, or the RDA accounts.

And so, when we worked with the operational community here inside the Pentagon and then with Forces Command who does the training, as we looked across the board, we thought that was an acceptable level of risk given the stocks we currently have on hand and what is projected in terms of requirements for those calibers of ammunition.

Mrs. HARTZLER. Okay. So let's talk about the next squad weapon. So the subcommittee understands the next-generation squad weapon is evaluating three candidate rifles and three candidate 6.8 millimeter bullet technologies to replace the M4 carbine and its 5.56 millimeter round in close combat [inaudible].

So can you give us a status of the next-generation squad weapon program and under what circumstances and when will the Army consider retirement of all 5.56 millimeter rifles and carbines and provide soldiers the 6.8 millimeter rifles?

Mr. BUSH. Ma'am, I can take the first part of that on the programmatic. I will let General Murray talk about requirements. So, as you know, this is a program that is using new authorities from Congress. We are in the middle of rapid prototyping right now with, as you mentioned, more than one vendor.

We are looking to make a rapid fielding decision early in the first quarter of fiscal year 2022, down to one, at which point we would proceed into rapid fielding and initial production. That includes selecting the ammunition to go along with the weapon.

So, ma'am, as you know right now, that requirement is not for the entire Army. So I will let General Murray talk about the future of 5.56.

General MURRAY. Yes, ma'am. And it is actually, as you know, two different weapons. So rifle and an automatic rifle with a common cartridge. And, as you mentioned, ma'am, right now we are programming for the close-combat force, plus some additional in terms of Special Operations Command. The number is somewhere

around 120,000 we are talking about right now, with a combination of the two.

And then we have not considered yet whether we will replace the M4 and the M16, the M4 carbine and the M16, which fires the 5.56 millimeter ammunition you spoke of. That is a future decision to be made, very much dependent upon what we find with the prototyping effort we have going on right now.

Mrs. HARTZLER. Okay. Very good.

Mr. Bush, please describe the plan and timeline to establish the 6.8 millimeter ammunition manufacturing at Lake City Army Ammunition Plant to support the fielding of and training with the new rifle as well as [inaudible].

Mr. BUSH. Yes, ma'am. So—

Mrs. HARTZLER. Please describe—yeah, the plan and the timeline for the production of 6.8 ammunition there at Lake City.

Mr. BUSH. Yes, ma'am. So fiscal year 2022 request includes funding for preliminary work necessary to support whatever ammunition type is selected for production at Lake City in the future. So that is my understanding, is that all that preliminary work is properly funded and fully funded in fiscal year 2022.

What would follow is a transition over a number of years from initially contractor-produced ammunition to capability at Lake City to produce everything the Army needs for that new type of ammunition. It would take place over, I believe it is 3 to 4 years before it is completely transitioned because of the requirements for a new facility.

Mrs. HARTZLER. Uh-huh. Okay. Very good. And before we change subjects, I do appreciate your offer to meet with me and my staff about this issue and how to mitigate it and to learn more because obviously this is real concerning to us here in Missouri. So—

Mr. BUSH. Yes, ma'am.

Mrs. HARTZLER [continuing]. Thank you, yes.

If I could talk a little bit—shift to combat vehicle programs, Lieutenant General Smith, I am pleased to see the Marine Corps fiscal year 2022 request continues procurement plans for the purchase of 92 amphibious combat vehicles [ACVs] for Marine Corps replacement for the aging amphibious assault vehicle, which I recently had a chance to see the new one.

As the Marine Corps primary armored infantry carrier for ship-to-shore assault and armored operations inland, please provide the status of the Marine Corps progress for the development and fielding of the ACV.

General SMITH. Yes, ma'am, thank you for that. Ma'am, the amphibious combat vehicle is on track; it is on schedule for performance and for cost. So the folks up at BAE up in York, Pennsylvania, kind of fought their way through COVID.

They worked with the Italian Government—IVECO [Industrial Vehicles Corporation] was the original manufacturer—to make sure that that program stayed viable through COVID. We are on track for the production numbers that we anticipated seeing.

We produced the first two platoons of those vehicles. One platoon carries an entire company. It is a little bit of Marine math, but a platoon carries a company. And so we have prioritized our Marine

expeditionary units who are always out there deployed on board our naval amphibious ships.

So the first two of those platoons are out. They are out in California and our desert training base at Twentynine Palms. Their readiness is good.

The training shift first to the second platoon, changing from tracked vehicles to wheeled vehicles required a little bit of adjustment for our drivers. They made that change and met their objectives for the initial operating testing capabilities. But we did declare initial operating capability [inaudible] on schedule, on performance, and on budget, and scheduled to meet our needs in the most rapid way possible to replace the amphibious assault vehicle, which, as you said, is aging, and that is what we owe the Marines.

I don't know if that answers your question, ma'am. I would like to get into—

Mrs. HARTZLER. Yes.

General SMITH [continuing]. If it doesn't.

Mrs. HARTZLER. No. That sounds like good news to me. It is nice when you hear that it is on cost, and it is on schedule production-wise, and certainly it is needed after some of the—the accident and what has happened with some of the other vehicles. So we are glad to see that.

General Murray, I would like to ask you, the next-generation combat vehicle is one of the Army's top six modernization priorities, and the Army has used resources freed up by program terminations and reductions to fund efforts to develop a next-generation combat vehicle.

Central to this effort has been development of the Optionally Manned Fighting Vehicle [OMFV], a program intended to replace the B2 Bradley Infantry Fighting Vehicle.

Can you provide an update on the Army's modified strategy and current plans for the Optionally Manned Fighting Vehicle, and how did these plans and last year's cancellation of the solicitation for the OMFV affect plans for further upgrades and fielding of the Bradley Infantry Fighting Vehicle?

General MURRAY. Yes, ma'am. And so for OMFV, the Optionally Manned Fighting Vehicle, as you probably know, we started off with an entirely different approach when we approached it from a—and I will say this—requirements standpoint. An entirely different approach is we didn't start with the requirement.

We started with a list of characteristics that we went out to industry, and it was really intended with characteristics and not requirements to allow industry to be creative and take advantage of the innovative thought and processes that go on inside of industry.

So we put out an RFP [request for proposal]. We had a number of vendors come back and express interest, and we also started not with bending metal. We started with a digital design as our first phase. We are getting [inaudible] where we will down-select to up to five vendors based upon those digital designs, and then we will take it a step further and work with those five vendors.

And we are a number of years out before we will ask any of whoever it is that we end up selecting to actually bend metal and produce a vehicle. So we are trying to take advantage of commercial best practices in terms of digital twinning and digital design to in-

clude putting soldiers against these digital designs for a virtual soldier touchpoint to make sure we understand what is most important to our soldiers as we progress forward.

Right now we believe we are on track. My conversations with industry is, they are receptive of this approach, and then we will see as this program progresses.

In terms of the M2 Bradley, you know, that is our infantry fighting vehicle for today and for the near-term future. So we do have plans for the Bradley—what we call the A4, the most recent version of the Bradley. We will most likely not produce A4s across the Army because we won't need to by the time we get to the Optionally Manned Fighting Vehicle.

But the sustainment of the Bradley fighting vehicle, there are funds against that. The upgrade of the Bradley fighting vehicle for both the A3 version and the A4 version, there are funds against that to make sure that our soldiers have the capability they will need until we are able to deliver the Optionally Manned Fighting Vehicles.

Mrs. HARTZLER. Very good. Thank you for the update.

I yield back, Mr. Chairman.

Mr. NORCROSS. Thank you.

Mr. Carbajal, you are recognized for 5 minutes.

Mr. CARBAJAL. Thank you, Mr. Chairman.

General Smith and General Murray, the Army and Marine Corps are resourcing initiatives to improve the form, fit, and function of personal protective equipment [PPE] to better accommodate female soldiers and Marines.

Can you update our subcommittee on the status of these efforts to improve PPE for female service members? Does the budget provide you enough funds to properly study and then procure this PPE?

General MURRAY. Sir, I will go first. The answer to your last question is, absolutely. So as you know, the Army has been working on—and, you know, we called it female body armor, but what I prefer to say is body armor that is better produced and cut for our female soldiers, so things like—to accommodate different sizes, we have vastly expanded the types of sizes we are offering.

And I would argue it is not only just for our females, but it is also our smaller statured male soldiers as well. We have made some special accommodations for female-specific gear in terms of undergarments for the body armor, different cuts of what we call the plate carrier, or the IBA [interceptor multi-threat body armor system], where the plates go into.

We are making modifications to the plates themselves to enable not only our female soldiers but all soldiers to become better marksmen in terms of the—we call it a shooter's cut. We have done more research on lighter weight materials and seeing some significant improvements in the ability to have light weight for all our soldiers, not only the body armor itself but the helmet as well, and keep the same levels of protection.

So the research and development up at Natick is almost continuous, and then as we make those breakthroughs, we roll that out into production to continually improve our protection for our soldiers.

General SMITH. Mr. Carbajal, it is Eric Smith for the Marine Corps. What I would say, sir, is that our first and foremost piece is we are interested in Marines' comfort, but what I am committed to is their protection. So what we have done is we have changed the number of sizes that we have.

Instead of the old-timey small, medium, and large, we have made extra small, extra small short, extra small long, extra small et cetera, and that includes right now, going from the normal 5th percentile to 95th percentile—that is how we fit most things—to the 2nd to 98th percentile.

I mean, we can cover anybody between the 2nd and 98th percentile. That currently leaves approximately 200 individual Marines, most of whom are female, below, in that 1 to 2 percent for smallest stature, and actually about 3,000 Marines, mostly male, in the bigger than 98. They are extremely tall, et cetera.

So, in the case of females, in particular, it is about 200 who do not have body armor that fits them, what we determined to be, appropriately. So we have to custom-work that before they would go into a combat zone. That is not the case we have now. There is no one deployed with ill-fitting body armor, but we do have 200 Marines who we cannot outfit properly without going to a customized version.

So, like General Murray, we are absolutely in lockstep with the Army in looking for the best, lightest, body armor that protects, adjusting the cuts in shoulders, deltoids, et cetera, so it best fits the individual Marine.

We do have the money to do it. We have what we need. There is a—the Holy Grail, if you will, sir, is conformal body armor, when you start bending plates to make it perfectly fit a body. That is not in the scale, in the realm of possible now, sir. When it becomes the industry standard, that is great. That will take care of a hundred percent, but that doesn't exist now, sir.

So we default to protection; comfort comes second. And, again, we are about 200 Marines fall below what we are able to outfit without going custom.

Does that answer your question, sir?

Mr. CARBAJAL. Yes, it does. Thank you very much.

General Smith, my colleagues and I would like assurances that the Marine Corps is taking the necessary steps to prevent any future tragic assault amphibious vehicle accidents like the one that occurred off of the California coast in 2020.

What safety upgrades are being applied to the AAVs [amphibious assault vehicles] throughout the fleet, and how will be the ACV be safer and more effective?

General SMITH. Yes, sir. First, sir, anytime we bring that mishap up, the first thing we owe—I owe—is personal condolences, which aren't enough and don't do anything to bring back our dead sailor and our eight dead Marines. Nothing I can say today will fix that, and the mishap was 100 percent preventable and also 100 percent inexcusable on every level.

What we have done, sir, for the AAV that still does exist until the amphibious combat vehicle can replace it, we have inspected all of our vehicles for their watertight seals, and nothing gets into the water without that inspection. There is a pretty robust checklist for

everything from training to the actual seals on the vehicle to make sure that those vehicles that do enter the water, with safety boats for training, are completely viable and safe.

The ACV is a completely—the amphib combat vehicle is a different design, sir. It does not hold water like the AAV. The ACV, sir, does not work off of a thing called the plenum, where water is purposely brought in to cool the engine. There is a very small engine compartment that lets about 20 gallons or so of water in there to cool it.

It has a completely different hull form that has fewer penetration points so that water cannot get in and accumulate, fewer entry points. It runs off of a completely different design than the, you know, 50-year-old AAV, the amphibious assault vehicle.

So the design is completely different, sir, and we do not and will not see those kind of incidents with the amphib combat vehicle—

Mr. CARBAJAL. Thank you, General. I am out of time. I have a couple more questions, but they will be submitted for the record. Thank you very much.

Back to you, I yield back, Mr. Chairman.

Mr. NORCROSS. Thank you.

Mr. Wittman, you are recognized for 5 minutes.

Mr. WITTMAN. Well, thank you, Mr. Chairman. I would like to thank our witnesses today.

General Smith, I would like to start with you. We know that it has been a lot of focus on the changing nature of what the Marine Corps is going to be faced with, and we know that you have to be able to reach out and place at risk our adversaries at long distances.

And one of those elements in the Commandant's Planning Guidance is about ground-based anti-ship missiles, and I want to refer to testimony not just from the Commandant in his Planning Guidance but also in March of 2021, the former INDOPACOM [United States Indo-Pacific Command] commander, Admiral Phil Davidson, emphasized this, and I want to use his words.

He said this, he said the expansion of ground-based fires enables the maneuver of our maritime and air forces because what you get is the requirement for much more intense search for offensive capability out of our adversaries. They also have to look for intelligence, surveillance, and reconnaissance in their networks. If we want to make our adversaries work harder to find our stuff and defend against it, that is what deterrence is about. It is about imposing costs.

And as I look at Admiral Davidson's words and I ponder them, as well as the Commandant's Planning Guidance, I find myself in complete agreement, which is why, last year, Congressman Gallagher and myself worked to correct the appropriators' mistake that unfortunately found itself in cutting funding in half for the ground-based anti-ship missiles.

And, unfortunately, the cuts stood in the final appropriations bill. I just don't think the appropriators understood the critical nature of that and why it was needed.

In the PB [President's budget] 2022 request, the Marine Corps is also seeking funding for \$102 million for 10 production represen-

tative models and also to make sure those models are operationally tested as part of the ground-based anti-ship missile capability.

I want to get you to elaborate on why this anti-ship missile capability is so critically important for the Marine Corps, especially as you are looking to distribute your operations, to create lethality in different areas, to raise the level of uncertainty for our adversaries.

