

Senator Angus King:

... Submission for the Missile Defense Agency and missile defense policies in preparation for Fiscal Year 2023 National Defense Authorization Act. The Department of Defense has submitted to the Congress a missile defense review and nuclear posture review along with the national defense strategy. While this overall document is classified and we await an unclassified version, and await, and await.

Senator Deb Fischer:

And await.

Senator Angus King:

An unclassified version, we would like to have that by the way, it continues the policy of defending the Homeland and deterring attacks against the United States while assuring our allies through a regional missile defense strategy. I would note it also continues the policy of reliance on our nuclear deterrent to protect against large and sophisticated attacks against our Homeland from Intercontinental ballistic missiles, air launch ballistic missiles, or sea launch ballistic missile threats from near peer adversaries, such as Russia and China.

Senator Angus King:

Missile Defense has two new aspects that we hope to examine in today's hearing. First and foremost is the defense against hypersonic missiles, which do not follow a ballistic trajectory. Second is the requirement to protect Guam against any threats that China might pose. This is a daunting task that requires integration of missile defense systems from the Army, Navy, and Missile Defense Agency, and what I hope we will learn more about in today's hearing. The President's budget submission for the Missile Defense Agency is 9.6 billion dollars, a decrease from the Fiscal Year 2022 to enacted level of 10.3 billion dollars.. I would like to know how the Fiscal Year 2023 budget request continues your effort for Homeland and Regional Missile Defense, as well as defense against new threats, such as hypersonic missiles.

Senator Angus King:

Again, let me thank today's witnesses for agreeing to appear. After opening statements, we'll have rounds of five minute questions for the witnesses. Senator Fisher?

Senator Deb Fischer:

Thank you, Mr. Chairman. Welcome to all of our witnesses today. We appreciate you appearing before us today. We look forward to hearing from each of you. Overall, the budget request for Fiscal Year 2023 is a significant improvement over what the administration proposed last year and contains robust funding for the next generation interceptor program, as well as for the defense of Guam. While I'm happy to see the department finalize its plan for defending Guam and dedicate significant resources to do so, I can't help but feel that this effort is already behind. The last two INDOPACOM commanders [inaudible 00:02:47] support for this project and this subcommittee proposed to begin funding it two years ago, an effort that was ultimately rejected in favor of further study. In the time that's past, the threat has only gotten worse.

Senator Deb Fischer:

Additionally, I continue to be concerned about the overall level of funding for missile defense proposed in this year's budget proposal. Compared to the FY 22 appropriation, the Missile Defense Agency's budget would decline by over 700 million dollars, a reduction of over 7% at a time when threats are growing and the department's purchasing power is being eroded by the effects of inflation. I look forward to hearing more from our witnesses about these issues and about how the FY 23 request would impact their mission. Thank you, Mr. Chairman.

Senator Angus King:

Thank you. Our witnesses today are the Honorable Dr. David Honey, Deputy Undersecretary of Defense for research and engineering, Honorable John F Plumb, Assistant Secretary of Defense for space policy, General Glenn VanHerck, Commander US Northern Command and North American Aerospace Defense Command, Lieutenant General Daniel Karbler, Commanding General US Army Space and Missile Defense Command, and Vice Admiral John Hill, Director Missile Defense Agency. Secretary Honey, please.

Honorable David Honey:

Chairman King, Ranking Member Fischer and distinguished members of the Strategic Force Subcommittee, thank you for the honor to appear before you today, and to provide testimony on behalf of the Department of Defense for the Center Arms Services Committee Hearing on missile defense. I am pleased and appreciate the opportunity to discuss this important topic.

Honorable David Honey:

In a rapidly evolving threat environment, US adversaries are developing more lethal weapons by advancing technology in areas such as ballistic, hypersonic, and cruise missiles that threaten the safety and security of the United States and our allies. In support of the National Defense strategy priorities, the Department of Defense created the Office of the Undersecretary of Defense for research and engineering to set the strategy for technology and innovation while addressing the needs of the joint force.

Honorable David Honey:

Directed energy, a defense specific technology, is a key critical technology area we are developing to counter a wide variety of current and emerging threats with a goal of rapid response in engagement at the speed of light. This is a joint effort that is being largely supported and carried out by the Office of the Undersecretary of Defense for research and engineering, the Missile Defense Agency, the Air Force, the Army, and the Navy.

Honorable David Honey:

The scope of the effort spans countering cruise missiles in the near term, hypersonic missiles in the near and medium term, and ballistic missiles in the long term. To address the threat of adversaries cruise missiles, a number of key technologies and capabilities crucial for counter and cruise missiles will be demonstrated over the next two years. The OUSDRNE, high energy laser scaling initiative also known as HELSI, is funding industry to develop and deliver high energy laser technology for cross domain applications across the department.

Honorable David Honey:

The department is also developing high power microwave weapons for a wide range of missions, including countering drones, cruise missiles, and hypersonic missiles. There is microwave technology test bed at MDA, the remote electromagnetic disruption of critical advanced threat, also known as REDCAT at the Navy, and the countering electronic high power microwave, extended range, airbase air defense, [Jamira 00:06:18] at the Air Force.

Honorable David Honey:

Lastly, countering hypersonic and ballistic missiles will require substantially more laser power. Therefore, under the HELSI effort, R&E will begin scaling laser powers in Fiscal Year 2023 and is examining opportunities to accelerate the scaling significantly. This combined with improved beam control systems will allow capabilities against hypersonic and ballistic missiles to be developed by the Services and the Missile Defense Agency.

Honorable David Honey:

Chairman King, Ranking Member Fischer, members of this committee, R&E is committed to setting the technology and innovation strategy to advance defense specific technologies such as directed energy and deliver these critical capabilities to the war fighter. We will continue to support these joint efforts to increase readiness, as well as the capability and capacity of fielded, Homeland, and regional missile defense systems while investing in advanced technology that offer new ways to counter a diverse set of threats. Thank you again for the invitation to testify. I look forward to answering the committee's questions. Thank you.

Senator Angus King:

Dr. Plum.

Honorable John Plumb:

Chairman King, Ranking Member Fischer, members of the committee, thank you for inviting me again to testify today on missile defense strategy, policies, and programs. The missile threat continues to evolve. As Secretary Austin has stated, China is the department's facing threat. China has advanced its missile capabilities over the last 20 years to counter the US and the Indo-Pacific, and to intimidate and threaten its neighbors, including Taiwan.

Honorable John Plumb:

Russia is developing testing and deploying new missiles that pose challenges for US missile warning. In Ukraine, Russia has launched well over 1500 missiles as part of an unprovoked campaign that has caused the deaths of thousands.

Honorable John Plumb:

North Korea continues to improve expanded diversify its missile capabilities, posing an increasing risk to the US Homeland, our forces, allies and partners. North Korea has accelerated its missile testing in recent months, including the launch of long range missiles. Iran maintains a large and growing inventory of regional missiles, as well as [uncrude 00:08:30] aerial systems, UAS, which it uses both directly and via proxy groups to strike its neighbors.

