[H.A.S.C. No. 114–120]

HEARING

ON

NATIONAL DEFENSE AUTHORIZATION ACT FOR FISCAL YEAR 2017

AND

OVERSIGHT OF PREVIOUSLY AUTHORIZED PROGRAMS

BEFORE THE

COMMITTEE ON ARMED SERVICES
HOUSE OF REPRESENTATIVES
ONE HUNDRED FOURTEENTH CONGRESS

SECOND SESSION

SUBCOMMITTEE ON STRATEGIC FORCES HEARING

ON

THE MISSILE DEFEAT POSTURE AND STRATEGY OF THE UNITED STATES—THE FISCAL YEAR 2017 PRESIDENT'S BUDGET REQUEST

HEARING HELD
APRIL 14, 2016

U.S. GOVERNMENT PUBLISHING OFFICE
20–080 WASHINGTON : 2017

For sale by the Superintendent of Documents, U.S. Government Publishing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2104 Mail: Stop IDCC, Washington, DC 20402–0001

SUBCOMMITTEE ON STRATEGIC FORCES

MIKE ROGERS, Alabama, *Chairman*

TRENT FRANKS, Arizona
DOUG LAMBORN, Colorado, *Vice Chair*
MIKE COFFMAN, Colorado
MO BROOKS, Alabama
JIM BRIDENSTINE, Oklahoma
J. RANDY FORBES, Virginia
ROB BISHOP, Utah
MICHAEL R. TURNER, Ohio
JOHN FLEMING, Louisiana

JIM COOPER, Tennessee
LORETTA SANCHEZ, California
RICK LARSEN, Washington
JOHN GARAMENDI, California
MARK TAKAI, Hawaii
BRAD ASHFORD, Nebraska
PETE AGUILAR, California

TIM MORRISON, *Counsel*
LEONOR TOMERO, *Counsel*
MIKE GANCIO, *Clerk*

CONTENTS

THE MISSILE DEFEAT POSTURE AND STRATEGY OF THE UNITED STATES—THE FISCAL YEAR 2017 PRESIDENT'S BUDGET REQUEST

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ARMED SERVICES,
SUBCOMMITTEE ON STRATEGIC FORCES,
Washington, DC, Thursday, April 14, 2016.

The committee met, pursuant to call, at 2:00 p.m., in room 2118, Rayburn House Office Building, Hon. Mike Rogers (chairman of the subcommittee) presiding.

Mr. ROGERS. I call this hearing of the House Armed Services Subcommittee on Strategic Forces to order. Welcome everybody here today. Today we are holding an oversight hearing on the missile defeat posture strategy of the United States, the fiscal year 2017 President's budget request.

And, unfortunately, votes are going to be called on the House floor between 3:00 and 3:30. So in order to make sure we can get to the meat of the hearing, which is the Q and A period, the ranking member and I have agreed that we are going to dispense with our opening statements and the witnesses' opening statements, so they will be submitted for the record in their entirety, and we will go straight to questions.

[The prepared statements can be found in the Appendix beginning on page 27.]

Mr. ROGERS. We are very fortunate today to have a very distinguished panel. The witnesses we have are the Honorable Brian McKeon, Principal Deputy Under Secretary for Defense Policy, Department of Defense; Admiral Bill Gortney, Commander, North American Aerospace Defense Command, U.S. Northern Command; Vice Admiral James Syring, Director, Missile Defense Agency; Mr. Barry Pike, Principal Executive Officer, Missiles and Space, U.S. Army; and Rear Admiral Edward Cashman, Director, Joint Integrated Air and Missile Defense Organization.

And Lieutenant General Mann is here somewhere. Or maybe not. I think—well, that is for the closed session. That is right. We will have Lieutenant General Mann here for the closed session.

All right. And with that, like I said, we will dispense with the opening statements and I will go directly to recognizing myself for the first series of questions.

This will be for Admiral Syring and Admiral Gortney. Is the Iran ballistic missile threat to the region, including Israel or the United States, slowing in any respect since last year? Admiral Gortney, would you like to go first?

Admiral GORTNEY. Sir, we have seen, as a result of JCPOA [Joint Comprehensive Plan of Action], the nuclear issue temporar-

ily, potentially permanently, taken off the table, but we see them to continue to develop the propellent, the rocket motor, and we assume they are continuing to develop a reentry vehicle. So we see, of the three pieces that they need, a nuclear weapon miniaturized to put on it, a delivery-capable booster, and a reentry vehicle. We don't see the latter two being slowed.

Mr. ROGERS. Admiral Syring, did you want to offer anything in addition to that?

Admiral SYRING. I agree. I do not see it slowing in any way.

Mr. ROGERS. Great. Admiral Syring, we often talk about the combatant commanders and military services for the unfunded requirements list. Do you have an unfunded requirements list?

Admiral SYRING. So there are gaps in the BMDS [Ballistic Missile Defense System], but our——

Mr. ROGERS. Please pull the microphone closer.