I want to make sure we understand, you know, why this is important in the Marine Corps force design strategy, and why it is the foundation of what you are doing going ahead in the Indo-Pacific.

General SMITH. Thank you, Mr. Wittman. I will be brief. Sir, that ground-based anti-ship missile, which is the Naval Strike Missile, the same one fired out of an LCS [littoral combat ship], out of Navy systems, it fits on the back of a joint light tactical vehicle which has been robotized. Highly mobile, internally transportable in our C-130s, moveable via the future light amphibious warship and all of our current surface connectors.

That small Marine unit we would refer to as an expeditionary advance base operation, perhaps 75 Marines, that is carrying up to, let's say, 18 of these missiles, highly mobile, can, in fact, place at risk an adversary naval force, reaching out—in the unclassified setting, sir—in excess of a hundred miles against a ship—we have successfully tested this at Point Mugu—at a range of right around a hundred miles, again, for the purposes of this open hearing. That missile allows us to hold forces, enemy forces, at risk and to open sea lanes in support of distributed maritime operations for our fleet commanders.

When we have this and when the adversary has to respect a force of only 75 Marines, they have to, to your point and Admiral Davidson's point, and Admiral Aquilino, the current commander's point, it causes the adversary to spread out their information—or intelligence, surveillance, reconnaissance network and look at everything, because when everything is a threat, that is how you enable fleet maneuver. Because now they are worried about everything, things that were too small to worry about, now that small thing has some lethality that can bring down a vessel, by the way, that cost \$2 billion at the expense of a \$1.7 million missile. Does that answer your question, sir?

Mr. WITTMAN. Yes, sir, General Smith. I appreciate that. That is great. That is incredibly important, as we go forward, to make sure that is properly resourced.

I want to go now to Mr. Bush and Mr. Stefany. As you know, the First District of Virginia has a tremendous number of Active Duty military stationed in bases in every branch of the service, including the Coast Guard, and we also have an extraordinary group of civilians that work with companies that support our members of the military.

There is a tremendous amount of innovation and creation out there, and what I hear constantly is the high level of frustration, and that it is too hard to do business with the Department of Defense. They get into the SBIR [Small Business Innovation Research] process and the Small Business Technology Transfer, or the STTR programs.

The problem is, is they can do the research and development, so they can do the phase 1 and phase 2, but it is very hard for them to graduate, to actually scale up, to take what they have developed in concept and actually grow their businesses.

And one of two things happen. Either they get capped because if they grow larger, they actually get penalized; they can't do business. Or they finally give in and one of the big primes purchases them, and then that innovation and technology never makes its way into the hands of our warfighter because the primaries buy it up and then shelve it. So they are essentially pushing back against competition.

I want to know, you know, what is DOD doing to actively discourage this in order to help. I hear a lot of words about, "Oh, yeah, yeah, we are looking at those companies," but I see very little in terms of real numbers.

I want to know what you are doing internally to fix this systemic acquisitions issue and what you are doing to try to get these businesses that work very hard to grow and that take very innovative and creative ideas and actually get them to the point where we can field them.

That is what I believe the future is going to be, and unfortunately what happens right now is they either fade away or they get vacuumed up by the primes. Mr. Bush or Mr. Stefany.

Mr. STEFANY. Okay. Yes, sir, I will take this one first, Representative Wittman. So, yes, you are describing what I guess we would describe often as the valley of death in the research and development world——

Mr. WITTMAN. Yes.

Mr. STEFANY [continuing]. Where a small company or even a midsize company will have a great idea, we get it going, and then it doesn't get pulled into a major acquisition program with the big prime. So very, very aware of the problem, and as far as what we are doing about it, well, we have a number of—our Office of Naval Research has, we call it integrated naval prototyping program that is specifically built to cross that, to take promising ideas that actually have matured to what you would say maybe a SBIR level 2, and get them across and pull them into an experimentation or an actual prototyping, a rapid prototyping event attached to a major program.

And so we could show you that alignment, where we are trying to actually take those and map them directly to programs of record so that you can actually see those alignments.

Mr. WITTMAN. Very good.

Mr. STEFANY. And in the past, it has been like we just kind of waited for industry to do it, and now we are trying to actively map them across.

Mr. WITTMAN. Very good.

Mr. NORCROSS. The gentleman's time has expired. We are going to have another round here.

Mr. WITTMAN. Okay. Thank you.

Mr. NORCROSS. Mr. Brown, you are recognized for 5 minutes.

Mr. BROWN. Thank you very much, Mr. Chairman. I want to thank our witnesses for being here today.

My first question is for General Murray. Good afternoon. I had an opportunity recently to meet with your colleague, General Potter, the Army G-2, and it is my understanding that the G-2 leads the ISR [Intelligence, Surveillance, and Reconnaissance] Task Force, charged with ensuring that ISR concerns and capabilities are integrated into and support the CFTs [cross-functional teams] as required.

Can you just describe to the committee the process by which the ISR Task Force interacts with the CFTs and how any ISR requirements or modernization priorities are being addressed by Army Futures Command? Thank you.

General MURRAY. Thank you, Congressman Brown. It is good to see you again. So, much like logistics, ISR is a part of every one of the cross-functional teams. And if you looked at the way we look at requirements, things like TITAN [Tactical Intelligence Targeting Access Node], which is an intel [intelligence] system, is very, very high on our list as we look at our future requirements. The ISR Task Force is a key contributor of things like Project Convergence back in the one we did last fall, the one we will do, again, this fall and the one we will do in 2022. The ability to—if you remember, Project Convergence 20 was all about sensor-to-shooter look and the ISR Task Force provides us the sensors through either organic means, national means, other service means, but that all revolves around the ISR Task Force.

The ISR Task Force is also intimately involved with the Artificial Intelligence Task Force at Carnegie Mellon as we begin to look at the algorithms that we are developing to really refine that sensing and do some of the automated—the PED [processing, exploitation, and dissemination] work, the processing of the information that comes off the sensors. General Potter and I have conversations probably at least weekly, if not more, in terms of the integration of the sensing part of it that ISR provides.

So, short of being another cross-functional team, ISR Task Force and the superstars they have got on that task force are in daily conversations, not only at AFC headquarters but really across all of the cross-functional teams that are highlighted and key parts of all the experimentation we do, most recently EDGE 21 [Experimental Demonstration Gateway Exercise 2021] at Dugway Proving Ground.

Mr. BROWN. Thank you. For General Smith and also for you, General Murray, picking up where I think Representative Wittman was in terms of presenting, you know, multiple lethalties and challenges to our adversaries. I always get a little concerned when I hear, you know, one service suggesting that another service's modernization priorities are not necessarily well conceived or that they're duplicative.

The Army has as the top modernization priority long-range precision fires, and General Smith, you just talked about with Representative Wittman, the value, the importance of the ground-based anti-ship missile. Air Force certainly has a role to play as well. I mean, they provide a long-range air-to-ground, air-to-air fire. Can you just talk a little bit about how the Joint Requirements Oversight Council is involved in ensuring that these modernization priorities with the different services are kind of aligned

with one another or in sync with one another, not at odds with one another but, in fact, complement each other when we think about the joint warfighter operating concept?

We will start with General Smith, and then we will go over to General Murray, please.

General SMITH. Congressman, good to see you, sir. The JROC, Joint Requirements Oversight Council, does, in fact, sir, conform program to records. So underneath the leadership of General Hyten, our Vice Chairman, you must pass requirements through the JROC. So all of the things that we seek in terms of long-range precision fires and I am in literally, sir, in weekly contact with Lieutenant General Richardson who is the deputy down for General Murray, literally weekly, sir, on our long-range precision fire efforts together. We are appropriately overlapped, but not duplicative. We each have a role to play. We are certainly very light and mobile and have X range. The Army is much more long range. They bring more heft to the fight. Both of those are characteristics that the joint force commander has asked for.

So, again, sir, we both seek long-range precision fires that we can employ within our maneuver space and within our units, but they are certainly not duplicative, sir. They are complementary, and the JROC does oversee that. And I will stop there, sir, and pass to General Murray.

General MURRAY. And, Chairman, I think we are out of time. You want me to answer that?

Mr. NORCROSS. You can finish the answer.

General MURRAY. Right. And I would just echo General Smith's comments. And we do do, between the Army and the Marine Corps and really if you look at Project Convergence across all five of the services to now include the Space Force, it is weekly synchronization meetings. I echo his comments on the JROC's role. And then the other thing I would say, Congressman, it is all in support of the joint warfighting concept, and as that emerges, I think you will see the complementary nature of that, and I appreciate you using that word and our ability to provide multiple dilemmas from the land, from the sea, from the air is critical to present those multiple dilemmas to any potential adversary and not allow them to focus on one particular thing.

And I would just say in closing is we always have and always will fight as a joint force, and we will all make contributions to that fight.

Mr. BROWN. Thank you, gentlemen. Thank you, Mr. Chairman.

Mr. NORCROSS. You got it.

Mr. Bacon, you are recognized for 5 minutes.

Mr. BACON. Thank you, Mr. Chairman.

And I appreciate the panel today. Thanks for your leadership in our Army/Marines. We are grateful to you. Mr. Bush, you have touched on this, but I am getting some mixed signals, or maybe I am just not understanding, so let me just clarify. We know we have a need to modernize our tactical wheeled vehicles and maintain a rate of production that sustains the industry's future capacity. It appears to me from the research I was doing that the Army cut this budget area and shifted funds to other areas. So we are con-

cerned about how this will weaken a fragile domestic industrial base.

Can you—do you see this as a risk? Are we covering the need? I would like to get your perspective. Thank you.

Mr. BUSH. Sir, you are correct in identifying that funds were shifted from some elements of that portfolio to protect other things, yes, sir. So the Army's judgment is that at this time it is an acceptable risk, but there are no such thing as no risk, especially when you make changes year on year. Sir, at this time we don't see an existential risk to that industrial base across the United States, but that doesn't mean there is going to be any effect at all from the shift of resources.

Mr. BACON. Is it true that we have shifted resources in many of the recent budgets? Is that correct?

Mr. BUSH. Sir, I can't speak in detail about previous budgets, but if you look across the tactical wheeled vehicle fleet, year to year, there are changes there, and sometimes things are moved from there to other higher priorities.

Mr. BACON. What is a concern to us on the committee that we be able to preserve this industrial capacity. If we get too weak and fragile, we won't be able to recover, and we don't want to rely on overseas sources. So we may come back to that. We may have to look at that in the NDAA [National Defense Authorization Act], for the one we are working on.

General Smith, I would like to ask you about the Ground/Air Task Oriented Radar, or the G/ATOR, and how it is being developed and its current status. The U.S. Marine Corps is seeking a plus-up of about \$301 million for eight more G/ATORs. General, how will the Marines integrate this system into the Marine littoral regiment? And are the current tactical wheeled vehicles, are they built to accommodate the G/ATOR, or is it easy to integrate? Thank you.

General SMITH. Sure. Thanks for the question. The G/ATOR radar is our radar of the future. It is called the TPS-80. We are seeking to accelerate a success story. Like the ACV, it is on schedule, on cost, and it is actually exceeding performance parameters. We fully populated one of the radars at a test facility in Baltimore and what it achieved would exceed the classification level of this committee and most of the spaces within the House.

We would have to go to a different compartment to talk about it. So it is a real success story. It is internally transportable by our KC-130Js, which is the key for us, sir. And what it does is it gathers and passes data to the joint force. Under General Murray's leadership and that of Lieutenant General Jim Richardson for Project Convergence 21, we will take one of our G/ATOR radars out to Project Convergence at the Yuma Proving Ground this fall, and it will gather and pass data to the joint force, to the Navy, to the Army. It is a phenomenal collector even in a passive mode. So we are trying to accelerate the success and finish the buy early to save dollars and get that proven asset into the hands of the warfighters. We took it to Australia last year, had an exercise called Talisman Sabre, performed extremely well, and it is on performance, schedule, and cost. And it is, again, highly mobile, sir, and highly useful in the Indo-Pacific or other theaters because of its lightness and

mobility and the wheeled vehicles that move it are part of our inventory, sir, and it is mobile on the ground with our current ground vehicle—or ground vehicle strategy enable that ability, sir.

Mr. BACON. Thank you. Shifting gears to both General Murray and General Smith—and I know my time's running short. I see a need for long-range surface-to-surface precision fires, especially when your opponents or potential adversaries have them. I also see a problem in the Pacific where there is lack of operating areas.

Does this not concern you when we have very limited operating areas whereas China can hide them anywhere in its country? Won't this be a challenge for us for putting a lot of resources in this weapons system? And I know I don't have much time left. So I have got 10 seconds. Thank you.

General SMITH. Very quickly. So, obviously, sir, there is two pieces. For us the best place that you can operate from is the naval vessel, but I would offer, sir, that these long-range precision fires assets, we do have a lot of friends in the region. In all candor, China does not. We have a lot of friends there. And we do always seek diplomatic efforts to gain access. If—and I won't [inaudible], but these long-range fires capabilities that the Army seeks in very long range and we seek in a short or medium range to complement each other, if an existential threat to [inaudible] derives, sir, we each carry the capability—I will not speak for the Army, but I have seen them in action. I worked for them in Iraq. We have the ability to seize for a short period of time and hold pieces of ground in order to conduct operations even when not, quote, approved. That is why we do raids, airfield seizures, et cetera. So, while not the first option, sir, it is a capability that the Marine Corps retains. And I would pass to General Murray.

Mr. BACON. I will yield my time back. I really appreciate your—all's insights.

And, Mr. Chairman, thank you for indulging me an extra minute.

Mr. NORCROSS. Absolutely.

Ms. Sherrill, you are recognized for 5 minutes.

Ms. SHERRILL. Thank you.

Mr. Bush and General Murray, as we switch to the 6.8 millimeter round and leave behind the NATO [North Atlantic Treaty Organization] standard 5.56 millimeter ammunition, I just have a couple questions about interoperability. So what can you tell us about whether our NATO allies would support a planned NATO-wide adoption of the 6.8 millimeter round?