Honorable John Plumb:

Iran's Nascent Space Program could shorten its pathway to a future long range missile capability. In light of these threats, the department reassessed its missile defense policy, including inputs from interagency stakeholders, allies, and partners in the 2022 Missile Defense Review, the MDR. As you've noted, the classified MDR was provided to Congress in late March.

Honorable John Plumb:

Missile Defenses contribute to deterrence in many ways. They provide resilience. They complicate adversary attack plans and reduce adversary confidence. They raise the threshold for potential conflict. They help assure our allies and partners, and they limit damage from missile attacks, which in turn provides additional decision space for national senior leadership.

Honorable John Plumb:

The department's top priority is to defend the Homeland and deter attacks against the United States. The President's budget request includes significant investments in Homeland Missile Defense, including 2.8 billion to develop the next generation interceptor, and for the service life extension of our GBIs, 4.7 billion to fund the transition to a resilient missile warning and missile track satellite architecture. It's important to note that this is not part of the MDA budget. This is 4.7 billion dollars for the space force. 278 million for new over the horizon radars to enhance our ability to detect cruise missile attacks from the Homeland and 892 million to field missile defense capabilities to augment the THAAD battery on Guam. Guam, like all US territories, is unequivocally part of the US Homeland and a missile strike against Guam is a direct attack against the United States.

Honorable John Plumb:

For regional defense, the department is also strengthening our missile defenses to counter regional threats that include hypersonic threats. The President's budget request invests heavily in regional ballistic cruise and hypersonic missile defenses, including 3 billion for army ballistic and cruise missile defense programs, including the procurement of 252 more Patriot interceptors, 2 billion for [EEGs BMD 00:10:38], including procurement of 57 more SM-3 missiles, 335 million for THADD development procurement and testing, 1.3 billion for hypersonic missile tracking and defense. And 825 million for counter UAS solutions.

Honorable John Plumb:

The sobering reality of the tragic event in Ukraine, in which Russia has used and continues to use a broad array of missiles to attack, and in my opinion, terrorize civilian populations, highlights the extent to which our adversaries are prepared to use missiles in a conflict. Missile defenses are critical for defending the US Homeland, and for defending our deployed forces and our allies and partners. The department and the administration remain committed to improving them. I look forward to working with the Congress to advance this shared goal. I thank you and look forward to your questions.

Senator Angus King:

General VanHerck.

Gen Glen VanHerck:

Chairman King, Ranking Member Fischer, distinguished members of the subcommittee, it's my honor to represent the men and women of the United States Northern Command and North American Aerospace

Defense Command as we defend Canada and the United States. I appreciate the opportunity to testify alongside Dr. Honey, Dr. Plumb, Vice Admiral Hill, and Lieutenant General Karbler.

Gen Glen VanHerck:

NORTHCOM and NORAD faced the most dynamic and strategically complex environment in our respective histories. Strategic competitors have openly declared their intent to hold our Homeland at risk in an effort to advance their own entrance and limit our options and ability to respond. North Korea continues to test nuclear capable ballistic missiles with increased range and lethality, while Russia and China have fielded and continued to invest heavily in advanced long range cruise missiles, hypersonic missiles, and delivery platforms. As we've seen throughout Russia's unprovoked and irresponsible invasion of Ukraine, Russia has fielded large numbers of long range cruise missiles, including hypersonic missiles that can cause enormous damage to infrastructure, create strategic effects with conventional warheads.

Gen Glen VanHerck:

These conventional precision strike capabilities and advanced delivery platforms are designed specifically to hold critical infrastructure in the Homeland at risk below the nuclear threshold, in order to disrupt and delay our ability to project power globally, while attempting to undermine our will to intervene in a regional crisis overseas. In my view, missile defense of the Homeland starts with the strategic deterrent to include the options and survivability provided by reliable and effective nuclear triad, but as I testified before the full committee, I'm concerned that deterrence by cost imposition does not adequately account for the conventional capabilities our competitors have already fielded. This over reliance increases the risk of miscalculation and escalation because it limits our national leaders' options in crisis and conflict.

Gen Glen VanHerck:

To account for the full range of our competitors nuclear and conventional capabilities, it is necessary to balance deterrence by cost imposition with deterrence by denial, an integrated deterrence that employs all elements of national influence. This integrated approach leverages both military and nonmilitary capabilities in order to provide our leaders with a wide range of timely deterrence options. To be clear, we must continually demonstrate to potential aggressors that an attack on the Homeland will result in failure. We do that by demonstrating reliable and effective capabilities that cause potential adversaries to doubt their chances of an effective attack on the Homeland. This is why I continues to support Vice Admiral Hill's plan to field the next generation interceptor by 2028 or sooner, if possible.

Gen Glen VanHerck:

Deterrence by denial also includes demonstrating Homeland readiness, responsiveness, and resiliency along a range of kinetic and non-kinetic capabilities to defend the Homeland. NORTHCOM's support to civil authorities and our security cooperation relationships with allies and partners are critical to integrated deterrence, as is NORAD's mission to provide threat warning and attack assessment and defend the approaches to North America.

Gen Glen VanHerck:

In this strategic environment, we cannot wait for our competitors to act. It is vital that we get ahead of our competitors' decision making and provide our national leaders with timely and informed options needed to achieve favorable outcomes. With that necessity in mind, NORTHCOM and NORAD are

focused on four strategic principles in our Homeland Defense design, starting with all domain awareness, from undersea, to [on orbit 00:15:08] and everything in between, to include the cyber domain. Simply put, we have to be able to see the threats in order to deter, and if required, defeat them.

Gen Glen VanHerck:

I want to thank the subcommittee for your support of the Over the Horizon Radars on my FY 22 unfunded priorities list. Over the Horizon Radar will significantly improve my ability to detect and track threats in the air, maritime, and space domains. I ask for your continued support in authorizing the funding requested for Over the Horizon Radar in the FY 23 President's budget.

Gen Glen VanHerck:

All domain awareness is required to achieve information dominance, which is the use of advanced capabilities like machine learning and artificial intelligence to quickly analyze, process, and deliver data to decision makers at the speed of relevance. By doing so, we will increase senior leader decision space, enable decision superiority over competitors.

Gen Glen VanHerck:

Finally, today's problems are global and all domain, and they demand globally integrated strategies, plans, and actions. Missile threats to the Homeland inherently originate beyond my area of responsibility, so it is vital that we have the ability to detect potential threats and share data rapidly between commands, agencies, allies, and partners around the world. These strategic priorities are vital elements of our ability to execute a layered defense in the execution of the National Defense Strategy and integrated deterrence.

Gen Glen VanHerck:

I'll end by thanking the committee for all you've done to support our soldier, sailors, Airman's, Marines, and Guardians as they defend the Homeland. Thanks for the opportunity to appear. I look forward to your questions.

Senator Angus King:

Thank you General. General Karbler.

LTG Daniel Karbler:

Chairman King, Ranking Member Fischer, distinguished members of the subcommittee, I'm honored to, again, testify before you representing an incredible people first organization of more than 3000 soldiers and civilians across 10 time zones and 22 locations. These amazing professionals provide space, high altitude-

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LTG Daniel Karbler:

These amazing professionals provide space, high-altitude, and missile defense forces and capabilities to Army and joint war fighters. Let me express my sincere appreciation for your continued support of our people and their families.