Admiral SYRING. Sure. There are gaps in the BMDS currently that are not funded, and they include advanced technology, a space layer, and additional sensor capability as well.

Mr. ROGERS. What funding do you require to meet the combatant command requirement for THAAD [Terminal High Altitude Area Defense] and SM–3s [Standard Missile 3]?

Admiral SYRING. I am building seven THAAD batteries. The stated requirement from the Army is nine. So I have a two-battery gap today to the stated requirement. I am building at a rate to fill out the seven batteries by the end of the FYDP [Future Years Defense Plan].

Mr. ROGERS. What about the Aegis system?

Admiral SYRING. The Aegis system, 33 BMD [ballistic missile defense] ships today, going to over 40 by the end of 2020, 2021; SM–3s, IAs and IBs, about 170 on path to 415 through the FYDP. I do not have an end inventory objective yet for Aegis.

Mr. ROGERS. Great. Are you funded to develop and deploy defense against boost-glide missiles like those being developed by Russia and China? How much would such development cost?

Admiral SYRING. I am not funded.

Mr. ROGERS. How much would it cost to do that?

Admiral SYRING. I have asked for $23 million to begin a low-power laser demonstrator this year to demonstrate the feasibility by 2021.

Mr. ROGERS. And let's see. Mr. Pike, I would like to call your attention to the screens. You will see red, yellow, and green highlighted areas which represent different decades of key systems to the current Patriot radar employed by the U.S. forces. I note these are the systems employed by the U.S. and not our partner nations in the Patriot program.

[The graphics referred to are retained in the subcommittee files and can be viewed upon request.]

Mr. ROGERS. If the green represents the radar hardware that is with 1990s vintage, which are expected to be obsolete in 2010, and it is now 2016, of course, would I be correct to say that even under your radar digital processor programs, some of the newest equipment in the radar, in this radar, the green shaded area, will be older than any air defender who uses it?

Mr. PIKE. Sir, I haven't done the math on that, but it is aging technology, sir.

Mr. ROGERS. So if I am correct, and we are to assume that 2028 initial funding of a new Patriot radar will occur, we will have a radar system with components, in some cases, that are 58 years old?

Mr. PIKE. Sir, we are continuing to modify and request funds to modify the existing Patriot radar until we are able to field the lower tier air missile defense sensor. The schedule is not really established yet. It is 2028. The Army is meeting this afternoon as a part of the Army Requirements Oversight Council to establish the actual operational requirement. And once that operational requirement is established, we will be able to assess the maturity of the technology against the requirement. And so that schedule that you have seen is not set in stone.

Mr. ROGERS. But you see what I have described. It is completely unacceptable. Aren't there systems that we have available that have been developed already that could meet the needs that this system should be meeting that are available for us to access from the private marketplace?

Mr. PIKE. Sir, the Army conducted an analysis of alternatives. It was a very broad analysis across all the department, assessed all the available radars within the Department of Defense, modifications to those existing radars and the new radars all together. That analysis of alternatives is complete through the Army. However, it is within OSD [Office of the Secretary of Defense] for a sufficiency evaluation. And, again, once that analysis of alternatives is complete and delivered to the Congress as a part of the law, then we will be able to go forward with an acquisition strategy, and a formal schedule, and a materiel solution, none of which we have currently today.

Mr. ROGERS. I just want to be clear. Speaking only for myself, I am not turning loose of this one. It is going to have to be remedied.

Admiral Syring, if MDA [Missile Defense Agency] was developing and procuring these radars with the missile—with the acquisitions authorities you have, how much time would it take for you to take care—or take care of this problem?

Admiral SYRING. Mr. Chairman, I haven't——

Mr. ROGERS. Please pull the mike.

Admiral SYRING. I haven't looked at their specific technology, their specific schedule, but I can talk to what we did with LRDR [Long Range Discrimination Radar], which is the current radar that is under contract today, where we had a very defined requirement from the Joint Staff and had that under our umbrella, had the technology proven actually through the Navy's AMDR [Air and Missile Defense Radar] competition. So we didn't have to go through any of the Milestone A to B activity. It is going to take us 6½ years from start to finish.

Mr. ROGERS. Okay. With that, I yield to the ranking member for any questions he may have.

Mr. COOPER. Thank you, Mr. Chairman.

Admiral Syring, the level of funding for MDA is lower than in previous years. Can you explain this reduction for fiscal year 2017?

Admiral SYRING. Sir, it is lower and it is part of the overall DOD [Department of Defense] top line reduction as well. My share of that has lowered, you know, not an equal percentage, but a similar percentage.

Mr. COOPER. Admiral, do you support successfully flight testing the redesigned kill vehicle before making a final production decision?

Admiral SYRING. Completely.

Mr. COOPER. Again, Admiral Syring, is the schedule-driven requirement of deploying 44 ground-based interceptors driving undue risk in concurrency for acquiring and upgrading the interceptors?