General MURRAY. Good afternoon, ma'am. Right now, we are not having those conversations, to my knowledge, with NATO because we have not yet made the decision to go away from 5.56 millimeter. And so the 6.8 would initially go to the close-combat forces, which is around 120,000, leaving yet the rest of the 1.1 million people in the United States Army across all three COMPOs [components] with 5.56 and the M4 carbine/M16. That is a future decision based upon what we see out of the 6.8 developmental work that we are doing right now.

Ms. SHERRILL. Great. Thank you. And then I wanted to move into some of the discussion about land mines. So, as you know, the use of land mines in warfare is quite controversial. There is an

international mine ban treaty against anti-personnel mines of which the U.S. is not a member, but historically many U.S. commanders are against the use of land mines due to the risks they present to mobility and the fear of killing their own forces, according to a GAO [Government Accountability Office] study. Just some questions about the inclusion of land mine procurement in the fiscal year 2022 budget.

Mr. Bush or General Murray, how much of the procurement is focused on anti-personnel land mines?

Mr. BUSH. Ma'am, I believe very little. The programs we have, to my knowledge, are focused more on anti-vehicles.

Ms. SHERRILL. So did the U.S. use any anti-personnel land mines in recent conflicts in Iraq and Afghanistan?

Mr. BUSH. Ma'am, again, I am not aware. I would have to get that one for you for the record, if we actually used those systems in conflicts.

Ms. SHERRILL. Do you know when the last time the U.S. used mines in conflict? And I am happy to submit that for the record.

General MURRAY. We are probably going to take that one for the record. I don't want to give you a wrong answer. My experience, which is almost 5 years between Iraq and Afghanistan, we were not using anti-personnel mines, but that—that is 5 years out of the last 20. So we probably better take that for the record.

[The information referred to can be found in the Appendix on page 69.]

Ms. SHERRILL. I will submit it for the record. Thanks.

So I know you mentioned that you had the money that you needed for female body armor, small stature body armor, but it is on the list of unfunded priorities provided by the committee staff. It lists female or small stature body armor as unfunded, and so when was the last time women or small stature soldiers used this body armor in conflict? I assumed they have been using this in recent conflict. We have had the female body armor and the small stature body armor, from your testimony?

Mr. BUSH. Yes, ma'am. It has been a transition. The latest efforts is what General Murray was describing very well regarding the multiple sizes, and it is—with regard to the unfunded item, that is over and above what is in the budget, and I believe the unfunded list refers to that as an opportunity to accelerate fielding. So there is funding for some. It is not zero in the base budget. That money in the UFR [unfunded request] list, my reading of it was, it would accelerate the pace of fielding.

Ms. SHERRILL. And then—so it just seems like this female body armor, small stature body armor, is a critical funding piece, having been in the military myself with gear that didn't fit, not being able to fly over water during specifically cold months because my dry suit didn't fit, you know, this seems like a pretty critical piece of gear. And, I guess, as I am looking at the transition to great power competition against near-peers, why are we looking at land mines as an imperative?

General MURRAY. Well, ma'am, so land mines are used primarily to shape terrain. And so both, from an anti-vehicle, anti-personnel standpoint, I am going back in history how I grew up in the Army. It is really a terrain-shaping munition. The investment we are

doing right now in terms of land mines are policy compliant—although, we are not a signatory—policy compliant munitions so we have that ability to shape terrain in the future. And why do you want to shape terrain is to narrow options for your opponent.

Ms. SHERRILL. And I can submit my final question for the record because I am running out of time, but I am curious about if you foresee use of land mines in any sort of conflict with China in the future? And I can take that for the record.

Thank you.

Mr. NORCROSS. Thank you.

Mr. Jackson, you are recognized for 5 minutes.

Dr. JACKSON. Thank you, Chairman Norcross, Ranking Member Hartzler, and thank you to the witnesses for being here today. The first thing I want to say is something that many of my colleagues, including ranking member, have already said. The budget cut to the Department of Defense being proposed by this administration, in my mind, is somewhat unacceptable in the situation we are in right now. I support cutting waste and finding ways to save money. However, decreasing the top line for the Department of Defense is, in my mind, a shortsighted and political move at best.

The Army was one of the hardest hit by this year's budget request with the 2 percent decrease in proposed funding from last year's enacted level. However, cuts for the Army won't be just starting in fiscal year 2022. We know this. Over the last 3 years, the Army has terminated 310 existing programs, and in the fiscal year 2022 request, the Army proposed to cut or delay an additional 37. These cuts include armored vehicles, intelligence workstations, and individual weapon sites. I maintain a belief that if a program is not working as we would like it to, we should stop funding it. However, I am not in favor of cutting programs that are beneficial or potentially beneficial to the warfighter.

The Army claims that the fiscal year 2022 request maintains the modernization focus and the momentum that was begun in 2018 with the establishment of the Army Futures Command. The Army also has said that this year's request will not slow our efforts of building a force by 2028 that is more modern and relevant to peer competition in conflict. I strongly support the mission of the Army Futures Command and cross-functional teams. However, I am confused how we have nearly 350 different programs that can be cut, yet the Army is telling us that there will be minimal impact.

General Murray, I will direct my question to you. I would like you to provide some clarity on this, if you can. How do we have nearly 350 programs that could be cut, yet removing these programs have no impact on ongoing modernization and lethality efforts? And why would we even have had those programs in place to start with if they weren't worth the investment that we have put in this so far?

General MURRAY. Thank you, sir, for that question. And I actually think it is probably a mischaracterization to say they weren't important to begin with. So you mentioned some armored vehicles that some would call legacy, but are really going to be enduring systems. And so, as we looked at how we could protect the Army's highest priorities, the 31+4 signature systems and to make sure that we are ready for that—that multi-domain ready force in 2028

and then even beyond that into 2035 as we look at production is where can we take some what we consider to be and our Army simulators consider to be acceptable risk to make sure that we can maintain the transformation that we began in 2018. And I said this earlier, it is much more than just modernization; it is how do you go through this transformational change and really begin to take advantage of the technologies that, in some cases, are already here to make sure that we are ready for that future warfight.

So it is not that any of those programs weren't valuable to us. It is not that any of those programs were misconceived when we started them. It is just areas that we could go to to take some level of acceptable risk to make sure that our highest priorities get funded first.

Dr. JACKSON. Yes, sir. Thank you. I just want to ask one more question, too, and you may or may not be able to answer this. But I understand the future cost savings may exist, but I just want to be clear: Do you know how much money—how much money has been invested already in the 37 programs that are proposed to be delayed or cut in fiscal year 2022? How much money have we already put into those programs? Any idea?

Mr. BUSH. Sir, I can work on getting you that number. It is a little easier to understand the small number of terminations. Some programs that were slightly reduced, for example, the Abrams tank. The lifetime government investment of that is going to be in the many, many, many billions. But, sir, I can work with you and your staff to narrow down exactly the numbers you are looking for and get those for you.

General MURRAY. Sir, I would also answer, if I could. So some of the terminations were terminations inside of our equipping phase. Some of these were transitions to sustainment. So the program is just there. It is just transitioning into the sustainment phase in its life cycle.

Dr. JACKSON. Okay. That is great. Yeah, I would like to get more information on that. I think you guys are doing a wonderful job. I just want to be able to make sure that I can explain to my constituents what we are doing with the money, especially when it comes to the defense budget. I am really, you know, a strong defender of our DOD budget, and I want to make sure that I can explain to people when we are getting rid of programs, why we are doing it, and, you know, that the money wasn't wasted, and so on and so forth.

So I appreciate your time and those answers.

And, with that, I will yield back. Thank you.

Mr. NORCROSS. Thank you. Is Mr. Horsford on? I didn't see him. If not, Mr. Green, you are recognized.

Dr. GREEN. Thank you, Mr. Chairman. Today, we face—and I want to thank our witnesses for being here. I, too, want to echo what my colleague Congressman Jackson said. Today, we face unique threats. We are all talking about the great power competition, large-scale ground operations, the switch from fighting a war on terror to, you know, great power competition.

The Chinese military has increased its defense spending sixfold since 2000. President Biden saw fit this time to slash our defense budget by over \$4 billion in real dollars, and as, you know, Con-

gressman Jackson said, the Army seems to be bearing the brunt of that. They have got the largest Army/Navy in the world—and this is China, of course—and they work to significantly modernize their weapons systems to gain a superiority.

Russia is more than just posturing toward Eastern Europe, and, of course, China is repeatedly violating Taiwanese air space. There are new affiliates from al-Qaida and ISIS [Islamic State of Iraq and Syria], and the Biden administration is seeking to uproot the progress of the previous administration. Despite the bipartisan National Defense Strategy Commission recommending a 3 to 5 percent increase in defense spending above the rate of inflation, President Biden is proposing to add trillions of dollars to deficit spending, raising non-defense 16 percent in the face of cutting \$4 billion from DOD in real dollars.

The moment we fail to maintain vigilance is the moment when a belligerent power will seize the opportunity to tip the balance of power. And I just needed to say that and express my frustration with those real dollar cuts. In terms of my questions, I was curious as I listened to you, both the Marine Corps and the Army, describe research into body armor. Are you guys both separately doing research projects on body armor and fit to Marines and U.S. Army personnel?

General MURRAY. I would describe it as collaborative research, Congressman. And so we do our research up at Natick in Massachusetts, and then, across all of our research and development portfolios, it is actually very collaborative. So the researchers, the senior researchers, from all three of the services, in this case, represented—Marine Corps represented by the Navy—actually sit down on a quarterly basis, and we share our research results so that each one of us understands what everybody else is working on, where we can take advantage of each other's research.

Dr. GREEN. So you all are actively—you have two programs going, and then you just share information; is that how it works?

General MURRAY. I can talk to the Army program. I really can't speak to the Marine Corps program, sir.

General SMITH. I will. For the Marine Corps, we are in follow of the Army. So our folks are absolutely at the table with the Army. So we use that same research, sir, and we then take the plate, for example, and we put it into a plate carrier that best fits, you know, a Marine who's doing amphibious ops. But the bulk of it, sir, the plate, that thing that protects you, we are absolutely together.

So that is a—the SAPI [small arms protective insert] plate, sir, that is [inaudible] for all of us.

Dr. GREEN. So the technology on the materials for stopping the enemy round or shrapnel or whatever is a joint thing, and then you and the Marine Corps take that plate and fit it into a piece of equipment that works for a soldier or a Marine when he goes over into the water, right, on a ship?

General SMITH. 100 percent correct.

Dr. GREEN. As he is coming to shore. Okay. I just wanted to make sure. It sounded as if we had two unique programs going in your testimony, and that really concerned me, just like I think it was someone else—actually, someone across the aisle was talking about duplicity. That is a big concern for us, how those taxpayer

dollars are used to make sure we are not being duplicitous there. I, too, am very interested, and this is probably a question best for Army Futures, General Murray.

The industrial base, can you kind of let us know how they are involved in Army Futures Command? And when I got out of the Army and started my healthcare company, I realized probably the biggest challenge was scale and growing my company. And so it seems to me that if those—the industrial base guys are at the tip of the innovation spear, it might speed the process and if you could explain kind of how you all are doing that, if you are doing that, and what advantage you are getting from it if you do?

General MURRAY. And, sir, I will start that, and then I will let Mr. Bush comment as well. So—and just a small example, and it is not only the large primes, but it is also the smaller businesses as you mentioned as you start up your business. So, for instance, we—here later this month, we will have what we call a CEO [chief executive officer] roundtable, and it really—what I have kind of stumbled on is describing what problems we are trying to solve to our industry partners is a key thing to do upfront. And so they understand what is important to us, they understand the problems we are trying to solve, which allows them to invest their dollars to do the research they need to do to address those future problems.

So we will do that again this fall—later this month. Last fall, we had well over 400 industry partners on the net as we described the problems we were trying to solve through Project Convergence. So I do think it is that continuous, constant dialogue, whether it is a large prime or a small business, to understand the problems that we are dealing with is the most important conversation upfront.

Dr. GREEN. To put that into perspective, I took my company from \$180k in revenue to \$600 million in revenue, so I understand the challenge. It is not, you know, on the scale of the United States military, but that is—you got to put the innovator at the tip of the spear, as well as the guy who is going to manufacture that thing. I think your idea here with the CEOs is amazing.

It would be great if I could—I don't know if you all would allow us to come in and be a fly on the wall, but that would—I would learn a lot from that if you would allow it.

General MURRAY. Yes, sir.

Mr. BUSH. Happy to do that, sir.

Mr. NORCROSS. Thank you. The gentleman's time has expired.

We are going to do a lightning round here. And [inaudible] expect everybody to get through it.

General, there were several questions about the long-range precision fire and the fact that several of the services are doing that, and we heard the commentary by some folks in the Air Force about being expensive. Have you or Department of Defense or other services done a comparative analysis, the cost per engagement between the different services and their long-range fire, to give us a sense of cost, efficiency?

Obviously, they are not all doing exactly the same thing. Do you know any studies that have been involved on these systems?

General MURRAY. Chairman, I can't speak for DOD, and I obviously can't speak for the other services. I will tell you that, within the Army, about a year ago, I have an organization within Army

Futures Command that does analysis for me, is we began to look at the cost, if you will, and really the right mix of long-range fires capabilities. We called them at that point strategic fires, but the longer range fires within the Army portfolio and what we are looking at. And that did consider, from an operational effectiveness primarily, what the right mix would be, and there are costs associated with that within the Army's long-range fires portfolio.

General SMITH. Mr. Chairman, on the Marine Corps side, we have the Marine Corps Warfighting Laboratory. We have also done our own operations analysis division to look at a cost imposition strategy. And what we seek is the reverse of, with no offense for those of us that fought in Iraq and Afghanistan, where we would fire a multi-hundred-thousand dollar Hellfire missile at a \$4,000 pickup truck which happened to have a machine gun in the back of it, that is a cost imposition problem.

We are now talking about a low million dollar missile against an almost \$2 billion ship. So we did do cost analysis on what it takes to incapacitate or to sink a vessel, and the cost differential is significant between what we are investing and what the enemy would have to do to both protect the ship in terms of active and passive measures and the actual cost of when we succeed versus when they succeed.