LTG Daniel Karbler:

My role remains unchanged from previous testimony. I serve as the commander of the Joint Functional Component Command for Integrated Missile Defense. As the Army's proponent for air and missile defense, or AMD, I provide U.S. Northern Command the soldiers who stand ready to defend our nation from intercontinental ballistic missile attack. I serve as the Army's service component commander to both U.S. Strategic Command and U.S. Space Command, and I serve as the Army's AMD enterprise integrator.

LTG Daniel Karbler:

We have witnessed significant changes over the past year to include the largest employment of offensive missile systems in Europe since World War II in Russia's invasion of Ukraine. Like Russia, other potential adversaries across the globe are developing, fielding, and normalizing the use of increasingly diverse, robust, and lethal offensive missile systems in an attempt to gain coercive power and strategic advantage over the United States and our allies and partners. It has never been more imperative that we strengthen our capabilities to deny our adversaries the benefits of using these weapons.

LTG Daniel Karbler:

We'll accomplish this through continued investment and sustainment of combat-ready, integrated, and lethal AMD forces. Space capabilities combined with our allies and partners will also prove essential in ensuring our nation's security. To address the challenges of the ever-changing landscape, we continue to implement new ways of accomplishing our mission and enhancing our capabilities. To briefly outline a few enhancements, our space and missile defense soldiers and civilians have completed an upgrade to our joint tactical ground stations at our four global theater missile warning company locations.

LTG Daniel Karbler:

These upgrades improve our missile warning, missile defense queuing, and battle space characterization in support of multi-domain operations. We relocated two European-based U.S. Patriot batteries to Poland and one to Slovakia. This defensive relocation reinforces our nation's commitment to Article 5 and proactively counters any potential threats to U.S. and allied forces in NATO's Eastern region.

LTG Daniel Karbler:

During a joint March 2022 exercise, an air defense battalion under the European-based 10th Army Air Missile Defense Command successfully deployed four maneuver short-range air defense striker-based platforms throughout NATO's Eastern region, a move of over 1,500 miles, which culminated in a successful live-fire in Estonia. Support to testing and exercises remains a priority.

LTG Daniel Karbler:

Earlier this year, Air Defense Artillery soldiers participated in THAAD flight test 21, where two Patriot Advanced Capability-3 missile segment-enhanced intercepts were integrated with THAAD software to successfully intercept two short-range ballistic missiles. This integration enables earlier interceptor launch and results in increased defended area battle space. Our soldiers also recently completed phase one of the Integrated Air and Missile Defense Battle Command System, initial operational testing and evaluation, in full support of the Army's number-one AMD modernization effort.

LTG Daniel Karbler:

Let me close by again highlighting our most important asset, our people, who remain committed to accomplishing our no-fail national security mission. Despite the challenges of the COVID-19 pandemic, our professionals continue to provide space and missile defense capabilities that support combatant commanders. It is our people who make us strong, it is our people who make winning possible. I consider it an honor and a privilege to lead and serve alongside them, and request the continued support of Congress to sustain our ability to recruit, develop, retain, and resource such a highly qualified and mission-ready team. When you put people first, winning happens. I look forward to addressing your questions. Thank you.

Senator Angus King:

Thank you, General. Admiral Hill.

VADM Jon Hill:

Good afternoon, Chairman King, ranking member Fischer, distinguished members of the subcommittee. It is a great honor to be here with some incredible key partnerships here to testify before you today. I'd like to first start by recognizing and thanking those who operate from abroad and here at home, operating the Integrated Missile Defense System. Then, of course, I'm Missile Defense Agency team comprised of military, civilian, and contractor workforces that ensure that the war fighters can operate those systems.

VADM Jon Hill:

Our FY23 budget was mentioned, is 9.6 billion, to continue the mission of protecting the homeland, our four deployed forces, our friends and allies. A little bit back on the threat. Everyone's mentioned it. I want to put a finer point on it. When you think about advanced ballistic missiles, long-range cruise missiles, hypersonic missiles, what that really means down at the war fighter level is heavy maneuver, large numbers at high speed, with 360 degree attack. That is a challenge.

VADM Jon Hill:

So, rather than walking through all of the elements of the Integrated Missile Defense System that we have deployed globally and operated by our services, I want to focus in on what I see as the three top priorities for PB23. Priority one is the no-fail mission of defend the homeland against ballistic attacks from the rogue nations. I want to thank Congress for the great support on the Service Life Extension Program. We are making great progress. We are on track, ahead of schedule. We've got the first round that we refurbished back in the hole now, number two's inbound, and rounds three, four, and five are being processed now. That is going to extend the reliability of our in-service fleet.

Senator Angus King:

I'd prefer you not use the term inbound in this room. Makes me a little nervous.

VADM Jon Hill:

Yes, sir. I will scratch that from the script. Then I'd like to switch on over to the next-generation interceptor. It was mentioned earlier. We are, like light speed, working very closely with General VanHerck and his team to ensure that the two contractors that we put in place last year about this time, March of 2021, are tracking to get to first emplacement around the 2028 timeframe. Right now, both are performing so well that they are anticipating and our team believes that we're tracking towards

2027. That's incredible. That means flight testing earlier, that means ground testing earlier, that means we have a better sense of where we are as we move forward to upgrade the numbers of intercepts and the capability that we'll be bringing forward.

VADM Jon Hill:

Priority two, and the reason it's priority two, not just because it's a territory with U.S. citizens living on it, it will be one of the most difficult things we do as an agency, and that is the defense of Guam. We have a current architecture with a ship stationed up forward, and we have a THAAD battery on the island. We have a clear set of operational requirements from INDOPACOM. We finalized the architecture in PB23. The department did provide funds in FY22 to accelerate, and then Congress added a plus-up for us to do that. Our plan is to leverage mature systems, to expand so that we have emerging capabilities tied in, and I think the most important thing that we'll bring to the table, it's a single command and control structure. Critically important for the Pacific Defense Initiative. So we're staying very close to INDOPACOM as we move through this development.

VADM Jon Hill:

Priority three, really driven by the threat, and that's the hypersonic missile defense that's been mentioned by everybody. We are leveraging our existing sensors today to get indications and warnings, so we're not starting at zero. Our Command Control Battle Management deployed globally has the ability to pull in the space assets that are available, the land-based assets, the sea-based assets to get us track on hypersonics when they fly through the field of view. Our Command and Control Battle Management System, C2BMC, is running a prototype today that provides indications and warning to INDOPACOM.

VADM Jon Hill:

Where we're going in FY23 is we will have our first two hypersonic ballistic tracking space sensors, HBTSS, in space, operating in an inclination to where we can collect data from testing we do in the INDOPACOM region. We are going to get fire control data where we can leverage our weapons. What we have deployed today for hypersonic defense with the sea base is the sea-based terminal capability. I mentioned that already. That's been deployed for a while. We're on increment two of that capability, moving out towards increment three. When I say that, that means we're expanding the threat set to take on a larger number of those hypersonic threats.