Admiral SYRING. No, sir. We will flight test the last configuration that will complete the 44 by 2017 in a very complex ICBM [intercontinental ballistic missile] intercept test later this year.

Mr. COOPER. Admiral Gortney, do you remain confident in the national missile defense system's capability? The Government Accountability Office stated in its February 2016 report that, quote, "several key aspects of missile defense have not been demonstrated through flight testing," end of quote. Do you agree?

Admiral GORTNEY. Sir, I am confident of the systems that I am responsible for, the ballistic missile defense for the homeland, and that——

Mr. COOPER. Is your mike on?

Admiral GORTNEY [continuing]. And that—the ballistic missile defense for the homeland that I work with MDA, and also the National Capital Region-Integrated Air and Missile Defense System, high confidence in its ability to engage the threats that it is designed to go against.

Mr. COOPER. Admiral Gortney and Admiral Syring, how many successful flight intercept tests are needed to demonstrate that interceptors work as intended and are reliable?

Admiral SYRING. Sir, going forward, we have scheduled and it is funded in the program to test before we field. For example, the version that will go in next year will be flight tested later this year. For the redesigned kill vehicle, we have a nonintercept flight test and then an intercept flight test followed by a second intercept flight test in 2020 before that configuration will be fielded.

Mr. COOPER. So two successful flight tests make it reliable?

Admiral SYRING. It will be one nonintercept test, which we will learn a lot, and then two intercept tests. And based on the engineering that we get from the flight tests, along with the ground testing that we will do, it will be a complete body of evidence that will give us confidence in a decision to go to full production.

Mr. COOPER. Admiral Syring, what is the appropriate level of investment for boost phase missile defense?

Admiral SYRING. I don't know, is the answer, sir. And I don't know because I need to get to a technology feasibility demonstration with some confidence in the next 4 to 5 years to go prove that it is, one, technically feasible and, two, the cost estimates that I am getting from industry for a long-term program are affordable.

Mr. COOPER. Mr. Pike, it is kind of shocking that the plan for Patriot modernization is expected to take 12 years, and that is assuming, I guess, you get approval this afternoon from your com-

mittee. I join in the chairman's assessment we need to do what we can to make that much faster.

All witnesses, should we start building an east coast missile defense site?

Mr. MCKEON. Mr. Cooper, we are aware of the requirement in the NDAA [National Defense Authorization Act] to look at this and have something for a radar by 2020, and we have done the work on environmental impact statement [EIS] for a possible east coast site pursuant to a prior NDAA. It is not where we would spend our next dollar in this budget, but it is something we will be postured to do after the EIS, if a decision is made to do that.

Mr. COOPER. Any other opinions?

Admiral SYRING. I will speak before the commander.

Not at this time. Not this year, is the way I would respond.

Mr. COOPER. Admiral Syring, a final question. Would upgrading the Hawaii-based Aegis Ashore testing facility to a fully operational site improve U.S. missile defense in the region?

Admiral SYRING. Yes, sir, potentially. Any sensor improvement for Hawaii and, frankly, in the kill chain for the BMDS, you know, east and west will improve our sensor and discrimination capability.

Mr. COOPER. But you are talking sensors, not missiles?

Admiral SYRING. Sensors first, sir, yes.

Mr. COOPER. Okay. Thank you, Mr. Chairman.

Mr. LAMBORN [presiding]. Representative Franks.

Mr. FRANKS. Well, thank you, Mr. Chairman. And thank all of you. Thank you those that are wearing uniform for your commitment to protecting America and human freedom. I never want to miss that moment to tell you how much we appreciate you.

Admiral Syring, I for one am very grateful that a man of your acumen is in the position that he is in. In 2011, the Institute for Defense Analyses conducted a study, and in it, it concluded a space-based interceptor layer would help defend against the more challenging missile threats, including direct ascent antisatellite missiles and antiship missiles. Now, I know that it is imperative that at the right times we time the development of these things. It is always good to be looking at them and being potentially aware of the challenges that we may face. But can you explain to this committee why this capability might someday be important and it might be helpful to defend not only our satellites, but potentially against antiship missiles?

Admiral SYRING. Mr. Franks, we have not in the recent years studied that in great detail. We have done some costing analysis of what a program may take and have some idea of the technical challenges to the said interceptor layer. Obviously, fielded interceptors in space worldwide from 20, 30 years ago, work had been done to show that that could help, but, sir, we haven't looked at it in the Department other than costing it against the range of alternatives. And, frankly, the cost has been overwhelming on what it would take and the technical challenges.

Mr. FRANKS. Yeah. Well, I guess that might be part of why some of us would kind of like to begin to reorient at least our awareness in that direction.

As detailed in a 2014 "Defense One" article, in both 2007 and 2014, China, as I know you well know, tested rockets to launch kinetic kill vehicles against satellites in low and high orbits respectively. And both of these tests appear to indicate that they have the capability to attack our space assets. And in defending U.S. space assets against those direct ascent antisatellite weapons, is that something that defending these assets is ultimately included in the MDA mission?