Mr. NORCROSS. So your analysis was within the Corps itself and not in comparison to the other services. Is that correct?

General SMITH. Sir, that is correct; although, the joint warfighting concept and then, obviously, I wouldn't speak for OSD [Office of the Secretary of Defense] Cost Assessment [and] Program Evaluation or the Joint Staff, but they certainly oversee how much each of the services is investing in and looking at a portfolio of long-range systems all driven by the joint force commanders' need for, much like a golf bag, seven irons and drivers both look like clubs, but they are certainly not the same. But you will require them all in a relatively difficult maritime environment such as the Indo-Pacific.

Mr. NORCROSS. And the fact that there is differences in how you apply them and certainly the cost, it is a factor because that goes hand in glove with risk, as we heard earlier. Some programs are not making it.

Mrs. Hartzler, are you still on?

Mrs. HARTZLER. Yes, sir.

The administration presents a very dramatic shift in funding in the President's budget for submission without any details on the Future Years Defense Plans, the FYDP. Additionally, the Army identified \$4.4 billion worth of unfunded requirements to go along with this dramatic shift in spending priorities. This places Congress at a disadvantage because we can't see the impacts of supporting or disagreeing with these dramatic shifts or these unfunded requirements across the FYDP.

The insights that comes from the FYDP are essential to ensuring that Congress and this committee can execute our constitutional oversight requirement. So when will the Army deliver a FYDP, and what should our expectations be of fiscal year 2023 and beyond? And, thirdly, will there be further program restructures, or has the

Army completed most of its adjustments with the President's budget of 2022?

Mr. BUSH. Ma'am, the current plan, as I understand it, is for the budget—fiscal year 2023 budget that is delivered early next year would have the full FYDP picture for Congress to consider. There are, I think, year to year always going to be program adjustments, ma'am. So I would say that is undecided at this point, but every year we have to look—General Murray and I co-chair one element of the Army's internal budget reviews and there are always move-arounds to try to make sure that high priority things are funded as best possible. So a work in progress, ma'am.

Mrs. HARTZLER. All right. So you are saying we won't see a FYDP for this year?

Mr. BUSH. No, ma'am.

Mrs. HARTZLER. Okay. Thank you.

I yield back.

Mr. NORCROSS. All right. We now—Ms. Sherrill, you are recognized.

I skipped Mr. Wittman. Forgive me.

Mr. WITTMAN. Okay.

Mr. NORCROSS. All right. Lightning round. Go for it.

Mr. WITTMAN. Thank you, Mr. Chairman. I want to go back to Mr. Bush and follow up on a question I asked that Mr. Stefany answered about what are you all doing to address our small- and medium-sized companies that are falling into this valley of death when it comes to their efforts to seek and maintain the innovative and creative business they want to do with the Department of Defense?

Mr. BUSH. Thank you, sir. So I think I will answer two ways, and then I would like General Murray, actually, to add on, something that is good innovation that is happening at Futures Command with regard to SBIR.

The first thing, sir, it is incumbent upon the government and the Army to do a better job when communicating with companies about what if there is another side of the valley, so to speak, when they bring them in to do work. So that is an expectation job on our part that we need to do better so the companies aren't investing their own dollars in something that may not have a path to actually being fielded.

So, within the Army, that requires connecting experimentation or smaller efforts in SBIR to actual programs of record, and there are some good things going on in that area. One thing I will offer, sir, two countervailing pressures we have that we are trying to mitigate balance in this area. One is ensuring that defense companies we are working with have cybersecurity that is adequate to protect government secrets. That is a challenge for all companies. It is also a challenge for small businesses who don't have the resources that some of the big companies do.

Another thing I would mention is the supply chain risk. So, again, this is government work to make sure that the companies we are doing business with, if we are actually going to enter into some kind of production arrangement, source materials and supplies from companies in places we trust. So, sir, it is a balancing act. I can't say we are doing it perfectly right now, but we are

working to balance those risks. And if you wouldn't mind, I will let General Murray talk about something in Futures.

Mr. WITTMAN. Yes, sir.

General MURRAY. The Army Applications Lab in Austin, Texas, with us is—and to be honest, we struggled for a long time. But we may have stumbled onto a way of using SBIR dollars. And so we have gotten the process down to less than 30 days to award a contract of SBIR and in the past it was upwards of 200 days, and we have done that primarily by simplifying the process for them, and it is not, actually, simplifying the process; it is almost like providing a Sherpa service to help small companies that are not familiar with the way the U.S. Government does business to help them through the process. I think the most important thing we found is, and Mr. Bush mentioned this, is starting with a problem upfront with somebody on the other side that wants to pull them across that valley of death is a key to getting these programs across that valley of death. So, working with our program managers, our program executive officers, finding something that will actually solve a problem that they are interested in solving, the problem that they have, and then in getting them involved from the very, very beginning to help us with this program has been key and instrumental.

Mr. WITTMAN. Thanks, General. I want to jump in to something else real quick with you and General Smith.

As we know, the whole issue of optionally manned systems, unmanned systems, ROGUE [Remotely Operated Ground Unit for Expeditionary] Fires, or, as my grandson would call it, "rogoo" fires, the whole effort is, how do we take base technology, the technology that control things like the operations of the systems, the controls of the systems, all those things are common across those different platforms? What are each of your service branches doing to look at where we can learn from common technologies that are either developed on the private side or that have been developed by another service branch to use those as we spin up these unmanned or optionally manned systems quickly?

General MURRAY. And quickly so my counterpart in the Marine Corps has time, sir. So there is an autonomy kernel [Remote Technology Kernel] that we developed at the Ground Vehicles Systems Support Center in Warren, Michigan, that is the same technology, the same algorithms that we are using in our leader/follower technology. So, one, seven or eight trucks followed by—and it is government IP [intellectual property], government developed, and I will let General Smith take over because it is also the same technology they are using in one of their programs.

General SMITH. Thank you, General Murray. Congressman, that is exactly correct. The same leader/follower technology that is in use by the ROGUE Fires vehicle, it is the industry standard, if you will. We have a naval unmanned campaign framework signed by the SECNAV [Secretary of the Navy], led by Mr. Stefany and General Kilby and myself, to move forward collectively/jointly on making sure that the technologies that do exist are used by all. I would note, sir, that, for example, Google cars have hundreds of thousands of miles on them. We are a long way from that. And with that steady R&D [research and development] funding, we will gain

the miles and the hours on both surface-borne vessels and on ground vehicles, but the challenges we face in that austere environment where it is not a puddle, it is a 15-foot-deep hole built by a bomb crater, that technology is not yet there, sir, and only a kind of a steady R&D funding will allow us to get Google car, if you will, to a tactical level for that young soldier, young Marine to be able to operate a vehicle in really horrible austere conditions that, as you know, sir, will come to us when war is visited upon us.

Mr. WITTMAN. Very good.

Mr. Chairman, I yield back. Thank you.

Mr. NORCROSS. You have got it.

Ms. Sherrill, are you still on?

And I think we are up to Mr. Jackson. You can wrap it up.

Dr. JACKSON. I have got all my questions answered. I appreciate it, though. Thank you.

Mr. NORCROSS. Terrific. I want to take an opportunity to thank the witnesses for their service and certainly their testimony today, but I would like to offer up for any closing remarks you might have.

Mr. Bush, let's start with you.

Mr. BUSH. No closing remarks, sir. Just thank you to the members for the time and for considering the Army's requests, and I stand ready to meet with members at any time if they have questions and work through anything they need so they have all the information we had when making our judgments.

Mr. NORCROSS. Thank you.

General Murray.

General MURRAY. Nothing more to add, sir, other than thank you for your time today.

Mr. NORCROSS. Terrific.

And so, Mr. Stefany.

Mr. STEFANY. Besides thanking you for your time, I did want to follow up a little bit on the industrial base part and the mention of how they performed in COVID and how authorities like you have given us to improve cash flow and make [inaudible] in producing for our sailors and Marines during this past year [inaudible] on the production front.

Mr. NORCROSS. Thank you.

General Smith.

General SMITH. Mr. Chairman, not that you need it, but I honestly and personally do appreciate the courtesy that always comes with this particular subcommittee. It is always a privilege to speak to you, and I really do appreciate the courtesy that comes from you, sir, from Ranking Member Hartzler, and your members. It is kind of nice to have. Thank you, sir.

Mr. NORCROSS. You got it. Vicky, do you have anything?

Mrs. HARTZLER. No. Just appreciate everybody's service and the information we received. Look forward to keep working with everybody.

Mr. NORCROSS. Then we are adjourned. Thank you.

[Whereupon, at 4:41 p.m., the subcommittee was adjourned.]

A P P E N D I X

JUNE 7, 2021

PREPARED STATEMENTS SUBMITTED FOR THE RECORD

JUNE 7, 2021

**Statement of the Honorable Donald Norcross
Chairman, Subcommittee on Tactical Air and Land Forces
FY 2022 Army and Marine Corps Ground Programs Modernization Hearing
June 7, 2021**

The hearing will come to order.

The Tactical Air and Land Forces subcommittee meets today to review the Army and Marine Corps Ground Modernization programs in the fiscal year 2022 budget request.

First off, I'd like to thank our witnesses for being with us today and for the work done to put together this year's budget requests to Congress.

Following a year of unprecedented challenges, the committee is eager to hear details from today's witnesses on how the services budget requests will satisfy the equipment requirements of the Army and Marine Corp both today and in the future.

This subcommittee will closely examine the choices made for modernization, as well as how those choices also preserve and reduce risk in our defense industrial base. Certainly this year, the COVID pandemic has elevated our concern for the successful management of that risk in the industrial base. I am grateful to both Army, Navy, and Marine Corps senior leadership for their openness with this subcommittee as we followed these impacts on both the military and civilian fronts, supported their management through this pandemic, and now look forward to restoring the workforce to safe and efficient operations. The goal for both services is always to achieve a modern ground force that can match the strength of peer and near-peer potential adversaries. And, as happens every year, the services must realistically assess their requirements and make those tradeoffs, at "acceptable risk", between investment priorities, current and future capabilities, and industrial base stability.

Across the past three budget cycles, the Army and Marine Corps have made significant changes and tough choices with respect to their plans to develop, produce, and field future capabilities. As an essential matter of congressional oversight, we must have confidence that Army and Marine Corps modernization strategies are realistic, achievable, and affordable.

We understand from the services budget requests and modernization plans, that many of their high priority development programs will soon enter low rate initial production, complete operational testing, and, if testing is successful, start full rate production. The number of systems entering these phases at the same time creates a bow-wave of new procurement funding that, if not budgeted, means the modernization strategy is not achievable.

Today, we will ask our witnesses to state for the record that, given the FY2022 request and assumed or planned funding levels over the next five years, all their priority ground modernization programs are affordable and therefore achievable.

The distinguished Army, Navy, and Marine Corps leaders before the subcommittee today are well qualified to explain their services' modernization budget request. I would like to welcome:

- **Mr. Doug Bush**, Acting Assistant Secretary of the Army for Acquisition, Logistics, and Technology;
- **General John Murray**, Commanding General, Army Futures Command;
- **Mr. Frederick "Jay" Stefany**, Acting Assistant Secretary of the Navy for Research, Development, and Acquisition
- **Lieutenant General Eric M. Smith**, Commanding General, Marine Corps Combat Development Command, and the Deputy Commandant for Combat Development and Integration

I look forward to your testimony and discussing these topics. Before we begin, I would like to turn to our Ranking Member from Missouri, Mrs. Hartzler, for any comments she may want to make.

RECORD VERSION

STATEMENT BY

**MR. DOUGLAS R. BUSH
ACTING ASSISTANT SECRETARY OF THE ARMY
(ACQUISITION, LOGISTICS AND TECHNOLOGY)**

AND

**GENERAL JOHN M. MURRAY
COMMANDING GENERAL, ARMY FUTURES COMMAND**

BEFORE THE

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

**ON FISCAL YEAR 2022 ARMY
GROUND MODERNIZATION PROGRAM**

FIRST SESSION, 117TH CONGRESS

JUNE 7, 2021

**NOT FOR PUBLICATION UNTIL RELEASED BY THE
COMMITTEE ON ARMED SERVICES**

INTRODUCTION

Chairman Norcross, Ranking Member Hartzler, distinguished Members of the House Armed Services Subcommittee on Tactical Air and Land Forces, thank you for your continued support and enduring commitment to our Soldiers, our Civilians, and their Families. On behalf of the Secretary of the Army, the Honorable Christine Wormuth, and the Army Chief of Staff, General James C. McConville, we thank you for the invitation to appear before you today.

Our shared mission is to make sure that the Army continues to achieve overmatch against all potential adversaries, ensuring that our Army can fulfill its mandate to compete successfully, deter, and, if necessary, fight and win our Nation's wars as part of the Joint Force.

We support the Army's transformation through persistent modernization in order to meet future challenges. Even during a global pandemic, this past year has been one of dramatic change, rapid innovation, shared challenges, and significant progress with an unprecedented unity of effort across the Army modernization enterprise. The Army is boldly transforming to provide the Joint Force with the speed, range, and convergence of the cutting edge technologies that will be needed to provide future decision dominance and overmatch for great-power competition.

The Army is transforming how we fight, what we fight with, how we organize, how we do business, and who we are. We are already realizing the benefits of these efforts. Your support of our Fiscal Year 2022 (FY22) budget request will ensure we are able to achieve persistent modernization.

THE STRATEGIC ENVIRONMENT

The Interim National Security Strategic Guidance highlights an increasingly assertive People's Republic of China and increasingly disruptive behavior from Russia. China is

our pacing threat. Both states are applying all instruments of national power, including military modernization as they compete aggressively with the United States.

China is progressing in artificial intelligence (AI), robotics, and cyber. Advancements in hypersonics add to its strategic reach, endangering some of our traditional force projection assets. Both China and Russia have also committed to an increased pace and scope of military exercises, honing their joint warfighting capability, while China went through a large scale restructure and change of leadership to reinforce and enhance its modernization goals.