VADM Jon Hill:

Where we need to go is away from the terminal area. You have to defend there, but it is the most difficult place to engage because you really don't know where a terminal is going to be, because it is maneuvering and it is high speed. So we're moving to get to a layered defense capability, and in PB23 we are going forward with the Glide Phase Interceptor. We have three companies on board now, and we'll be down selecting to two later this year.

VADM Jon Hill:

So Chairman King, ranking member Fischer, members of the subcommittee, MDA continues to increase readiness, resiliency and cybersecurity, and the capability and capacity of homeland and regional defenses, while investing in advanced technology. We are committed to attracting and building a strong, talented future workforce, and our capabilities-based approach and unique acquisition authorities enable MDA to deliver by, through, and with the services to the combatant commands to meet their

requirements. I appreciate your continued support for the Missile Defense Agency, the people, and the missile defense mission. I look forward to answering your questions. Thank you.

Senator Angus King:

Thank you, Admiral. Thanks, all of you, for your extraordinary service and work. I want to start with some budget questions. I don't think we're seeing the full picture when we talk about the Missile Defense Agency budget. Dr. Plumb, there are other missile-related expenditures in other parts of the budget? I think you touched on this. I want apples to apples, from last year to this year, on the whole missile defense enterprise.

Honorable John Plumb:

Yes, sir. I don't think I could give you the specific numbers. I will say, at least for the \$4.7 billion for the transition, this is the first piece of funding to transition to a robust proliferated low-earth orbit missile warning and missile track architecture, including a architecture that can observe hypersonic weapons. That's \$4.7 million more than was in the budget previous year. That's a new thing. My colleague here, Secretary Honey, was just talking about the directed energy funding. That funding is no longer part of MDA's budget, at least most of it. It's now with R and E, so there's a bucket of money there.

Senator Angus King:

It would be helpful for me, Dr. Honey, for the record, not right now, but for the record of this hearing, if you could give us a sort of apples to apples with all the pieces of the budget last year and this year. Can you supply that?

Honorable John Plumb:

Yes, we'll take that for the record, sir.

Senator Angus King:

Thank you. I appreciate that. Hypersonic defense. Well, let me just back up. I am disturbed by the fact that the president's budget proposes a cut at a time when we all know that we're facing a new threat, and an important one. So perhaps what you're telling me is that there's money in other places to deal with the threat by things like directed energy. Is that correct?

Honorable David Honey:

Yes, Senator, that is correct. We do have funds elsewhere that are developing directed energy solutions for that particular threat.

Senator Angus King:

Okay, well, I hope you can supply that for the record, as you suggested you would. What have we learned from Ukraine? I'll direct this to any of the witnesses, but I would think the guys with the uniforms on might have some thoughts. General Karbler, what have we learned?

LTG Daniel Karbler:

Sir, a couple lessons that I've taken personally from Ukraine and that we're applying within the air and missile defense community, first, as I said, in my opening statement, we see adversaries normalizing use

of ballistic missiles. If you went back about 10 years, force on force, ballistic missile use just was not as prevalent. Now we see Russia as well as other adversaries using ballistic missiles.

Senator Angus King:

And conventional air defense doesn't work?

LTG Daniel Karbler:

No, sir. You need ballistic missile defense in order to be able to counter that. With that, we recognize also that it can't just be an active defense solution. We've got to be able to integrate offensive capabilities to take out those missiles when they're on a tell, or when an aircraft is on a runway or in a hanger. So the offensive/defensive integration is key, as well as then the layered missile defense. So everything from THAAD to Patriot to-

Senator Angus King:

Isn't it true that most of the damage done in Ukraine has been done by artillery and missiles, not by conventional aircraft dropping bombs?

LTG Daniel Karbler:

Yes, sir. So that layered defense would allow us, from Army capabilities, THAAD and Patriot, to counter ballistic missiles, as well as cruise missiles, and even our Counter-Rocket, Artillery, Mortar, our C-RAM systems that we have, to get after those particular artillery pieces.

Senator Angus King:

The question I've gotten from a variety of people is why haven't we provided the Ukrainians with Iron Dome or something like Iron Dome?

LTG Daniel Karbler:

Sir, the reason that we put a Patriot battery into Slovakia was because the Slovaks provided an S-300 system into Ukraine.

Senator Angus King:

And that's a rough equivalent?

LTG Daniel Karbler:

It's a rough equivalent to Patriot. As far as the U.S. providing Iron Dome into Ukraine, any involvement of any U.S. air defense forces in Ukraine would have to be a policy discussion.

Senator Angus King:

I understand. General VanHerck, the Arctic. Give me 30 seconds on the importance of the Arctic in terms of this process. It seems to me that's opened up a whole new level of strategic competition.

Gen Glen VanHerck:

Senator, that's exactly right. Environmental change in the Arctic is creating opportunities and vulnerabilities. Access to resources that didn't exist years ago, longer shipping seasons, economic

prosperity, but what we're seeing is those norms, rules, and international laws that have served U.S. well since the end of World War II are under challenge in the Arctic and elsewhere around the globe.

Senator Angus King:

Would it help if we acceded to UNCLOS?

Gen Glen VanHerck:

Senator, I support the succession to UNCLOS as soon as we can, if we can make that happen.

Senator Angus King:

Thank you. Thank you very much, General. Senator Fischer.

Senator Deb Fischer:

Thank you, Mr. Chairman. Admiral Hill, I understand the Missile Defense Agency plans to deploy two satellites equipped with a hypersonic and ballistic tracking space sensor. What is the department's plan for this capability beyond these two prototypes?

VADM Jon Hill:

Senator, thank you. Great question. Just to go back, what hypersonic ballistic tracking space sensor does, it's really two functions. The B stands for ballistic targets, and that handles some of the changes that we're seeing in the ballistic flights today. Think of changes in propulsion, which challenge our sensors today. So we're going to meet that challenge with HBTSS. But what it really does is it gives us fire control quality data on hyper glide vehicles. When I say fire control, I'm not talking about putting out fires. What I'm talking about is very discreet positional and velocity differences so that we can get a very firm track and put a weapon on it. The weapons are very sensitive to having a very firm track, and we get that fire control data from HBTSS.

VADM Jon Hill:

Now, to your larger question of how does it fit into the broader architecture, we're very close with the Space Force. They are working that architecture. It's not complete yet. What we will do in '23, by having those first two in air, they're built by two different companies, but they will be interoperable. They're interoperable on the ground today. We will track different flight tests that we do, and we will prove that we have that data so we have the confidence to then proliferate. We'll work that closely with the Space Force over the next year to determine where they go. And there's flexibility in the sensor. It doesn't have to be limited to a LEO constellation. We can go with MEO, and so there's lots of flexibility, low-earth and medium-earth orbit. So we're working that with the Space Force, and we'll be part of that broader architecture. Thank you, ma'am.