Admiral SYRING. Sir, if we can defer the answer to classified session, I think we would——

Mr. FRANKS. All right.

Admiral SYRING [continuing]. Have a very constructive discussion on that point.

Mr. FRANKS. Okay. Would it be appropriate to ask if any other agency has any concurrent mission in research and development against to—the means to defend against these types of weapons?

Admiral SYRING. Sir, if I can defer that to a classified session as well.

Mr. FRANKS. Okay. So let me rephrase this here a little, because I think you are absolutely right. But it is appropriate in this setting to suggest that a ballistic missile defense layer in space would provide not just the U.S. the ultimate high ground, it could provide a means to defending our space systems from these ballistic ASATs [antisatellite weapons]. Is that correct?

Admiral SYRING. Sir, if it could—if it was technologically feasible and affordable, which I think both, in my mind——

Mr. FRANKS. Important question.

Admiral SYRING [continuing]. At this point are no; the answer would be yes to your question. I have serious concerns about the technical feasibility of interceptors in space, and I have serious concerns about the long-term affordability of a program like that.

Admiral GORTNEY. But, sir, that does not mean that the Department is not looking at another alternative to go after that problem set. There may be another mechanism, another way to do that, and I know the Department is working on that.

Mr. FRANKS. Would you suggest that there is some efficacy in maintaining an eye on that possibility?

Admiral GORTNEY. It is a little bit out of my lane here, but, of course. We are going to look at what is the requirement and then what is the way, the mechanism that gives us the best value that is the most effective in order to solve that particular problem set. And sometimes one overarching system may be technically very hard and very expensive. But we can talk to the other mechanisms we are using when we go classified, sir.

Mr. FRANKS. Okay. And at this time—well, yeah. Perhaps I would be running into the same challenge.

So, Mr. Chairman, I am going to yield back here. And thank you all.

Mr. LAMBORN. Okay. Representative Garamendi.

Mr. GARAMENDI. Thank you. And first, I apologize for not being here for the opening statements. So I may be covering some turf already handled.

Missile defense can be done in a couple of different ways. The one I want to really focus on is directed energy. We have talked

about that in both classified and in open hearing. In this open hearing, can you bring me up to date on where we are with the directed energy issue?

Admiral SYRING. Yes, sir. Working on two primary technologies within MDA, the DPALs [diode pumped alkali laser] technology that is being risk mitigated out at Livermore and fiber combined laser technology at MIT [Massachusetts Institute of Technology]. And, frankly, industry has been brought in over the last year to 18 months in a big way in terms of what they could potentially do with laser technology. We have asked this year for funding support for a low-power laser demonstrator to start this year to test in the 2020, 2021 timeframe to go prove directed energy in a boost phase mode.

Mr. GARAMENDI. How much money have you asked for?

Admiral SYRING. $23 million in fiscal year 2017 budget.

Mr. GARAMENDI. Did you miss some zeros?

Admiral SYRING. No, sir. The——

Mr. GARAMENDI. And what will the $23 million do?

Admiral SYRING. The 5-year program is $278 million; $23 million is the initial increment of funding required to get concepts and contractors awarded.

Mr. GARAMENDI. And that is requested for this year's budget?

Admiral SYRING. That is correct, sir.

Mr. GARAMENDI. I recall something—didn't we do that last year also?

Admiral SYRING. Last year as well, sir.

Mr. GARAMENDI. Did you get it?

Admiral SYRING. No, sir.

Mr. GARAMENDI. It was in——

Admiral SYRING. It was not appropriated. It was supported by this committee and the authorizers, both House and Senate, but was not appropriated.

Mr. GARAMENDI. Did the House appropriate it?

Admiral SYRING. I will have to take that for the record in terms of what their mark was before conference, but in the end, it was——

[The information referred to can be found in the Appendix on page 109.]

Mr. GARAMENDI. Well, I guess I am looking for names.

Admiral SYRING. Sir——

Mr. GARAMENDI. Who killed it?

Admiral SYRING. So, sir, part of this is this is new, it was new last year, and I think there has been an education required on our part to go explain to people exactly what this demonstrator will do and that it is not a new airborne laser 747 project, which actually had benefit. But this is a very much smaller scale demonstration to inform a future program, and that is all. There is nothing more, nothing less. And I believe industry is capable of competing and fielding a technology demonstrator.

Mr. GARAMENDI. We have a classified session. I will wait till that point. Thank you.

Mr. ROGERS. The gentleman yields back.

The Chair now recognizes the gentleman from Colorado, Mr. Lamborn, for 5 minutes.

Mr. LAMBORN. Yeah. Thank you, Mr. Chairman.

And, Admiral Syring, I would like to ask you about foreign military sales [FMS] of an advanced THAAD system to United Arab Emirates [UAE], and then get the Department's perspective on that afterwards. But is that something, if they are willing to front some of the cost of that, that we can afford? And are there people on record, and including yourself, perhaps, that would be in favor of this project?