In addition to these traditional threats, the United States is facing increased competition in the Arctic, challenges resulting from climate change, and the prospect of future pandemics. The Army's modernization efforts take these new realities into account as we define capability requirements and develop new concepts.

HOW WE FIGHT

Our Multi-Domain Operations concept describes how we fight—by continuously converging effects across all domains, at the speed of relevance. We are in the process of transitioning this concept to doctrine in order to ensure the Army is capable and ready to support Joint Force operations. At the same time, we are working to develop the future concept based on future threat assessments, emerging Science and Technology (S&T), and experimentation. We established “Team Ignite” in order to create feedback loops among these efforts and inform how we will fight in the future.

WHAT WE FIGHT WITH

The Army remains committed to our six consistent modernization priorities: Long Range Precision Fires, Next Generation Combat Vehicle, Future Vertical Lift, Network, Air and Missile Defense, and Soldier Lethality. In FY22, the Army continues to focus on

building a multi-domain force by divesting some equipment that does not support future warfighting capabilities.

We are grateful to Congress for the stable funding provided to support our modernization efforts. The FY22 President's Budget Request continues to fund our six priorities, as we aggressively pursue our "31+4" signature modernization systems.

The FY22 budget builds on the progress we have made across all modernization priorities to align requirements developers with acquisition experts and representatives from the testing, logistics, science and technology, and other communities, dramatically reducing the time span from identification of a capability gap to prototype testing and operational experimentation. Within each area, we highlight our recent progress, our partnership, and the way forward with continued, steady funding.

- The Long Range Precision Fires (LRPF) Cross-Functional Team (CFT) is partnered with Program Executive Office (PEO) Missiles and Space:
 - The Army's Extended Range Cannon Artillery (ERCA) can now shoot in the 70 kilometer range with accuracy. We are on track to field the first ERCA battalion in FY23.
 - We had a successful and accurate flight test of our Precision Strike Missile (PrSM) in 1QFY20. We will begin fielding PrSM in FY23.
 - The Army Rapid Capabilities and Critical Technologies Office (RCCTO) continues to make progress in delivering the first hypersonics battery in FY23. Working closely with the CFTs, RCCTO manages the development and production of the Army's hypersonics effort, the Long Range Hypersonic Weapon (LRHW). With a successful flight test in March 2019, the program has additional joint flight tests planned in FY21-23 to validate the Common Hypersonic Glide body design, the Army launcher and the Command and Control system. Also, later this year, RCCTO will field the road mobile, C-17 transportable prototype battery to an operational unit, minus the

missiles. This will allow the unit's Soldiers to start training with the equipment so they are ready when the missiles arrive in FY23, providing the Army with a hypersonic capability.

- Additionally, RCCTO received the Mid-Range Capability (MRC) mission in July 2020, which leverages existing Service missiles, software, and hardware to fill a critical capability gap identified by the U.S. Indo-Pacific Command (INDOPACOM). The MRC prototype will be fielded to an operational battery in FY23.
- The Next Generation Combat Vehicle (NGCV) CFT is partnered with PEO Ground Combat Systems:
 - The decision to revisit the characteristics, acquisition strategy, and schedule of the Optionally Manned Fighting Vehicle (OMFV)—very early in its cycle—is the type of decisive action that working as an integrated team enables. We remain committed to the OMFV program. The need for this ground combat vehicle capability is real. It is imperative we get it right for our Soldiers.
 - The Robotic Combat Vehicle will undergo increasingly rigorous experiments and capability demonstrations between FY22 and FY24, with a decision to procure or reassess no later than FY24.
 - The Armored Multi-Purpose Vehicle is currently fielding and is an adaptable and more survivable general-purpose, mortar carrier, medical evacuation, medical treatment, and mission command vehicle that replaces the 1960s-era M113 Family of Vehicles.
 - In 4QFY25, we are on track to deliver the first fielding of Mobile Protected Firepower (MPF) and to give our light infantry much needed firepower.
- The Future Vertical Lift (FVL) CFT is partnered with PEO Aviation:
 - Following the successful firing of a SPIKE Non-Line of Sight (NLOS) missile from an AH-64E Apache in 4QFY19, we will achieve Initial

Operational Capability (IOC) in FY23 with three Combat Aviation Brigades. This capability extends range by four times over our current HELLFIRE missiles.

- The Future Attack Reconnaissance Aircraft (FARA) closes the gap left by retirement of the Kiowa. Two prototypes will fly in FY23, followed by a year-long flight demonstration.
 - The Future Long Range Assault Aircraft (FLRAA) will replace part of the UH-60 Black Hawk fleet with increased speed, range, payload, and endurance. We expect initial FLRAA prototypes in FY25.
 - FVL will leverage advances in Unmanned Aircraft System (UAS) technology to develop the Shadow replacement and Air Launched Effects, which includes a wide array of payloads and extended communication mesh networks with a fielding plan in FY25.
- The Network CFT is partnered with PEO Command, Control, Communications-Tactical:
 - We are currently fielding Capability Set 21, including commercial radio, satellite communications, and cross domain solutions of the Integrated Tactical Network to four Infantry Brigade Combat Teams in FY21, and a newly modernized, agile, and scalable tactical network transport tool suite to three Expeditionary Signal Battalions-Enhanced. These capabilities allow our commanders greater connectivity options, make the network more intuitive for our Soldiers, and increase interoperability with allies and partners. Soldier feedback and experimentation will inform continued fielding of Capability Set 21 in FY22, as well as Capability Set 23.
 - Congruent with Network modernization, the Army is seeking to modernize Global Positioning System (GPS) receivers to meet current and emerging threats by providing the Joint Force with advanced, assured positioning, navigation, and timing (PNT) systems. Included are modernized receivers that meet Congressional mandates to

transition to M-code GPS and integrate alternative PNT technologies for our ground combat platforms, dismounted Soldiers, precision weapons and munitions, and aviation systems.

- We are currently fielding the first generation mounted assured PNT systems to our forward deployed formations with a second generation ready for fielding no later than FY23. We are in the process of evaluating solutions for dismounted Soldiers and continuing work on precision weapons and aviation variants. The Army recently approved development of Navigation Warfare tools to ensure that Army forces have continued access to this critical part of the electromagnetic spectrum.
 - Additionally, the Army continues to invest in the ground segments of space-based technologies that close operational gaps in deep sensing and targeting activities. We are coordinating with partners in the intelligence community, the Space Force, and private industry to enhance Army access to Low Earth Orbit space-based sensing and link with national level capabilities to provide tactical-level sensor-to-shooter capability to combat formations.
- The Air and Missile Defense (AMD) CFT is partnered with PEO Missiles and Space:
 - The Army's integrated Air and Missile Defense capabilities will protect Joint Forces from enemy aircraft, missiles, and drones to enable operational effectiveness. This includes both theater and short-range air defense systems like the Maneuver-Short Range Air Defense (M-SHORAD). The Army just fielded the first unit, 5th Battalion, 4th Air Defense Artillery Regiment in Europe and will have four battalions equipped by FY23.
 - RCCTO continues to make progress on its Directed Energy Maneuver-Short Range Air Defense (DE M-SHORAD) effort, a 50 kilowatt (kW)-class laser on a Stryker, scheduled to conduct a combat shoot-off later

this summer at Fort Sill, Oklahoma. This will be the directed energy component of the M-SHORAD battery, and the DE M-SHORAD prototypes with residual combat capability will be delivered at the platoon level in FY22.

- There have also been advancements made in relation to directed energy development for Indirect Fire Protection Capability (IFPC), which pairs high-energy lasers with high-power microwaves for fixed and semi-fixed defense. RCCTO is leveraging Office of the Secretary of Defense and Air Force investments for a 300 kW-class IFPC-High Energy Laser, and IFPC-High-Power Microwave directed energy capabilities that will be delivered at the platoon level in FY24. These directed energy weapons are a strategic tool in the fight against modern battlefield threats. This spring, the Army will conduct a shoot-off to inform our decision on the enduring IFPC solution.
 - The Army Integrated Air and Missile Defense (AIAMD) IOC is 3QFY22, with fielding on track for one battalion. An integral part of AIAMD, the Integrated Air and Missile Defense Battle Command System (IBCS), is a revolutionary command-and-control system that streamlines sensor-to-shooter linkages for air and missile defense engagements.
 - As directed by Congress, we are preparing for an initial deployment of the Interim Cruise Missile Defense Capability at the end of FY21.
- The Soldier Lethality CFT is partnered with PEO Soldier:
 - The Integrated Visual Augmentation System (IVAS) is a good example of a departure from the traditional requirements process. We are working with Microsoft Corporation in three-week sprints, going directly to Soldiers in each of the sprints to refine the product and make sure we get it right. This approach led to a significant reduction in the estimated delivery schedule to Soldiers, and we are on track for delivery to the first unit by 1QFY22.

- We equipped the first unit with the Enhanced Night Vision Goggle–Binocular (ENVG-B (Directed Requirement)) September 2019, with five brigades equipped by March 2021. The ENVG-B (Program of Record) is scheduled to field the first unit in 2QFY22.
- In 4QFY22, we will equip the first unit with the Next Generation Squad Weapon (NGWS) Rifle and Automatic Rifle, as well as General Purpose Ammo and an improved sight system.
- Additionally, our Synthetic Training Environment CFT has already put prototypes of One World Terrain (OWT) in the hands of units. More than just imagery, it provides a 3D representation of the entire earth that we can integrate into simulation. When paired with IVAS, it will allow our Soldiers to simulate any location on the planet right from their combat goggles. OWT has also shown how it can be used operationally to help forward-deployed units identify locations to harden their security posture and improve the protection of their Soldiers.

Our budget request also includes support for research in nine S&T priority areas: disruptive energetics, RF electrical materials, quantum, hypersonic flight, AI, autonomy, synthetic biology, material by design, and advanced manufacturing. Our investments in S&T are helping solve problems in each of the modernization priority areas, as well as identify future opportunities.

Finally, the Army is pursuing clean energy initiatives to reduce the Army's carbon footprint and its reliance on fossil fuels. Key initiatives include the development of improved power generation sources, the electrification of small air and ground robotics systems, and advancements in fuel efficiency for both current and future programs. For example, we are developing the technology to obtain better fuel efficiency for the Joint Light Tactical Vehicle, generators, and heating and cooling systems. We are also investing in the Improved Turbine Engine Program (ITEP), which we believe will improve fuel efficiency for future Army aviation assets.

HOW WE ORGANIZE

We are developing new organizations as we transition from modernization concepts to tangible sources of strategic readiness. The Multi-Domain Task Force (MDTF) is one example, providing long range precision fires in conflict and long range precision effects in competition. During INDOPACOM's Pacific Fury 21 exercise, the MDTF validated its ability to synchronize long range fires and effects with the Joint Force.

The Army uses AimPoint 2035 to describe what our future force will look like. We are refining those descriptions through experimentation and analysis of the impact emerging technology will have on the character of war. The investments are included in the FY22 budget request and will inform the changes we need to provide a combat credible force of the future.

HOW WE DO BUSINESS

(ASA)ALT, AFC, and G-8 are key stakeholders in the Army modernization enterprise, along with other organizations across the entire Army, including HQDA staff and other Army commands. AFC, under the strategic direction of HQDA, develops and delivers future concepts, requirements, and organizational designs based on its assessment of the future operating environment. AFC plays an essential role in developing system characteristics, informed by experimentation and technical demonstrations, and refining these characteristics into requirements. ASA(ALT) develops, acquires, and fields materiel solutions that meet the operational requirements defined by AFC and others, and acts as the acquisition decision authority throughout the acquisition lifecycle. G-8 is the day-to-day manager of the requirements approval process and the developer of the Project Objective Memorandum (or "POM") at the Headquarters, Department of the Army, in concert with ASA(ALT) and AFC.

Each of the Army's eight CFTs bring together representatives from all key stakeholder communities—scientists and technologists, operators, requirements experts, logisticians, and industry—in collaboration with their partner PEOs. The partnership among ASA(ALT), AFC, and G-8 also provides a unique opportunity for close collaboration between the CFTs, ASA(ALT)'s PEOs, and G-8's System Synchronization Officers to bring system concepts and designs to life, along with the appropriate level of funding. With the strong partnerships between the CFTs and PEOs, the responsible PEOs assign and oversee the program managers for all "31+4" signature systems. This close working relationship between the CFTs and the PEOs is extremely valuable: the acquisition community contributes to AFC's operational requirements development process and the CFTs participate in deliberation over acquisition strategies, while each organization retains its own responsibilities.

Soldier Centered Design drives the entire process. Taken from industry best practices, this concept allows the Army to get feedback from Soldiers and commanders early in the development process. This is accomplished by getting equipment into the hands of Soldiers from the operational force early, through Soldier Touchpoints, in order to refine the requirements *before* we even start to write requirement documents and significant investments are made.

Speeding up the staffing of requirements documents has been key to shortening the overall time line from idea to fielding. We significantly reduced the amount of time to staff and approve requirements documents since 2018, where it took an average of 245 days, to 119 days in FY20, and we intend to reduce the staffing time by another 20 percent this year.

Project Convergence is the Army's campaign of learning and experimentation. Working closely with our counterparts from the other Services, we identify Joint warfighting problems to solve. We use the Army's Joint Systems Integration Lab and experimentation events "in the dirt" to test together and ensure we can connect them.

Project Convergence informs the Department of Defense (DoD) Joint All-Domain Command and Control (JADC2) and the Joint Warfighting Concept (JWC).

Congress has called on DoD to forge new partnerships with both commercial industry and small businesses to develop adaptive approaches and apply innovative contracting tools in support of modernization. The establishment of the Army Application Lab allows us to both attract nontraditional technology firms to solve Army problems and make the Army a preferred business partner while increasing the return on our investment. As an example, we have been able to reduce the award times for Small Business Innovative Research contracts from 224 days to just 25 days, removing a significant barrier to entry for many small, innovative companies.