Senator Deb Fischer:

I know that there are other programs under development that are related to the missile warning and tracking, but are any of these other capabilities comparable in terms of being able to provide that fire control quality data that you need?

VADM Jon Hill:

Ma'am, it really is unique to HBTSS for the hyper glides. Space capability is so important, not just because we're going to catch the global maneuver, but we use it for indications of warning. It's what kicks off an engagement today. General Karbler talked a little bit about that. When we see the flash, then it'll go through the face of a radar, and that's how we get a track. We can see the track on the ground. For hypersonics, since they're very hard to see, they'll normally maneuver outside the field of view of a ground-based radar or a sea-based radar. You need that sort of constellation in place to get to the fire control data.

VADM Jon Hill:

When I look at the capabilities that are in the architecture today, they're very complimentary. The wide field of view, think of that as surveillance. When we say track with a wide field of view, that's going to contain those tracks, and then they queue the HBTSS to go and get that very fine precision track that we need to place a weapon on target.

Senator Deb Fischer:

How long do you think you're going to be collecting all this data on these prototypes before we're ever going to see any kind of plan for what the future is going to be, for what we're going to need in the future?

VADM Jon Hill:

Yes, ma'am. If we get this right in terms of-

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Senator Deb Fischer:

... going to need in the future.

VADM Jon Hill:

Yes. Ma'am. If we get this right, in terms of defining the architecture based on the data we have, we can make decisions as early as possible. My-

Senator Deb Fischer:

What does that mean, early as possible?

VADM Jon Hill:

I think for sure what-

Senator Deb Fischer:

You know I get really nervous when I hear dates like 2028 for something, and we're pleased that it's 2027.

Senator Tommy Tuberville:

Eisenhower retook Europe in 11 months.

Senator Deb Fischer:

Shush. How are we going to condense the time period then maybe have to accept more risk?

VADM Jon Hill:

Perhaps. But I think right now we're not starting from zero, in the storytelling of putting two up in March of '23, there's work that's being done now in that architecture. Decisions can be made early for that proliferation and planning for that and making sure that we have the industry lined up to execute.

Senator Deb Fischer:

At the hearing last year, I asked about the status of implementing section 1684 of the FY 2017 NDAA which requires the Department to designate a single entity as the lead acquisition organization for defending the homeland from cruise missiles. General VanHerck and Admiral Hill, you both made clear at the time your support from making this designation. Dr. Plumb, welcome back again. When can we expect the Department to finally resolve this?

Honorable John Plumb:

Thank you Senator Fisher, as you are probably aware, both the secretary and the deputy secretary have committed to moving this forward. I'm headed to give you a specific date, but I think it's in the near future and the joint staff is working on that is my understanding.

Senator Deb Fischer:

I would just like to note another thing I'm worried about is lack of action. It would be nice to see things move forward at a quicker pace.

Honorable John Plumb:

I am pushing on it.

Senator Deb Fischer:

Thank you. General VanHerck, in your unfunded priorities list, it includes \$50 million for cruise missile defense demonstration involving an elevated sensor. Can you describe that project and how it would contribute to pacing the growing cruise missile threat to the homeland?

Gen Glen VanHerck:

Senator, that's an opportunity to basically go all the way from the domain awareness sensor through a joint tactical fire control system. Admiral Hill talked about that earlier to the actual execution and demonstration from a sea-based missile system to engage a cruise missile. It would help us reduce risk and move forward in the near term if we got that \$50 million to demonstrate three separate engagements of capability.

Senator Deb Fischer:

Thank you, Mr. Chairman,

Senator Angus King:

Senator Tuberville.

Senator Tommy Tuberville:

Thank you very much. Thanks for being here. I want to follow up a little bit on what Senator King was saying earlier general.

Senator Tommy Tuberville:

General Karbler, my former job of coaching, I used to watch teams on the field on film. Sometimes you'd think a lot more of them, sometimes you think less, than all of a sudden you get them in a real game, you found out what they were. Russia's missiles in the last 90 days we've seen them in action. Can you give a coach's perspective and evaluation of what they've done, how they've done it, has it been good, bad, indifferent?

LTG Daniel Karbler:

Sir, I'll give you a coach's perspective. The offensive line is not coordinated with the quarterback, who's not handling the ball off to the running back and the wide receivers are jumping off sides. What do I mean by that? We've seen him employ his missile systems in artillery disconnected from any kind of ground maneuver. Anybody that understands combined-arms maneuver know that you need to employ both and concert each other to accomplish whatever your campaign objectives are. And we see him not doing that, whether it's the missile efficacy, whether it's incompetence of the ground forces, inability to move, logistics challenges, et cetera. From a coach's perspective, none, none of the players on the offensive side have come together to move the ball down the field.

Senator Tommy Tuberville:

There are missiles that they've launched. What percentage of them have worked? Do we have any idea?

Gen Glen VanHerck:

I can talk about that.

Senator Tommy Tuberville:

Go ahead.

Gen Glen VanHerck:

I probably shouldn't talk about that in an unclassified session. Why we'll tell you originally, we thought they weren't working at a rate that was as good as ours, but what I would say is they're on par with our capabilities, not all of them, specifically their cruise missiles. They've had challenges with some of their hypersonic missiles as far as accuracy, but I would not take away from a strategic perspective that Russia's cruise missile or hypersonic missile, their strategic capabilities have severely underperformed. I just want to make that clear.

Senator Tommy Tuberville:

They make their own?

Gen Glen VanHerck:

My understanding is they internally... Not the military makes them, but they have companies contractors within Russia that make them, as well. You may know more, John.

Honorable John Plumb:

Yes, sir. I think that explains it pretty well.

Senator Tommy Tuberville:

Thank you. General VanHerck, you talked about the homeland, we've got a lot of work to do defending the homeland with hypersonics from China and ballistic missiles. My understanding is we have a majority of our F-22s and 35s in Alaska. Do we have a defense system up there that will protect them?

Gen Glen VanHerck:

Senator, it depends on what we're protecting them from. I'm confident in the ground-based interceptors that are there. From ballistic missiles, yes, we do have that capability.

Gen Glen VanHerck:

With regards to cruise missiles, hypersonic cruise missiles that are actually currently coastal defense cruise missiles in Russia, I have significant concerns about my ability to defend those assets. Not only F-22s, Senator, you have significant portions of our ballistic missile and our threat warning capabilities in Alaska. Cobra Dane is out there at Clear Station. We have the radar and we're building our long-range discriminating radar, as well. I was just there by the way. Very, very impressive.

Senator Tommy Tuberville:

Thank you. This is to anybody, fixed interceptor sites, we're talking about trucking missiles in Guam, 42 trucks carrying missiles around, and that doesn't seem logical to me. The MDA is the lead architect and it looks like we're going to have to find somebody to man and train them. Anybody talk about that? About Guam and the missile system that we're putting on Guam.

VADM Jon Hill:

Yes, sir. I can give you some insight there. First, it was a pretty extensive department-wide study. We did look at a number of fixed site options. And then in the end, just given the capability that we need on the island and the flexibility there, we did go with mobile across the board. The sensors will be mobile. The command and control, there's an option to be mobile. We're working that very closely with them [inaudible 00:41:36] now, and when it comes to launching systems, those are mobile.