Admiral SYRING. Sure. Right now in the budget, we are at the beginning concept feasibility level in terms of funding. I don't have a complete program even in my budget yet for THAAD–ER [Terminal High Altitude Area Defense-Extended Range]. The—or a follow-on THAAD. There is industry concepts on it and, frankly, some good thinking on that, and that, you know, there would be policy involvement with this question as well in terms of either a cooperative development on it or a full FMS case on a development program. But I don't have a stated requirement yet from the UAE for this capability. But certainly if we got it, we would consider that along with policy.

Mr. LAMBORN. Yeah, Mr. McKeon.

Mr. MCKEON. Mr. Lamborn, as a matter of general policy, our regional missile defense approach is to seek cooperative partners. So in theory, we certainly would want to encourage that kind of cooperation, and as Admiral Syring said, we don't have a program to go market with the Emirates, and nor have we gotten a request from them for this. So if we got to that stage, we would obviously need to look at some technology releasability issues and the funding issues on each side. But in theory, it is something we would certainly be open to.

Mr. LAMBORN. Okay. That is helpful. Thank you both for saying that.

And, Admiral Syring, let me shift gears and ask about concurrency. Both the MDA and special forces have some unique capabilities in terms of rapid acquisition processes, and I believe concurrency is part of that. And can you talk about how that has been helpful to the MDA and what your perspective is?

Admiral SYRING. Sir, there has been some great examples recently that the agency has delivered in terms of meeting both policy and State Department requirements and combatant commander requirements. The example that comes to mind is Romania and how quickly we were able to design, build, produce, test, and field a system from an announcement that was back in 2009. And to do that in a foreign country with the cooperation of the Romanian government, and all of the work that went in not just with MDA, but whole-of-department approach on this, including the Army Corps of Engineers, including many parts of OSD, OSD Policy, it was remarkable in terms of us being able to do that quickly with contracts—requirements, contracts, award, and production and fielding. And I believe our authorities enabled that.

Mr. LAMBORN. Well, I for one will go on record and say that I think this is something we need to examine to make broader than just MDA and special forces as we talk about acquisition reform, which the chairman of the full committee, to his credit, is very

much wanting to push. So I think that this is something we need to look at and expand it within the Department of Defense.

Admiral SYRING. Sir, if I can just—you had also asked about concurrency. I think that is an important point. I think that is the risk of what I talked about, to make sure that we are managing concurrency as we go fast properly and not taking excessive risk with either technology or funding.

Mr. LAMBORN. All right. Very good.

Does anyone else want to comment on that concept?

Okay. Thank you very much, Mr. Chairman. I yield back.

Mr. ROGERS. I thank the gentleman.

The Chair recognizes Mr. Larsen for 5 minutes.

Mr. LARSEN. Thank you. Admiral Syring, you are very popular this afternoon, but I will warn Secretary McKeon, I have a question for you, so——

The first question, though, for admiral is back to Mr. Cooper's question on RKV [redesigned kill vehicle]. And I understand how you answered it, but I want you to take a little bit different approach on this and I want to ask you how are you reducing acquisition risk itself for the RKV?

Admiral SYRING. Yes, sir. Great question. The first—the first part of acquisition of risk starts with design and system engineering. And if we rush the cycle we are in now without proper maturity and without meeting the proper technology or design gates in terms of deliverables at certain points in the design, you will fail in the end.

So this foundation that we are building with rigor and depth on the system engineering that are going into the design of the RKV is, in my view, the most important part. And what my direction has been to the team that is working this, which is a fantastic team, cross-industry team working this, is that we will not proceed past major design review points if the deliverables have not been met, and not been delivered, and do not meet our entrance and exit criterias. And, sir, I can get this to you. There is a very lengthy entrance and exit criteria list for all of our design reviews and all of the gates that this design has to pass through.

And the design maturity in the end, sir, will drive when this thing is ready for test. I am planning for an end of 2018 test, but if the design maturity is not such, I will not test in 2018. And to me, that is where we need to hold the line here, is early on. And rushing programs through the design phase, they are absolutely doomed to fail.

Mr. LARSEN. Also, we had a conversation earlier. And just help me understand this issue on THAAD and South Korea from a technical operational perspective.

Admiral SYRING. Yes, sir. I will leave the policy and the State Department discussion to the Secretary. I will speak to it from a materiel standpoint. There is no doubt that the system can provide fantastic coverage capability for not only our ally there, but our U.S. deployed forces. And I am confident in the design of that system and its intercept record. And if the decision were to be made, I stand by that it is the right materiel solution.

Mr. LARSEN. Yeah. Great. Well, then the follow-up is on the policy, especially now in light of the National Assembly election yes-

terday where the president's party lost the majority and what the implications are. And so where are we from a policy perspective with the South Koreans?