The Army continues to implement the reform initiatives granted by Congress, which were designed to streamline and gain efficiencies in the acquisition process. These initiatives, which have reduced bureaucracy and helped the Army accelerate the delivery of capability to the field, include the granting of Middle Tier Acquisition Authority (MTA) which allows for both rapid prototyping and rapid fielding efforts, and the expanded use of Other Transactional Authority (OTA), which now can be extended to include production. The Army is using MTA for rapid prototyping to accelerate select efforts linked to the Army's modernization priorities, including ERCA, IVAS, Lower Tier Air and Missile Defense Sensor, PrSM, NGSW, and MPF, each of which is designed to leave a residual capability with the warfighter that can enable constructive feedback and refinement of requirements. The Army effectively utilizes OTA to streamline the acquisition of basic through advanced research activities, prototype projects, and follow-on production efforts. OTAs are simplified contract mechanisms that lend themselves to working with small companies and non-traditional contractors, two known sources of technological innovation. The Army used OTAs to more quickly award contracts in support of the Federal Response to COVID-19. In FY20, the Army awarded more than 1,300 agreements valued at \$13.7 billion.

In addition, in the FY16 National Defense Authorization Act, Congress encouraged delegation of Milestone Decision Authority (MDA) for most acquisition programs from the Office of the Secretary of Defense to the Military Departments. The Army further delegated MDA for some of these programs to the PEO level and below when appropriate. This delegation allows the Army to appropriately align program oversight with risk, resulting in reduced bureaucracy and increased efficiency.

All of these initiatives, combined with AFC's integrated governance process, allows for better and faster modernization decisions and faster requirements development.

WHO WE ARE

Army transformation is more than weapon systems and equipment. It also involves people. Ultimately, people are the Army's foundation and our greatest strength. It is critically important that we recruit, develop, and retain talent for the current and future force. To that end, the Army is moving to a 21st century talent management system to ensure people feel they are valued members of the team. Additionally, the Army has established digital talent initiatives to ensure our workforce is trained to effectively apply the technologies being developed. The Software Factory, for example, is increasing the Army's digital proficiencies while leveraging agile Development, Security, and Operations practices and cloud technologies to build organic software. Through partnerships with Carnegie Mellon University, the Army's Artificial Intelligence Integration Center (AI2C) is developing data science and AI expertise to ensure proficiency in the applications and ethics of AI and machine learning.

With the right people, with the right skills, in the right places, we can successfully—and persistently—modernize the Army.

CONCLUSION

The Army is nearly three years into the biggest transformational change since the early 1980s, modernizing and building a multi-domain-capable force that delivers speed, range, and convergence of emerging technologies. The Army, to be clear, will never be “done” modernizing. We are laying the foundation now to make sure the Army continues to modernize for the future of 2035, and for the one after that.

Thank you again for this opportunity to discuss Army Modernization and for your strong support of our Soldiers, Army Civilians, and their Families. We look forward to your questions.

Mr. Douglas R. Bush**Acting Assistant Secretary of the Army for Acquisition, Logistics and Technology and
Army Acquisition Executive**

Mr. Douglas R. Bush is currently designated as the Acting Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)) following his appointment as the Principal Deputy Assistant Secretary of the Army for Acquisition, Logistics and Technology on March 8, 2021. As the Acting ASA (ALT), Mr. Bush also serves as the Army Acquisition Executive and the Senior Procurement Executive.

From 2019-2020, Mr. Bush served as the Deputy Staff Director of the House Armed Services Committee (HASC). In this position, he managed all aspects of HASC administrative and legislative operations, including committee personnel and operations, emergency and safety procedures, the committee's budget, member and staff travel, and classified information management. He oversaw operations of 70 members of House Armed Services Committee staff working in support of 57 members of Congress serving on committee responsible for oversight of the Department of Defense.

From 2007-2019, as a Professional Staff Member of the HASC, Mr. Bush was the lead staff member responsible for analysis and oversight of a wide range of Army, Marine Corps, Air Force, and Navy combat system acquisition programs, with a focus on minimizing cost growth, delays, and shortfalls in delivered capability. Aviation programs overseen included fighter and reconnaissance aircraft, unmanned aerial systems, and air-launched missiles and munitions. Ground systems overseen included tanks, infantry fighting vehicles, amphibious systems, ammunition, small arms, and communications/network equipment programs.

CAREER CHRONOLOGY:

2005-2007, Legislative Director, Office of Congressman Neil Abercrombie, Washington, DC
 2003-2005, Military Legislative Assistant, Office of Congressman Jim Cooper, Washington, DC
 2002-2003, Legislative Correspondent, Office of Senator Bill Nelson, Washington, DC
 2001-2002, National Security Analyst, Association of the United States Army, Arlington, VA
 1993-1998, Officer, United States Army, 24th and 3rd Infantry Divisions, Fort Stewart, GA

COLLEGE:

MA, National Security Studies, Georgetown University, Washington, DC, 2002
 BS, Political Science (American Politics), U.S. Military Academy, West Point, New York, 1993

General John M. Murray
Commanding General, Army Futures Command

General Murray was commissioned as an Infantry officer in the U.S. Army upon graduation from the Ohio State University in 1982. Throughout his career, General Murray has served in leadership positions and commanded from Company through Division, with various staff assignments at the highest levels of the Army.

General Murray has held numerous command positions. His command assignments include: Commanding General Joint Task Force-3; Deputy Commanding General – Support for U.S. Forces Afghanistan; Commander Bagram Airfield; Commanding General 3rd Infantry Division at Fort Stewart, Georgia; Commander, 3rd Brigade, 1st Cavalry Division, at Fort Hood, Texas while serving in Operation IRAQI FREEDOM; Commander, 1st Battalion, 18th Infantry, 1st Infantry Division, United States Army Europe and Seventh Army, Germany; Commander, C Company, 1-12th Infantry Battalion, 4th Infantry Division (Mechanized), Fort Carson, Colorado.

Previously, he was the Deputy Chief of Staff, G-8, in the Pentagon; Director, Force Management, the Pentagon; Assistant Deputy Director for Joint Training, J-7, Joint Staff, Suffolk, Virginia; Director, Joint Center for Operational Analysis, United States Joint Forces Command, Suffolk, Virginia; Deputy Commanding General (Maneuver), 1st Cavalry Division, Fort Hood, Texas; Deputy Commanding General (Maneuver), Multi-National Division-Baghdad OPERATION IRAQI FREEDOM, Iraq; G-3 (Operations), III Corps, Fort Hood, Texas; Chief of Staff, III Corps and Fort Hood, Fort Hood, Texas; C-3, Multi-National Corps-Iraq, OPERATION IRAQI FREEDOM, Iraq; G-3 (Operations), 1st Infantry Division, United States Army Europe and Seventh Army, Germany; Chief, Space Control Protection Section, J-33, United States Space Command, Peterson Air Force Base, Colorado; S-3(Operations), later Executive Officer, 1st Battalion, 5th Cavalry, 1st Cavalry Division, Fort Hood, Texas; Chief, Plans, G-1, III Corps and Fort Hood, Fort Hood, Texas.

General Murray's awards and decorations include: the Distinguished Service Medal w/ Oak Leaf Cluster, the Defense Superior Service Medal with Oak Leaf Cluster, the Legion of Merit with two Oak Leaf Clusters, the Bronze Star Medal with three Oak Leaf Clusters, the Defense Meritorious Service Medal, the Meritorious Service Medal with two Oak Leaf Clusters, the Army Commendation Medal with Oak Leaf Cluster, the Joint Service Achievement Medal, the Army Achievement Medal with Oak Leaf Cluster, the Ranger Tab, the Combat Infantryman Badge, the Expert Infantryman Badge, the Parachutist Badge, the Air Assault Badge, the Joint Chiefs of Staff Identification Badge and the Army Staff Identification Badge.

General Murray hails from Kenton, Ohio. He and his wife, Jane, have three lovely daughters and seven grandchildren.

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BY THE HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON TACTICAL AIR AND LAND
FORCES

STATEMENT OF
FREDERICK J. STEFANY
ACTING ASSISTANT SECRETARY OF THE NAVY FOR
RESEARCH, DEVELOPMENT AND ACQUISITION (ASN RD&A)

AND

LIEUTENANT GENERAL ERIC M. SMITH
DEPUTY COMMANDANT, COMBAT DEVELOPMENT AND INTEGRATION
COMMANDING GENERAL, MARINE CORPS COMBAT DEVELOPMENT COMMAND

BEFORE THE

SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

OF THE

HOUSE ARMED SERVICES COMMITTEE

ON

MARINE CORPS GROUND MODERNIZATION

JUNE 7, 2021

NOT FOR PUBLICATION UNTIL RELEASED BY THE
HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

Around the globe, Marines and Sailors stand shoulder to shoulder to reassure allies and partners, respond to crisis, deter competitors, and if necessary, defeat adversaries in conflict. Integrated American Naval Power has led to global prosperity and the advancement of democratic ideals. Seeking to challenge established international norms and pursuing nefarious motives, peer competitors and rogue actors have invested in precision strike weapons over the last two decades to usurp the Navy and Marine Corps' military advantages. To ensure our Marines and Sailors deployed in harm's way are properly prepared in this decade and the next, the Marine Corps, in concert with the Joint Force, is re-thinking our operating concepts and strategies.

The Marine Corps seeks to achieve success in both maritime gray zone competition and more traditional conflict. In the future, deterrence will not only be achieved by denial of spaces or overwhelming fires, but also through deterrence by detection. Detection, which refers to gaining an information advantage over our adversaries, means the Marine Corps must win the reconnaissance and counter-reconnaissance competition on a daily basis. The required intelligence and communication capabilities, enabled through a system of sensors and networks, and combined with proven and established lethality will be required to deter future conflict among peer competitors.

Understanding the constraints of the fiscal environment, the Marine Corps has initiated a modernization campaign predicated on the reprioritization and realignment of our existing funding. These reallocations allow the Marine Corps to invest in our highest priority programs and modernize our warfighting capabilities. While confident in the progress we are making, we continue to conduct robust wargaming and experimentation to further refine our path forward.

The Marine Corps must support the Naval and Joint Force through long-range precision fires, resilient sensors and communication networks, and organic mobility.

Long-Range Precision Fires

As the Nation's Stand-In force, the Marine Corps is uniquely suited to provide precision fires from land-to-sea to enable Fleet maneuver. While this is a significant change from the past two decades of land-based operations, we are implementing this change to maximize the Marine Corps' deterrent and combat capabilities in support of future naval campaigns. Simultaneously, we retain our national crisis response force capability.

Ground-Based Anti-Ship Missile (GBASM)

GBASM is the Marine Corps' top modernization priority and is the key lethality component for the Marine Corps to facilitate sea denial in support of naval and joint operations. The current materiel solution for GBASM is the Navy-Marine Expeditionary Ship Interdiction System (NMESIS) which consists of two Naval Strike Missiles mounted on a remotely operated JLTV-based chassis. The capability creates cost impositions for an adversary by introducing a new and highly credible threat into their decision-making, while providing us with a relatively low cost and highly effective capability.

By combining existing technologies in the missile and the platform, the Marine Corps has reduced programmatic risks through the use of proven capabilities, which enables us to move faster. The Marine Corps successfully tested this system in November 2020, and in our FY 2022 budget request, we are seeking funding for 10 test systems for further developmental and operational testing. With the ability to strike enemy ships at ranges of 100 nautical miles and

beyond, we believe it will be a “game changer” for the Marine Corps, the Naval Fleet Commander, and combatant commanders.

Organic Precision Fires (OPF)

OPF is a family of loitering munition systems that will provide multiple echelons of the Fleet Marine Force with beyond-line-of-sight, precise fires capabilities. As a “hunter – killer” capability, OPF will provide continuous surveillance before, during, and after conducting lethal strikes against targets, while reducing potential for collateral damage. Furthermore, these systems will be capable of engaging targets at extended range with sufficient lethality to defeat armored, water-borne, and personnel threats.

Long-Range Unmanned Surface Vessel (LRUSV)

The Marine Corps envisions LRUSV as an uncrewed vessel, approximately 45 feet in length, capable of conducting semi-autonomous maneuver in the open ocean for extended periods of time. The vessel will serve as a platform for the launching of Organic Precision Fires, thus providing reconnaissance and surface-launched strike capabilities. Through extensive wargaming, the LRUSV has demonstrated the potential to generate significant operational impact, benefitting the Navy and Marine Corps’ anti-surface warfare campaigns. The Marine Corps is taking a deliberate approach to capability development using prototyping and experimentation to reduce technical and integration risk, validate designs, and better inform achievable and affordable requirements, with the ultimate goal of delivering capabilities to the Marine Corps and Joint Force in the mid- to late-2020s. The Marine Corps has already contracted for three prototypes, and with our FY22 budget request, we will seek to procure two additional prototype vessels to begin experimentation.

Resilient Sensors and Communication Networks

To enable naval and joint force commanders across the competition continuum, the Marine Corps must not only become lighter and more lethal, but also must enhance its ability to enable joint command and control, as well as reconnaissance and counter reconnaissance operations. Thus, the Marine Corps is working on more resilient and interoperable networks and data systems that will support Marines' sensing and communication capabilities, enabling the Navy Tactical Grid and Joint All-Domain Command and Control. This creates advantages for Marines across key maritime locations and provides the required information for uniformed and civilian leaders to make sound judgments.

Ground/Air Task Oriented Radar (G/ATOR)

G/ATOR is a state-of-the-art, ground-based, short-to-medium range, expeditionary radar system designed as a single materiel solution to satisfy air surveillance, air defense, ground counter-fire and counter-battery, with the ability to perform air traffic control mission sets. The radar is transportable by organic Marine Corps means. G/ATOR enables Marines to control designated airspace by way of detecting, tracking, classifying, and accurately determining the origin of enemy projectiles and air threats. Notably, G/ATOR will support forward-postured Marines by providing surveillance and detection of enemy air threats, not easily identified by other radar assets in congested littoral environments. The G/ATOR radar is already in service in the Pacific region, and the Marine Corps will continue to procure and field this highly capable radar system. In addition to G/ATOR, the Marine Corps is developing the Multi-Domain Radar for a Contested Environment (MuDRaCE). This advanced system is complementary to the G/ATOR and will enhance the Marine Corps and Joint Forces' situational awareness.