VADM Jon Hill:

I think the goodness that comes out of that is the investments that we make there, it's not a big engineering leap to get to that and we have the existing army mobile launchers, but the launchers that carry SM-3 and SM-6, the work that needs to be done to move those or have them in a mobile launcher is pretty straightforward, we think we can accomplish that and it does give the combatant commander options on where he can move those downstream. We'll initially site them in an area, and then if we need to move them, we'll move them.

Senator Tommy Tuberville:

And if we once had an Iron Dome in Guam, we don't anymore. Is that correct?

VADM Jon Hill:

I'll let turn that over to General Karbler.

LTG Daniel Karbler:

Sir, we exercised Iron Dome, we have two Iron Dome batteries. We sent one out to Guam to exercise and to make sure it was deployable and that the soldiers could operate it. But Iron Dome is not our ultimate solution for [inaudible 00:42:28] defense.

VADM Jon Hill:

Thank you. Thank you, Mr...

Senator Angus King:

Senator Rounds.

Senator Mike Rounds:

Thank you, Mr. Chairman. Gentlemen, thank you all for your service to our country.

Senator Mike Rounds:

Dr. Plum, it seems like this is the 11th or perhaps the 12th time that you've appeared before either the full committee or a subcommittee over the last few weeks. And it's been mainly been concerning nuclear weapons in space. You're also the DOD principle cyber advisor. I'd like to ask you how challenging it is to serve as the OSD lead for space policy, nuclear weapons, countering the WMDs, missile defense, electromagnetic warfare, and cybersecurity, which are six significant roles. Do you have sufficient resources to execute your responsibilities?

Honorable John Plumb:

Thanks for that question, Senator, it is a sizable portfolio. It is pretty fun, frankly. It's a good suite of strategic capabilities and I think they marry up quite well. Space layers through all of them, cyber through all of them, and they're all what I would consider is strategic layers to integrated deterrence.

Honorable John Plumb:

As far as the resources needed, the office is far more than just me. I have my [inaudible 00:43:50] ships. I have the principal cyber advisor, but since you've given the opportunity here, I will just say policy, as in general, could use more manpower or I guess I should just say civilians. We need more manpower resources. I think the growth in space, the growth in cyber, those two alone, and when you think that, for instance, the cyber offices are still basically staffed at the level they were five, six years ago, that seems like the wrong answer.

Senator Mike Rounds:

Can you talk a little bit about the cyber security element of both space and missile defense responsibilities and describe what you and your cybersecurity team bring to the table in this particular area?

Honorable John Plumb:

That's a very important question. Cyber security of our own forces, I think sometimes is confused with just cyber security, for instance, of the SIPRNet or of [inaudible 00:44:46], or even maybe the NIPRNet. But for the weapons systems themselves, absolutely essential, making sure we bake that into our space systems defense in-depth is a thing I like to say these hearings is really important, not just a perimeter. I've had several discussions with Admiral Hill here on missile defense, cyber security, as well. And all of these things are an ongoing issue that nothing's going to be solved overnight and it's never going to be fully solved, you have to keep improving and keep looking for what the adversary could possibly do and figure out ways to keep that in check.

Senator Mike Rounds:

A number of us on this committee have fought very hard to maintain key areas of the DOD spectrum. As the lead for electromagnetic warfare, can you tell this committee how important it is to be closely involved in the decision-making process when the federal government decides to conduct auctions for key DOD spectrum bans?

Honorable John Plumb:

Absolutely essential. Actually, my PhD involved global positioning system. That specific issue, which I think you're referencing is absolutely essential for DOD to be able to protect its ability to operate abroad.

Senator Mike Rounds:

When one agency or department of the federal government arbitrarily decides to auction Spectrum, it would appear that DOD should be directly involved in the discussions specifically to those areas of sale. Fair enough to say?

Honorable John Plumb:

I agree, sir.

Senator Mike Rounds:

Thank you. Admiral Hill, the United States has consistently provided missile defense capabilities in conjunction with Israel. It's been a good partnership both ways. Can you explain to this committee, the importance of our relationship with Israel? Specifically when it comes to missile defense for the United States and our allies and partners?

VADM Jon Hill:

Yes, sir, Senator, thanks for that question. We have a very strong partnership documented in an MOU and you know that half a billion dollars of the MDA budget goes to Israel. We work the full set of layered defense with Israel, from Iron Dome up to David's Sling, up to the variants of Arrow to include their latest elevated sensor of the work that they do, connecting all those and the networking of that. We also work with them on their target systems and we sit side by side and help them engineer through what they need to do to execute a test.

Senator Mike Rounds:

Fair enough to say it's a good partnership with information flowing both ways.

VADM Jon Hill:

It's a strong partnership and I would say it's beyond what you would normally see because we are side by side. There is not just the flow of information and the learning. There's definitely our people that just walk away from that having a better sense of tiered layered defense in a really constrained area with very short reaction times.

Senator Mike Rounds:

Thank you. I'm about it out of time, but I'm going to try to get into one more question. This for General Karbler, you mentioned relocating two Patriot batteries to Poland in March, it was a necessary move in our opinion, and I think you did the right thing. The question I have is how much more flexibility do you have to relocate missile defense capabilities when needed? What flexibility should you have and what is the state of the industrial base should we need to surge missile defense capabilities?

LTG Daniel Karbler:

Yes, Senator. The army air missile defense forces are the highest operational temple of any army forces that we have. Any deployment of them does stress the force. We are constantly looking at our air missile defense posture globally. We have battalions out in [inaudible 00:48:23], we've got the battalion in Germany, then we've got battalions that support CENTCOM. It does stress the force in talking with the chief of staff of the army about this just last week, he understands it and the secretary of the army, as well. They've committed to a 16th Patriot battalion, as well as a THAAD battery and a four additional maneuver shore at battalion. We are growing the air defense force in recognition of the OPTEMPO stress that's put on our soldiers.

LTG Daniel Karbler:

Senator, with respect to the industrial-based capability, I've really had to defer that to the PEO Missiles of space, the acquisition side, but I would tell you from my experience, if I went back to Desert Storm when we had very, very few Patriot interceptors to do ballistic missile defense and the industry ramped up very quickly and was able to get those Patriot interceptors out to the Patriot... I was in Israel, to the Patriot units in Israel, as well as the Patriot units that were in Saudi Arabia.

Senator Mike Rounds:

Thank you. Thank you, Ms. Chairman.

Senator Angus King:

Thank you. We'll have a second round of questions for those who have additional questions. I think it was Admiral Hill, you used the term, fire-controlled data, with regard to hypersonics. I wrote in my notes, "Fire what?" What are we firing? As you know, we've talked about this, I am gravely concerned about the strategic change in the whole scene of battle that hypersonics represent. And I know we're working on it and we're talking about it. I want a sense of urgency. Tell me Admiral, you're the commander of an aircraft carrier 800 miles from China and they send a hypersonic missile your way, you've got about nine minutes to figure out what to do. I want to know how close we are to having a defense. And I guess the second question is, is North Korea developing hypersonic capability? Because if they are, that's where we need to be focusing, not on hitting a bullet with a bullet over the north pole.