Mr. MCKEON. As you know, Congressman, I think even we discussed it last time I was here, we have made a decision to begin the formal consultations with our Korean partners. And I know there have been some meetings out in Korea looking at the siting and the funding issues. I am not an expert on Korean politics. I don't think this changes things for President Park and her approach to this. So I think we are optimistic we will get to a decision. I just don't have a timeline for you.

Mr. LARSEN. Yeah. Okay. All right.

GAO [Government Accountability Office]? Is GAO here? No. Okay. So we just have a report from GAO on this. Okay. I have it right here. That is fine.

Who can answer the question for me, the difference between what used to be called spiral development and now seems to be called concurrency? Are those the same things?

Admiral SYRING. Let me take that, and then maybe Mr. Pike can add. When we talk of—when I think about—I will give you my view. When I think about spiral development, I think about fielding a capability and then improving the capability over time.

Concurrency is the initial problem in developing that initial capability, in terms of assuming too much technical or cost risk as you develop an end item. And to me, they are two different things.

Mr. LARSEN. Mr. Pike.

Mr. PIKE. Sir, I absolutely concur.

Mr. LARSEN. You concur with concurrency?

All right. Well, I just—with the few seconds, I just don't believe we had a very good experience with spiral development. Others may disagree with me on that. It sort of became a moniker for getting things in the ground before they were ready. That is my definition of it. And so I guess I would differ with a few folks here that concurrency is something that is different than that.

Admiral SYRING. Sir, if I can just comment on that. That we have testified, I have testified in this committee that the direction was given to field this system quickly, and that very foundation that I talked about in terms of maybe doing another design turn or two before it was fielded, everybody says would have benefited that program. And everything that we are doing now is to work to improve what has been fielded, and I believe we are on the right path.

Mr. LARSEN. All right. Thank you.

Mr. ROGERS. I thank the gentleman.

The Chair recognizes the gentleman from Alabama, Mr. Brooks, for 5 minutes.

Mr. BROOKS. Thank you, Mr. Chairman.

Admiral Gortney and Admiral Syring, am I correct that under the current plan for the Ground-based Midcourse Defense [GMD] system, there are no operational spare ground-based interceptors and that there will not be for at least 5 or 6 years?

Admiral SYRING. Sir, we are—that is a correct statement. We are using everything that has been put under contract in terms of materiel buys to make our 44 by 2017, and to have enough interceptors to do the testing that we need to do over the next 3 or 4 years.

Again, the new design, Mr. Brooks, is paramount to buying additional interceptors. I do not want to buy more of the same—of the old design.

Mr. BROOKS. In your judgment, when exactly will there be operational spares based on whatever is best designed?

Admiral SYRING. Sir, as part of this budget, our first priority is to get the redesigned kill vehicle tested and get the older interceptors, the CE–1 interceptors, recapped with that new design. And then as we work through that upgrade and fielding path, there will be spares that are generated in procurement to have some margin against the current inventory.

Mr. BROOKS. Do you have a judgment as to what calendar year we are talking about before we start building up the inventory and have operational spares?

Admiral SYRING. It will be in the 2025 timeframe most likely, with our priority being fixing what is in the field first.

Mr. BROOKS. Is there anything that we in Congress should be doing to expedite the availability of operational spares over the next 9 years?

Admiral SYRING. Sir, I would ask you to wait until we prove the new kill vehicle design and the new booster design and test it, and then we can talk about buying beyond what is in the budget today.

Mr. BROOKS. Admiral Gortney, do you have anything to add to what Admiral Syring has just stated?

Admiral GORTNEY. No, sir. Again, the priorities that Admiral Syring has put in place, I fully support. We need to make that which we have as good as we can possibly make it while we then go to the next stage, and those are the proper investments.

Mr. BROOKS. All right. Back to Admiral Syring. Yesterday you mentioned in the Senate Subcommittee on Strategic Forces that MDA made the decision to pivot back to the GMD program and to increase the capacity and capability of the Ground-based Midcourse Defense system. With a decrease of $75 million for fiscal year 2017, what aspect of the Ground-based Midcourse Defense system will assume the most risk?

Admiral SYRING. Sir, if I can, we pivoted back to 44 by 2017, the Secretary of Defense made that decision, and we are implementing it as MDA. That was a 2013 announcement by Secretary Hagel in March. The 70, I think it was $79 million, in terms of less funding than what we requested in 2017 for GMD, there are no components of that that are going to accept any appreciable risk because of that reduction.

We requested a large amount of funding in 2016 to get many of the efforts that had not been started in GMD started, and you have been very supportive of that request. And then over time, some of those estimates have been refined. In addition, the cut that we took in the endgame, based on the budget agreement, in late 2015 had some effect on the GMD program carrying part of that cut.

Mr. BROOKS. North Korea has been testing ballistic missiles at an unprecedented rate. And with a projected $800 million reduction to Future Years Defense Program, what capabilities are we delaying into the future with respect to the ground systems and fire control on the one hand and the program operations on the other?