Marine Electronic warfare Ground Family of Systems (MEGFoS)

MEGFoS is an electronic warfare system that serves to counter improvised explosive devices and unmanned aerial surveillance threats while also providing limited counter-communications capabilities. This family of systems, which includes mounted and dismounted variants, is in development. Through the use of the electro-magnetic spectrum, MEGFoS will have the ability to locate and identify adversary forces while simultaneously providing friendly forces feedback on their signature management operations. MEGFoS will enable the Marine Corps to maneuver, fight, and sustain itself through the exploitation of the electro-magnetic spectrum.

Networking On The Move (NOTM)

NOTM is comprised of a robust communication system mounted on a ground combat vehicle or aviation platform. NOTM provides terrestrial line-of-sight and beyond line-of-sight satellite communications for Marines at-the-halt and while on-the-move. NOTM is purpose built to support our naval and joint concepts that require our forces to fight in a distributed manner by allowing dispersed commanders the ability to effectively command and control forces in a contested all-domain environment. The Marine Corps is currently fielding these systems that will allow for seamless command and control for maneuvering units in the future.

Next Generation Satellite Communications

Marine Corps Wideband Satellite Communications Family of Systems (MC-WSATCOM FoS) is a comprehensive, integrated, and sustainable solution designed to address current and future warfighting capability needs using military and commercial SATCOM systems in both contested and permissive electro-magnetic spectrum environments. The MC-WSATCOM FoS

will replace legacy very-small-aperture terminal communications systems, enable command and control of forward postured Marines, and be fully interoperable with naval and joint wideband SATCOM systems.

Integrated Broadcast Receiver (IBR)

IBR is the Marine Corps' family of terminals that provides direct, over-the-air access to the Joint-sponsored Integrated Broadcast Service. The IBR receives and processes near-real time multi-intelligence data from strategic, theater, and tactical sensors to include Theater Missile Defense indications and warnings. To ensure the survivability of the network, the IBR is low bandwidth, mission tailorable, and capable of operating in a degraded, intermittent, and emission controlled environment.

Military Global positioning system User Equipment (MGUE)

MGUE efforts are focused on enhancing the Resilient Expeditionary Positioning, Navigation, and Timing (REPNT) capabilities across the enterprise, enabling Marines to know and trust their position, effectively navigate, and receive precise and accurate timing information for themselves and their platforms. Under the MGUE program, the Marine Corps will transition to the modernized military GPS signal, which upgrades protections against enemy jamming and spoofing threats. The program is also a critical enabler of the Marine Corps' participation in Joint All-Domain Command and Control efforts within the Joint Force.

Next Generation Enterprise Network (NGEN)

NGEN is a Department of the Navy enterprise program enabled by cloud technology, modern networking tools and applications, and core enterprise services shared by both the Marine Corps and the Navy to support free flow of warfighting data from garrison to tactical

environments. NGEN forms the foundation for the Department of the Navy's future Naval Networking Environment and is interoperable with and leverages other Department of Defense provided Net-Centric Enterprise Services, supporting the Joint Information Environment.

Complementary Air and Surface Efforts

To achieve overall successful execution in the future, all of the Marine Corps' ground modernization efforts are complemented by air and surface capabilities and programs that are either mature or in development. For example, the F-35 is a mature program that will be critical to the Marine Corps' overall warfighting concept in the future due to its advanced sensing and strike capabilities.

Another example of a complementary aviation effort is the Marine Corps' pursuit of the MQ-9A Extended Range Unmanned Aircraft System (UAS), which the Marine Corps has identified as the materiel solution for the Marine Air-Ground Task Force Unmanned Experimental – Medium Altitude Long Endurance (MUX MALE) capability. The Marine Corps seeks to procure six MQ-9A Extended Range systems in FY 2022, and a total of 18 systems over the next several years, to form three UAS squadrons. The Marine Corps will leverage an existing Air Force system and two current Marine Corps assets in USCENTCOM to reduce risk, while providing advanced capabilities to the Marine Corps and overall joint warfighting enterprise. These squadrons will provide persistent airborne data relay in support of overall maritime domain awareness and command and control capabilities. The MQ-9A Extended Range is a critical enabler to the Naval force in building an alternate Precision, Navigation, and Timing network.

In addition to aircraft, the Marine Corps' the success of ground modernization is also predicated on Navy shipbuilding programs, such as the Navy's Light Amphibious Warship (LAW). The LAW, which is a new class of warship that will complement existing traditional amphibious warships, will provide added surface mobility and survivability for Marine Corps forces. These functions will be critical to Marine ground forces' ability to operate and sustain themselves in austere intra-theater locations across remote beaches.

Conclusion

The programs highlighted here are critical to the Marine Corps' modernization. Some of the programs are nascent, while others are more mature in the acquisitions process. Regardless, maintaining the pace of each of these programs is essential to achieving initial operating capability of critical warfighting concepts and sustaining momentum to achieve a combat credible force in a chaotic, uncertain, and competitive future operating environment. Our proactive modernization, balanced with the readiness to "fight tonight," will ensure your Marine Corps remains a naval expeditionary force-in-readiness that is prepared to sense, communicate, and act today and in the future. Our Marines and Sailors around the globe thank you, as well as many of your constituents in industry who are developing and building these systems, for your continued support over the last challenging year and in the future.

Frederick J. (Jay) Stefany
Assistant Secretary of the Navy (Research, Development and Acquisition) (Acting)

Frederick J. (Jay) Stefany serves as acting assistant secretary of the Navy (Research, Development and Acquisition) (Acting) as of Jan. 20, 2021, having served as Deputy Assistant Secretary of the Navy for Ship Programs since April 2018. In this role, he is responsible for executive oversight of all naval shipbuilding programs, major ship conversions, and the modernization and disposal of inservice ships. He is also responsible for executive oversight of cost, schedule and performance of surface ship, submarine, and Marine Corps combat systems, electronic warfare systems, shipboard radars, and Navy missile defense programs.

Previously, Stefany served as executive director, Amphibious, Auxiliary and Sealift Office, Program Executive Office, Ships. He provided executive leadership to 200 personnel and oversaw one of the broadest acquisition portfolios in the Navy, including more than \$30 billion in complex shipbuilding procurements. His responsibilities spanned four major program offices: LPD 17 Program (PMS 317), Amphibious Warfare Program (PMS 377), Strategic and Theater Sealift Program (PMS 385), and the Auxiliary Ships / Small Boats and Crafts Program (PMS 325).

Additionally, he oversaw several active major programs, to include LHA 6, LPD 17, EPF, ESB, T-AKE, T-AO(X), and Heavy Icebreaker ship classes, as well as ship-to-shore connectors, landing craft, research ships, and service craft boats.

Stefany entered the Senior Executive Service in March 2012, and has been in Civil Service for more than 27 years. Serving in a variety of key leadership positions throughout his career, including program manager and deputy program manager for the LPD 17 class Amphibious Transport Dock ship program (2004-2012). During his tenure, the first six ships of the San Antonio class were delivered and construction started on four additional hulls. He also assumed responsibilities for management of the initial concept work on a replacement for the Navy's Command & Control Ships and later, the replacement for the LSD 41 and 49 class ships.

Previous assignments include director of Naval and Commercial Construction (2002-2004), responsible for oversight of the Navy's portfolio of Amphibious, Auxiliary and Special Mission ships and craft for the assistant secretary of the Navy for Research, Development and Acquisition (ASN RD&A); assistant program manager in PMS 377 for LCAC (2000-2002) and for Amphibious Ship Combat / C4I Systems (1998-2000); and project engineer for both the LHD 5-7 (1992-1998) and LHD 1-4 (1987-1991) ship acquisition programs as PMS 377 delivered LHD 1-6 and LSD 52 to the Fleet.

Stefany received his bachelor of science degree in mechanical engineering from Lehigh University, Bethlehem, Pennsylvania, in 1985, and his master of science degree in management from the Florida Institute of Technology, Melbourne, Florida (National Capital Campus), in 1998. He is also a 1996 graduate of the Defense Systems Management College Advanced Program Management Course.

During his distinguished federal service career, Stefany has received the Navy Civilian Meritorious Service Award and two Navy Civilian Superior Service Awards.

Last Updated: 22 January 2021

Lieutenant General Eric M. Smith
CG, MCCDC & DC, CD&I

Lieutenant General Smith is from Plano, Texas and entered the Marine Corps in 1987 through the NROTC program at Texas A&M University. After completing The Basic School and Infantry Officer's Course, he was assigned to 2nd Battalion, 3rd Marines; participating in Operations Desert Shield / Desert Storm. Following a tour as an Officer Selection Officer, he attended the Amphibious Warfare School and then reported to 2nd Battalion, 2nd Marines for duty as Commanding Officer of Weapons and Echo Companies. During this tour he participated in Operation Assured Response in Monrovia, Liberia.

After a tour as a Marine Officer Instructor at Texas A&M University, he attended the United States Army Command and General Staff Course. His next assignment was as the Naval Section Chief at the U.S. Military Group in Caracas, Venezuela from 2001-2003.

From 2003 until 2006, he served in the 1st Marine Division as the Division Current Operations Officer; Executive Officer of Regimental Combat Team 1; Commanding Officer of 1st Battalion, 5th Marines; and Assistant Chief of Staff G3. During this period he completed two deployments to Iraq in support of Operation Iraqi Freedom. Subsequent assignments were as a student at the Marine Corps War College, Senior Aide to the Commandant of the Marine Corps, and Director of the Fires and Maneuver Integration Division at the Marine Corps Combat Development Command.

From 2009 until 2012 he served in the 2nd Marine Division as the Assistant Chief of Staff G3 and Commanding Officer of 8th Marine Regiment; completing a one-year deployment to Afghanistan in support of Operation Enduring Freedom.

In June of 2012 he reported for duty as the Director of Capability Development Directorate, and in May of 2013 he was assigned as the Senior Military Assistant to the Deputy Secretary of Defense.

From July through November of 2015 he commanded Marine Corps Forces Southem Command in Miami, Florida, and was then transferred to the Pentagon to serve as the Senior Military Assistant to the Secretary of Defense.

From February 2017 until June 2017, he served as the Assistant Deputy Commandant for Plans, Policies and Operations. From June 2017 until July 2018, he served as the Commanding General, 1st Marine Division. From August 2018 until June 2019, Lieutenant General Smith served as the Commanding General, III Marine Expeditionary Force.

On 13 June 2019, Lieutenant General Smith assumed responsibility as the Commanding General, Marine Corps Combat Development Command, and the Deputy Commandant for Combat Development and Integration, Headquarters, U.S. Marine Corps.

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

JUNE 7, 2021

RESPONSES TO QUESTIONS SUBMITTED BY MS. SHERRILL

Mr. BUSH and General MURRAY. First, the Army is requesting no funds for anti-personnel land mines in the Fiscal Year 2022 President's Budget Request. Upon additional research, we found there were no documented employments of anti-personnel mines in Iraq during Operation Iraqi Freedom or subsequent Iraqi campaigns. However, the U.S. State Department reported the operational employment of a single anti-personnel munition in Afghanistan in 2002 by U.S. military forces. [See page 23.]

QUESTIONS SUBMITTED BY MEMBERS POST HEARING

JUNE 7, 2021

QUESTIONS SUBMITTED BY MR. TURNER

Mr. TURNER. The Army identified an Unfunded Requirement of \$149.5M for PIM that when coupled with the FY22 PBR would procure up to 36 sets of equipment but that is still only half of the Full Rate Production (FRP) volume specified in the DOD approved Acquisition Program Baseline (APB) of 60 sets per year. This lower volume will still cause significant unit cost growth and workforce downsizing.

What is the impact on fielding to soldiers and the industrial base by moving away from the current volumes of 44–48 sets per year?

What analysis did the Army use to determine the UFR funding amount?

Mr. BUSH and General MURRAY. A Field Artillery Battalion consists of 18 Paladin Integrated Management (PIM) vehicle sets. Due to contract and production lead times, Fiscal Year 2022 (FY22) funding supports unit fieldings in FY25. The reduction in FY22 funding to 25 sets would not impact the number of units fielded in FY25. However, if production is sustained at a lower rate than 48 per year beyond FY22, unit fieldings could be impacted in FY26 and beyond. We do not anticipate an impact to the industrial base. Regarding the amount of funding included in the Army Chief of Staff's Unfunded Requirements (UFR) list, the Army's analysis accounts for the total vehicle manufacturing funding, which includes the Government Furnished Equipment portion (\$326.3 million (M)) of the base funding (\$446.4M). When combined with the UFR (\$149.5M) intended for vehicle manufacturing, the program receives approximately 17 percent more buying power. This reduces the manufacturing unit cost from \$13.1M to \$11.2M. At the \$11.2M unit cost, the Army can afford 18 additional sets (increases total from 25 sets to 43 sets) with the UFR funds allocated for manufacturing.

Mr. TURNER. The Army Program Manager in charge of the Extended Range Cannon Artillery Program recently briefed during an on-line Conference. He identified a 2-part acquisition strategy for the program. This included a competition to build and assemble kits for ERCA and a separate competition to integrate those kits onto a M109A7 Paladin Integrated Management (PIM) chassis.

Does this dual competition create a delay in moving the program from the initial operational test in FY23 to an operational/deployable unit by FY25 as previously briefed to this Committee?

I would like a committee briefing on the acquisition strategy.

Mr. BUSH and General MURRAY. The Extended Range Cannon (ERCA) is a Middle Tier of Acquisition (MTA) Rapid Prototyping (RP) program that is on schedule to issue 18 prototypes at the end of Fiscal Year 2023 (FY23) for a one-year operational assessment throughout FY24. There is no delay; the ERCA program is on schedule to transition from MTA Rapid Prototyping into a Program of Record. The formal Initial Operational Test and Evaluation for the ERCA Program of Record remains unchanged, scheduled for FY25. The Army is available to brief the acquisition strategy at your convenience.