VADM Jon Hill:

Yes, sir, Senator. Thanks for that question. We often talk about hypersonics and assume we're at zero. We are not at zero. I mentioned earlier that we have a command and control battle management capability that takes the space sensors that we have today, the land-based sensors and the sea-based sensors. And what's really key about sea base is that is where the defensive capability resides today. When a carrier strike group goes forward to use your example, they have some number of destroyers with them. And on those destroyers today, the sea-based terminal capability is on those ships. We did that based on a request...

PART 3 OF 4 ENDS [00:51:04]

VADM Jon Hill:

Terminal capability is on those ships. We did that based on a request from the CNO, because he was concerned about the carrier killer missile. You've heard plenty about that in the white press. Looks ballistic, so we have an ability with SM-3 in the upper tier to take out that threat. And then we have, in the lower tier, C based terminal, which is really a capability that we insert into the SM-6 missile that the Navy produces. So the Navy is producing those in number. MDA is providing the software package and the work in the combat system to control that missile. So we have the capability to take on the advanced maneuvering threat and terminal.

VADM Jon Hill:

I will say terminal is not sufficient. As I mentioned earlier, it is the most difficult place to engage. High maneuver, high speed, and again, you don't know where terminal is. Generally in the sea base, it's going to be after the carrier. So the destroyers will operate in close quarters and ensure that they provide that protection. Now, because it's not good enough, the investments that we're making in PB-23 is towards the glide phase interceptor. So when you think of having a layered defense against the glide vehicle, that then dips down and comes in and does the maneuver, we have the ability to stop that at the glide phase, the most vulnerable place where-

Senator Angus King:

We want the ability.

VADM Jon Hill:

We want the ability.

Senator Angus King:

Do we have it? You said we have the ability.

VADM Jon Hill:

We have three contractors in play right now to deliver that capability. We're moving towards a demo over the next few years. So we'll down select this year to two and we'll continue to move through. And then we'll deliver that demo, conduct an exercise with that.

Senator Angus King:

Is North Korea developing hypersonics?

VADM Jon Hill:

They claim to have developed hypersonics. If you go look at the outer mold line, you might be fooled and think that it is. But in terms of what we've seen in terms of data, I'm not entirely confident that they have that capability today. But the fact that they're testing it ought to be of concern.

Senator Angus King:

Director Honey, you mentioned directed energy in your testimony. I believe that strikes me as a promising, and I know there are technical problems, but give me an update on where we are in developing directed energy, microwave or laser.

Honorable David Honey:

Both classes of directed energy systems, lasers and high power microwaves, have seen significant developments and achievements over the past several years. And what I'm most impressed with is the fact that we now have high energy laser systems in 130 kilowatt class systems that are being deployed on ships for operational testing. And we have a modular package that will be able to be deployed on Army ground vehicles, as well as ships. These will be going into, as I said, operational testing around the world in this coming year. And out of that, we will be able to gain tremendous insights on lethality data to see how those systems will be useful in the future. These are mainly aimed at dazzling as well as cruise missile defense. And we also have significant developments in higher power systems in lasers that we think will be very important in the upcoming few years.

Senator Angus King:

Do you have sufficient resources to accelerate this process? Budgetary?

Honorable David Honey:

Yes, we have sufficient resources and also the folks leading the efforts have much better insights today than they did in the past. And just through understanding where to smartly take risks, they've been able to accelerate developments significantly.

Senator Angus King:

Admiral, if you were the commander of that aircraft carrier, I'd want this guy to be supplying you with some weapons.

VADM Jon Hill:

Yes, sir. I would want everything that's available. And we'll take the power you have now and put it on the ships if we could.

Senator Angus King:

Thank you. Senator Fischer.

Senator Deb Fischer:

Admiral Hill, it's my understanding that the department intends to award a production contract for 20 next generation interceptor rounds following the critical design review. And these interceptors will be

deployed to the unoccupied silos at Fort Greeley. But what's the plan to modernize the current fleet of 44 ground based interceptors.

VADM Jon Hill:

Yes, ma'am, thanks for the question. I think the best way to answer it is to just kind of clarify that we have about three classes of the ground based interceptors that are in service today. You have the oldest part of the fleet. You've got the mid grade fleet, and you've got the newest ones. So I know that General VanHerck takes that into account when he's working his shot doctrine. So we're not real concerned about the new ones. They have a long life and their reliability will carry them into the 2030s. Our plan is to reach a decision in production around the 24 timeframe.

VADM Jon Hill:

When you get to the preliminary design review and start thinking about production, there are options there because we do have the missile field that's ready to take those first 20. We'll likely make a decision to fill those first 20, but the nation has the option to start replacing some of the older ones. And that's why I think it's very important to have the two contractors in play. That's the other option we have here. You can keep them beyond CDR and you could have a double production house depending on where the threat goes. And if you need numbers, we can build the numbers by having two contractors carry through critical design review.

Senator Deb Fischer:

You said you're likely to have a decision made soon. When would you expect it?

VADM Jon Hill:

Yes, ma'am. I couldn't remember where the actual place on the chart was, but it's in 2024, where we will make a production decision. And part of that discussion would be, are you going to fill the missile fields or are you going to replace what you have? Are you just going to keep building so that you can fully replace existing inventory? Those are decisions that we have to make within the department.

Senator Deb Fischer:

And are you comfortable with that?

VADM Jon Hill:

I am comfortable that we have two contractors in play and that those options will be there to build out, fill that missile field, and then replace if we make a decision to do so.

Senator Deb Fischer:

Okay. Is this something that you're discussing with the NGI teams?

VADM Jon Hill:

Yes, ma'am. Yes, ma'am. Absolutely. And I mentioned a little bit earlier, actually, General VanHerck mentioned the 2028 timeframe for the contractors. And we are moving ahead of that schedule right now. We're going to learn a lot more as we come through development. We'll come through ground testing. We'll do individual component level tests, and we'll work our way to a flight test. This is a fly

before you buy it program. So we are going to do an intercept and salvo test before we go to full production.

Senator Deb Fischer:

General VanHerck, given that, what you've seen of the threat that's out there. Do you believe that 20 interceptors are going to be sufficient or do you need some sort of capability to replace the 44 GBIs that are deployed currently?

Gen Glen VanHerck:

Senator, my assessment is when you factor in service life extension, which will give us significant reliability and data and information that will help me with my shot doctrine, give me additional capacity. When you factor in the next generation interceptor and its capabilities along with long range discriminating radar, all of that, I will be comfortable when it's delivered in the '27 to '28 timeframe. It's a policy question going forward. Do we need to continue to develop and field additional capability and capacity as the threat develops additional capability and capacity? I remain concerned about my ability to stay up with that capacity especially.

Senator Deb Fischer:

Thank you. Admiral Hill, the General, just, I think, made an argument there against some of what we hear sometimes that we don't need to replace systems. So we just need to continue to do life extension programs. And I know that seems to be the current plan, likely to be the plan for the future, but how long do you think that can continue? Do you have same concerns that the General expressed?