Admiral SYRING. We are not delaying anything that we planned for or programmed in 2016, based on that reduction. What we are delaying is—or taking a risk with specifically was increasing the SM–3 procurement. Nothing associated with the GMD system in terms of the planned modernization of the ground system, operations and support, safety, any of those aspects that are mission critical, have not been affected by that.

Sir, I was planning in fiscal year 2016 for $7.8 billion in 2017. And based on the budget agreement that came down in the end, at the end of 2015, my number in the President's budget was reduced to $7.5 billion as my share of the Department cut. So it is really not 8.3 to 7.5. My President's budget request in 2016 was actually 8.1. What was enacted was 8.3. So it was—my request was 8.1, 7.8. It was enacted at 8.3. I would have been 7.8 without the budget agreement. Budget agreement kicked me down $300 million, kicked us down $300 million.

Mr. BROOKS. Thank you, Mr. Chairman.

Thank you, Admiral Syring and Admiral Gortney.

Mr. ROGERS. I thank the gentleman.

Admiral Syring, what are the risks of legislating or setting in stone a requirement to conduct a set number of tests before the RKV final production decision?

Admiral SYRING. Obviously, in this budget, we have a proposal and in our acquisition strategy that was signed by Mr. Kendall that there will be one nonintercept and one intercept test conducted to inform a production decision by him, not me. There will be another intercept in 2020 that will happen before really anything is fielded.

I would ask that you let us go through where we are in the early stages of design and some of the testing of the components, all of it very methodical and very laid out in terms of the ground testing that will accompany our confidence before a flight test, before we legislate that it needs to be three or four or five flight tests.

I think what will happen, sir, is that certainly at a minimum of two, the third flight test will give the warfighter the final confidence that the configuration is ready to be fielded. And I would say the third flight test, although not necessary for an acquisition decision, will be an important point for us before we go start pulling CE–1 interceptors out of the ground with new RKVs.

Mr. ROGERS. Thank you.

The Chair now recognizes the gentleman from Hawaii, Mr. Takai, for 5 minutes.

Mr. TAKAI. Thank you, Mr. Chairman. And, Admiral Syring, it is great to see you.

I have questions for you, Admiral. The first is, alarmingly, this year North Korea conducted its fourth nuclear test and also launched a satellite into orbit using long-range ballistic missile technology. From your perspective, is there a gap when it comes to missile defense for Hawaii right now due to this threat?

Admiral SYRING. If I can ask the commander to speak to that, sir.

Mr. TAKAI. Okay.

Admiral GORTNEY. No, sir, I do not think there is a gap to that particular threat. We are prepared to engage and protect Hawaii,

Alaska, and all the rest of the States with the existing system, and have high confidence in its success.

Mr. TAKAI. Okay. Thank you.

An Advanced Missile Defense Radar, or AMDR, prototype is being tested at PMRF [Pacific Missile Range Facility] in 2016. The AMDR radar would provide significant capability to detect and track advanced long-range ballistic missile threats. The prototype will be moved from PMRF for combat systems integration in 2017 unless a replacement radar is funded. I have submitted an amendment for advanced funding for planning and design to get a discriminating radar to Hawaii faster.

Are you, Admiral Syring, supportive of this effort?

Admiral SYRING. Sir, as you know, Admiral Harris has been open about the need for additional sensor capability in Hawaii. And we are obviously very well aware of that requirement and are looking at what the sensor options could be. But right now it is a test site, and it has been a very effective test site. I think it is fair to say that we in the Department will look at options, to include sensoring, to see if there is a way to answer the combatant commander's requirement in this area.

Mr. TAKAI. Okay. Thank you.

And my final question has to do with the transitioning of this test site from a testing facility to an operational one. So in order to operationalize the PMRF, and specifically the Aegis Ashore facility at PMRF in Kauai, a capability already in place, it must first be certified against the very ICBMs and the long-range missile technology that North Korea is developing and testing. What are the plans to do this?

Admiral SYRING. Right now there are no plans to do it, sir, simply. And I would just characterize it a little differently, if I can, sir, in terms of the sensor sort of options in that part of the discussion with Admiral Harris is what additional sensor capability can we provide the existing Ground-based Midcourse Defense system in terms of more capability against a more complex threat for Hawaii specifically. And that is the discussion that I think needs to happen. And right now there are no plans moving forward outside the Department to do that. Not that we haven't heard and don't understand the combatant commander's desire; it is a matter of what materiel solutions are available and when, and how much do they cost, frankly. And then what are the operational impacts, what are the secondary effects. Operationalizing an Aegis Ashore site is no easy step. There would be many parts of that in that equation.

And, sir, I don't know if you want to add.

Admiral GORTNEY. We cover Hawaii today with the sensors that we have. But one of our key investment strategies in the way ahead is sensors improvement, because if we get sensor improvement, not just for Hawaii, but for the entire system, for the east coast as well, then we drive our effectiveness up, which drives our reliability way up, which drives our costs down, when we get that sensor discrimination that we need to continue to outpace the threat. So where the threat is today, with the investments that we have, we are confident we can continue to protect all of the States. And should that change, then we will adjust fires on that investment strategy.