QUESTIONS SUBMITTED BY DR. DESJARLAIS

Dr. DESJARLAIS. In developing the JLTV recompetete strategy did you consider any alternative strategies besides the "build to print" winner take-all construct; such as pursuing a second source or split buy approach or requiring digital designs and digital engineering combined with the use of advanced manufacturing as part of the competition's evaluation criteria, and if not, why not? In your opinion how important will technology insertions and future capability growth be for JLTV in the future given evolving threat environments?

Mr. BUSH. Yes. The Army conducted market research and considered multiple strategies that focused on how much industry would be asked to invest, the capabilities, risk and the life cycle cost implications of these decisions. The Joint Light Tactical Vehicle (JLTV) acquisition strategy was selected to leverage an already capable platform; how to manage Government rights to the Technical Data Package; and through focused design upgrades and competition, bring new capabilities to the Soldiers and Marines. The JLTV follow-on contract is based upon a new A2 variant of the family of vehicles, which includes several technology insertions in the areas

of powertrain, electrical architecture, noise reduction, and stowage improvements. The pending competition also includes significant incentives for competitors to propose additional technology enhancements in the areas of fuel efficiency, corrosion, upgraded vehicle architecture, and driver assist capabilities, while keeping the cost of the JLTV affordable. These technology advances on a proven system, that currently has growth and modularity capability in weight, power and available kits, make the JLTV the optimal platform for the light tactical vehicle mission in a Multi-Domain Operational environment.

Dr. DESJARLAIS. I'm concerned that the Army's current approach for the JLTV re-compete without any changes to the current draft request for proposals you may only get one bid that being from the incumbent. If this proves to be the case would the Army go forward in awarding the contract, or would this require a restructure of the JLTV re-compete strategy?

Mr. BUSH. The Army believes that it has a strategy that has welcomed and encouraged competition throughout the Request for Proposal (RFP) development process. Potential offerors have been provided JLTV lease vehicles and multiple drafts of the RFP to ensure a thorough understanding of the design of the vehicle and the structure of the competition. These offerors have provided feedback to the process over the last 18 months and have indicated their intent to propose. If the Army only receives one proposal, we will move forward reviewing that proposal in accordance with the criteria in sections L&M of the RFP, ensuring the reasonability of the proposal and an award based on the merits of that proposal.

Dr. DESJARLAIS. Could you update the subcommittee on the status of the electric light reconnaissance vehicle (eLRV) prototyping effort. Is the program fully funded in the FY22 budget request, if not, why not?

Mr. BUSH and General MURRAY. The prototyping effort for the electric light reconnaissance vehicle (eLRV) continues to move forward. Necessary requirements documents were not finalized and approved in time to be incorporated into the President's Fiscal Year 2022 budget request, so the Chief of Staff, Army, included it in his FY22 unfunded requirements list. If FY22 funding becomes available, the program is postured to move out smartly. In the absence of additional funding, the program will continue to compete within the Department for funding.

Dr. DESJARLAIS. How committed is the Army and Marine Corps in pursuing electrification of its combat and tactical vehicle fleets, and going beyond establishing new start vehicle efforts, are there any efforts underway to begin modifying current enduring vehicle platforms?

Mr. BUSH. See General Murray response.

Dr. DESJARLAIS. I'm aware of the fact the ISV original equipment manufacturer has developed an all-electric military concept demonstrator vehicle based on the ISV platform in just 12 weeks. What are your thoughts on the potential or possibility to grow the ISV into a family of vehicles with different configurations, to include electric powertrains?

Mr. BUSH. The ISV was developed to motorize the Infantry Brigade Combat Teams (IBCTs) under strict Key Performance Parameters (KPPs) and Key System Attributes (KSAs) to allow for maximum transportability by rotary aircraft and mobility across the operational mission profile. The growth of the ISV into other mission roles and configurations would require identifying the capability gaps and formalizing requirements. The speed of GM Defense to integrate a commercially available Electric Powertrain architecture in the ISV continues to support the commercial readiness to meet validated requirements like the Electric Light Reconnaissance Vehicle, or "eLRV."

Dr. DESJARLAIS. How committed is the Army and Marine Corps in pursuing electrification of its combat and tactical vehicle fleets, and going beyond establishing new start vehicle efforts, are there any efforts underway to begin modifying current enduring vehicle platforms?

General MURRAY. The Army is committed to pursuing electrification of current and future platforms where it is technologically feasible, operationally sound, and fiscally affordable. Two emerging capabilities are serving as our foundation for learning where vehicle electrification is most appropriate across our fleets.

- Tactical and Combat Vehicle-Electrification (TaCV-E). Requirements documents are still in development, but we expect the TaCV-E to inform a pathway for electrification, as well as integration of artificial intelligence and machine learning onto the light and medium tactical wheeled vehicle (TWV) fleets by 2035 and the heavy TWV fleet and combat vehicles in the 2036-2050 timeframe.
- Electric Light Reconnaissance Vehicle (eLRV). We expect the eLRV to facilitate rapid prototyping of a non-developmental light tactical vehicle, leveraging industry's efforts and investments. The eLRV will be either hybrid or fully electric, seat six Soldiers, and operate across the mission profile of a mounted scout

squad within the Cavalry Squadron of an Infantry Brigade Combat Team. Market surveys for eLRV were released to industry in both November 2020 and April of 2021, culminating in a vehicle electrification demonstration and Soldier touch point at Fort Benning, Georgia, on 10–14 May 2021, with participation of more than six vendors and a pathway to fielding in FY26/27.

- Both the TaCV-E and eLRV programs have joint interest within DOD. The Army is also developing the requirements documents for a Common Tactical Truck (CTT) to rapidly prototype a heavy tactical vehicle that integrates commercial industry's best practices and leverages advanced technologies related to electrification, safety, and autonomy.

Army science and technology (S&T) organizations are developing technologies to enable the electrification of the ground vehicle fleet, with emphasis on improved energy supply and storage, energy efficient technologies, power management, and improved power transmission and distribution. Current Army S&T programs are investing in power dense technologies, efficient power architecture and alternative power sources (including Advanced Lithium-ion Batteries, Fuel Cells, Diesel Electric Power Generators, Integrated Starter Generators, and Wide-Bandgap Power Electronics), more efficient power and thermal management, anti-idle capabilities, and lighter-weight energyefficient components. Programs that support these efforts include Platform Electrification for Mobility (PEM), Enhanced E-Vetronics Technology, Advanced Mobility Experimental Prototype (AMEP), and Basic Research. Recent achievements include the demonstration of a Tactical Vehicle Electrification Kit that included high voltage power electronics, advanced Lithium-ion batteries, and an anti-idle capability that will transfer to the Joint Light Tactical Vehicle (JLTV) program, and the demonstration of a combat vehicle powertrain that includes an advanced combat engine, integrated starter-generator, high-speed transmission, and advanced batteries for improved mobility, power, and efficiency.

The Army Rapid Capabilities and Critical Technologies Office (RCCTO) is developing a hybrid diesel/electric prototype for the Bradley Infantry Fighting Vehicle. Designed to be a surrogate for other tactical vehicles, its goals are to improve fuel efficiency and operational endurance, reduce the thermal and acoustic signature, and provide additional onboard power. The first two prototypes will be delivered in 3QFY22. RCCTO has also initiated development of hybrid electric prototypes of both the High Mobility Multipurpose Wheeled Vehicle (HMMWV) and JLTV.

To unify future investments, the Army is developing an overarching Army Ground Vehicle Alternative Energy Strategy that will largely focus on the pursuit of vehicle electrification and demand reduction (fuel/maintenance) to be published in 3QFY22.

Dr. DESJARLAIS. I'm aware of the fact the ISV original equipment manufacturer has developed an all-electric military concept demonstrator vehicle based on the ISV platform in just 12 weeks. What are your thoughts on the potential or possibility to grow the ISV into a family of vehicles with different configurations, to include electric powertrains?

General MURRAY. [No answer was available at the time of printing.]

Dr. DESJARLAIS. How committed is the Army and Marine Corps in pursuing electrification of its combat and tactical vehicle fleets, and going beyond establishing new start vehicle efforts, are there any efforts underway to begin modifying current enduring vehicle platforms?

Mr. STEFANY. The Marine Corps is actively studying and evaluating electrification of its combat and tactical vehicle fleets to improve energy performance and increase the lethality and effectiveness of its combat formations.

As battery technology matures and becomes increasing energy dense, new options will become available for ground combat and tactical vehicles. An electric JLTV is not currently supportable as the required battery load is too heavy and too large for the JLTV's payload and cargo capacity. Recent studies indicate that a series hybrid fleet would perform significantly better than the internal combustion engine baseline and is a logical intermediate step to full electrification for combat and tactical vehicle systems that have to negotiate battlefield terrain and ford up to sixty inches of salt water.

The Marine Corps is working closely with the U.S. Army and supporting their research. A Marine Corps Medium Tactical Vehicle Replacement (MTVR) will be part of a Ground Vehicle Support Center science and technology electrification project.

Additionally, the Marine Corps is in coordination with the Office of Naval Research to develop an MTVR electrification research project conducted in conjunction with industry.

Dr. DESJARLAIS. How does the JLTV factor into the Commandant's redesign effort in becoming more expeditionary?

General SMITH. The Joint Light Tactical Vehicle (JLTV) is the Marine Corps' replacement for the legacy High Mobility Multi-Wheeled Vehicle (HMMWV) and an

integral component of its ground combat and tactical vehicle portfolio. The JLTV provides scalable protection, high mobility, the capability to ford up to sixty inches of water, and increased networked capacity on a versatile, reliable, and efficient platform. In addition to utility and general purpose functions, the JLTV is the base platform and prime mover for forty other capabilities ranging from heavy weapons and precision fires to communication systems and air defense. By building off of the JLTV platform, the Marine Corps is able to leverage commonality and reduce supply chain and sustainment challenges.

The JLTV was designed from inception to meet Marine Corps expeditionary mission profile requirements and be transportable by naval and organic connectors. It can be internally transported by the KC-130J, externally lifted by the CH-53K, and fits on Navy amphibious ships and connectors. Additionally, the Marine Corps is using the JLTV chassis as the basis for the Remotely Operated Ground Unit for Expeditionary Fires (ROGUE-Fires), which is an unmanned system to transport and launch ground based anti-ship missiles.

The Marine Corps will have fielded approximately 2,100 vehicles by the end of Fiscal Year 2021. The program is on budget and on schedule, and the Marine Corps is requesting funds to procure 636 vehicles in Fiscal Year 2022.

Dr. DESJARLAIS. How committed is the Army and Marine Corps in pursuing electrification of its combat and tactical vehicle fleets, and going beyond establishing new start vehicle efforts, are there any efforts underway to begin modifying current enduring vehicle platforms?

General SMITH. The Marine Corps is actively studying and evaluating electrification of its combat and tactical vehicle fleets to improve energy performance and increase the lethality and effectiveness of its combat formations.

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QUESTIONS SUBMITTED BY MR. BROWN

Mr. BROWN. In regards to the acquisition strategy for the Joint Light Tactical Vehicle, how is the Army ensuring competition in this phase of the selection process? How will the Army maintain technology insertions and future capability growth within the build-to-print strategy?

Mr. BUSH. Competition has been a bedrock of the JLTV program since its inception. The JLTV Follow-On Contract strategy has been designed with that foundational element in mind. The program conducted market research, engaged directly with potential offerors, and provided lease JLTV vehicles as a means to ensure a fair and balanced competition. The JLTV Follow-On Contract is based upon a new A2 variant of the family of vehicles, which includes several technology insertions in the areas of powertrain, electrical architecture, noise reduction, and stowage improvements. The pending competition also includes significant incentives for competitors to propose additional technology enhancements in the areas of fuel efficiency, corrosion, upgrade the vehicle architecture, and driver assist capabilities, while keeping the cost of the JLTV affordable.

Mr. BROWN. What is the status of the electric light reconnaissance vehicle (eLRV) prototyping effort and what are the planned funding levels, both in FY2022 and throughout the typical FYDP timeline? Is this technology under consideration for application to other tactical vehicle platforms?

Mr. BUSH. The eLRV requirement was not developed and approved in time to be included in the President's FY22 budget request. However, in anticipation of funding, the Army has conducted several efforts to inform the requirement and the program. The Army has issued two market surveys and supported an Industry Day at Fort Benning, Georgia, that included ten vendors, and resulting in four follow-on, in-person demonstrations due to address proprietary concerns. The current draft ac-

quisition strategy projects costs of about \$6M in year one, \$10M in year two, and \$10M in year three. The eLRV has the potential to serve as the foundation of the Army's development of electric platforms, battlefield power recharge, and development of green technologies. The eLRV campaign of learning will enable the Army to scale technologies developed under the program, as well as inform other Army and DOD efforts

Mr. BROWN. The Army and contractor have highlighted significant investments made for the Armored Multi-Purpose Vehicle (AMPV) to include the first ever use of robotic welding on combat vehicles. What is the planned rate for Full Rate Production? What is the planned program of record through FY2026? Will the program plan meet the recapitalization and modernization requirements of the force?

Mr. BUSH. The AMPV Full-Rate Production decision is scheduled for 1st Quarter, Fiscal Year 2023 (FY23) to support an Army Authorized Objective of 2,897 vehicles, and the Army anticipates synchronizing production and fielding consistent with other Armored Brigade Combat Team (ABCT) combat vehicle platforms starting in FY23. The AMPV program meets the Army's modernization requirements by replacing the M113 Family of Vehicles in ABCTs.

Mr. BROWN. In regards to the acquisition strategy for the Joint Light Tactical Vehicle, how do the current requirements map to the Commandants redesign effort to become more expeditionary?

General SMITH. The Joint Light Tactical Vehicle (JLTV) is the Marine Corps' replacement for the legacy High Mobility Multi-Wheeled Vehicle (HMMWV) and an integral component of its ground combat and tactical vehicle portfolio. The JLTV provides scalable protection, high mobility, the capability to ford up to sixty inches of water, and increased networked capacity on a versatile, reliable, and efficient platform. In addition to utility and general purpose functions, the JLTV is the base platform and prime mover for forty other capabilities ranging from heavy weapons and precision fires to communication systems and air defense. By building off of the JLTV platform, the Marine Corps is able to leverage commonality and reduce supply chain and sustainment challenges.

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