VADM Jon Hill:

I do. We read the same intelligence estimates and they're always low confidence, medium [inaudible 00:58:46], but you can kind of get a sense based on their testing and how they've progressed over the years. I would say there's a big difference between the GBIs that we have in service today versus what a next generation interceptor brings. And in this unclass environment, I will tell you that a unitary missile, think of that as a singular kill vehicle versus a next generation interceptor with multiple kill vehicles on it. That's a huge lift in terms of how we take on the threat, because the threat will continue to evolve to have maneuvering warheads and multiple maneuvering warheads. So we need the next generation interceptor. We can schlep all day long, those unitary missiles, and we can drive their lifetime to the right pretty far. But at the end of the day, you really need the upgrade that next generation interceptor brings. Because it's going to operate in a really tough space, but it does have multiple kill vehicles, which gives us a lot more flexibility.

Senator Deb Fischer:

And we have to have the resources that meet the threats that are coming too, that we get from intelligence. Correct?

VADM Jon Hill:

Yeah. Yes, ma'am.

Senator Deb Fischer:

Thank you.

VADM Jon Hill:

Thank you.

Senator Angus King:

Senator Tuberville. You're all set.

Senator Tommy Tuberville:

[inaudible 00:59:48] question. Thank you. Secretary Honey, you talked about high energy lasers. I've had the, been fortunate, I've watched one work on the ground from an MRAP, low energy. It wasn't really high energy, but works pretty good. Eventually, you said putting them on ships, and possibly in satellites, how in the world we going to find the energy for a high energy laser to really function the way we really want it? Are we on the R&D? How's the R&D on that as we speak?

Honorable David Honey:

The R&D has come along a long ways. And that's a very good question about these particular systems because of the history behind them. Where we've seen the biggest improvements has been in the conversion efficiency of energy to actual useful output from the lasers. As well as improvements in the beam control so that we don't have to have such a massive blast in order to have the weapons effects that we want. There's been just a tremendous amount of work that's been done by the department in these areas. And we're now seeing the payoff of those results today.

Senator Tommy Tuberville:

You ever, you see nuclear being used? Energy?

Honorable David Honey:

I'm sorry, do we_

Senator Tommy Tuberville:

Nuclear to power higher energy, possibly?

Honorable David Honey:

No, I don't. I don't see that as, right now, as necessary. There could be always the possibility in the [inaudible 01:01:13]-

Senator Tommy Tuberville:

I'm talking about for the future. We're talking about Star Trek and all that. You have satellites that have these long beams and all.

Honorable David Honey:

Yeah. Right now, at least for the systems that we're looking at, the conventional power sources that we have look to be sufficient.

Senator Tommy Tuberville:

Thank you. Thank you, Mr. Chairman.

Senator Angus King:

Senator Rounds.

Senator Mike Rounds:

Thank you, Mr. Chairman, I'm going to follow up on Senator Tuberville's line of question, because it seems to me that we're talking here about what a lot of people, that would watch this, would say, they're talking about something really close to Star Wars or Star Trek in terms of basically shooting one missile with another missile. Hitting one missile that's capable of 5,000 plus miles an hour with another missile, or an interceptor that can do the same thing. Or using a weapon of directed energy like a phaser or a laser in the future. We're talking about that right now, being deployed in some specific areas today.

Senator Mike Rounds:

And yet at the same time, I think back, I just received a note that, General VanHerck, your team has actually been looking at cold weather. And the fact that you've got teams that have to survive in cold weather, and we've got Arctic issues and so forth. We need the basic research. I know South Dakota School of Mines & Technology has been doing work on cold weather operations and so forth. And I look back, we've got a part of the world right now that is going to become very active in terms of protecting our country, and that's the Arctic. I'm just curious, General VanHerck, what do you see in terms of the challenges of operating in the Arctic? And what are the things that we're not thinking about right now, that we've just assumed we've been doing all along and yet we've got equipment, we've got material, manpower, and so forth. What do we have to expect that we should be doing right now to make sure that, within the Arctic we've done our due diligence and we haven't taken anything for granted in terms of being able to operate.

Gen Glen VanHerck:

That's a great question, Senator, we just completed an exercise in the Arctic. Arctic edge, where we brought joint and even combined with the other countries to the Arctic to operate. I will tell you there's significant lessons learned about the harsh environment, where our equipment... I won't go into details, but let's just say some strategic equipment that we place into the Arctic does not function because we haven't equipped it to operate. And over the last 20 years, we've been focused on a different environment as we developed equipment. So research and development is crucial to continuing to ensure we buy down the risk to potential future operations in the Arctic.

Gen Glen VanHerck:

It doesn't just go to weapon systems as well. It goes to human performance factors, medical capabilities, medical equipment. As you sustain yourself in a harsh environment like that long term, we have to look at the equipment we wear and the capabilities that we're going to utilize to sustain life in that environment. What we find is that you can operate in that environment less than about 50% of what you would in another environment. So appreciate what your school of mines is doing, advancing a lot of the research and capabilities to look at that. That's something I'm asking for in our Defense Planning Guidance, is to at least move the ball down the field, and continue that research and development for ensuring the capabilities are there. But also capabilities that support the human life as we sustain in the Arctic environment.

Senator Mike Rounds:

Thank you, sir. Thank you, Mr. Chairman.

Senator Angus King:

To follow up on your question, Senator Rounds, I recently learned that two thirds of the ice in the Arctic Ocean has disappeared in the last 40 years. It's a stunning fact.

Senator Angus King:

I want to ask one more question-

Senator Mike Rounds:

And Your Honor, may I say if I could, and yet at the same time, you have a problem in that, unless you got the right kind of oil, you're not going to operate very well in the Arctic conditions anyway, because your machinery doesn't work.

Senator Angus King:

Because it freezes.

Senator Mike Rounds:

Just because it freezes and the lubricity isn't there. Like you-

Senator Angus King:

I'd say Maine and South Dakota rather than Alabama might be able to work on that.

Senator Mike Rounds:

Has a lot to do with it, Mr. Chairman.

Senator Angus King:

A question from Senator Hirono. General VanHerck, for fiscal year 2023 the administration has not funded the development for long range radar in Hawaii to detect incoming threats from North Korea or China. Do our current radar and ground based interceptors provide adequate protection of Hawaii?

Gen Glen VanHerck:

Senator, I'm comfortable with my capability to defend Hawaii against ballistic missiles from a rogue actor, such as North Korea, today. As capabilities continue to develop, as capacity increases by potential rogue actors, then I may be potentially challenged to defend Hawaii. What we're really talking about is a Hawaii radar would contribute to an underlayer significantly, that would give additional capability and capacity. That's a policy decision that we go down there, but today I'm comfortable where we are.

Senator Angus King:

Thank you. Thank you all very much for your responses today, for your testimony, and for your service. It's been a very illuminating hearing. I appreciate your joining us. The hearing is adjourned.

PART 4 OF 4 ENDS [01:06:35]

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