Mr. TAKAI. Right. So for us in Hawaii, as well as discussions occurring in the media, and I think Admiral Harris has been part of those discussions, there is some indication of support and interest in operationalizing the facility on Kauai, number one, and, number two, to use the Aegis Ashore platform as the way forward.

I guess my question is—oh. I don't have—let me just say this. I think we can't wait until North Korea launches something that has precision that can detect and hit something similar to Hawaii. We have got to be a little bit more proactive.

Admiral SYRING. Sir, let me just add to finish, if I can, Mr. Chairman——

Mr. TAKAI. Okay.

Admiral SYRING [continuing]. That there is an ongoing sensor analysis of alternatives, that is extensive, looking at all sensor gaps around the world for not just us, but for other agencies and services, and certainly the Hawaii sensor capability is part of it.

Mr. TAKAI. Okay. Thank you.

Thank you, Mr. Chairman.

Mr. ROGERS. The gentleman yields back.

The Chair now recognizes the gentleman from Ohio, Chairman Turner, for 5 minutes.

Mr. TURNER. Thank you, Mr. Chairman.

Admiral, when you were asked about whether or not we need an east coast missile defense site, your answer was, "not at this time," meaning we don't need it now, which is a good thing we don't need it now, because we can't possibly have one, because there is a long lead time within which we need to construct one.

I would like to work with you to clarify your answer, because I think there are those with your answer of "we don't need it at this time" or "we don't need it now," who might use that as an answer to indicate that the preparation that this committee has undertaken for an east coast missile defense site is needless or unnecessary. You don't mean that, right? You don't mean that the work that Congress has done to prepare for an east coast missile defense site is needless or unnecessary?

Admiral SYRING. Absolutely not.

Mr. TURNER. Secondly, as you have articulated, I think, very, very well, the rising threats from North Korea and Iran are increasing threats that we are seeing that are happening at just almost a frightening pace. Do you foresee a time at which we might need the capability to respond to these threats of an east coast missile defense site?

Admiral SYRING. If I——

Mr. TURNER. I was asking you, Admiral, because, again, they were asking in a manner, I think, to utilize——

Admiral SYRING. Okay.

Mr. TURNER [continuing]. Your statement——

Admiral SYRING. Yes, sir.

Mr. TURNER [continuing]. To indicate that it is not necessary.

Admiral SYRING. Let me take that. We have a very systematic investment plan, which we have talked about, in terms of how we are improving the current fielded interceptors, and that is extensive and has required funding and budget this committee has supported, sir. And you are——

Mr. TURNER. Well, you are looking out for the future——

Admiral SYRING. Absolutely.

Mr. TURNER [continuing]. You are looking out, and you do see a time——

Admiral SYRING. I do.

Mr. TURNER [continuing]. Where that additional capability would be?

Admiral SYRING. I see a time when additional capacity will need to be talked about——

Mr. TURNER. Thank you.

Admiral SYRING [continuing]. Depending on where Iran goes with their threat development.

Mr. TURNER. Thank you, Admiral.

Mr. McKeon, this committee is charged with the responsibility of looking at our architecture to be able to see what our adversaries are doing and also respond to what our adversaries see we are doing. One of the areas that we are concerned with, obviously, is the Open Skies Treaty and Russia. General Stewart, head of the DIA [Defense Intelligence Agency], testified that Russia gets, quote, "incredible foundational intelligence on critical infrastructure, bases, ports, all of our facilities. So my perspective," again being his, "it gives them a significant advantage, and I would love to deny the Russians having that capability."

Mr. McKeon, is Russia permitting overflights of Kaliningrad, which of course are permitted under the treaty?

Mr. MCKEON. No. They have placed restrictions on flights over Kaliningrad.

Mr. TURNER. Is that a violation of the Open Skies Treaty?

Mr. MCKEON. We have raised that as a compliance concern, Mr. Turner, and I believe it is highlighted a little differently in the compliance report we have just submitted to you.

Mr. TURNER. Have you personally advocated that, as in your role, you make a recommendation that Russia be found in violation?

Mr. MCKEON. Sir, I hesitate to talk about what I recommend to my Secretary in internal deliberations. What I can say to you here, and I would be happy to discuss in a little more detail in the closed session, is we have expressed concern as a government about Russia's compliance with Open Skies. We have taken a view within our government that while we have obligations under the treaty, we will perform under those obligations and no more; that is, we will not give them any extra benefit.

Mr. TURNER. Well, Mr. McKeon, obviously the concern that we have is if there are those who believe, perhaps yourself even—because our indication is that we are hearing that you do believe that they are violating the Open Skies Treaty, and there are others who do believe so as a result of issues like Kaliningrad and overflights—that by our continued compliance, especially in light of General Stewart saying that it puts it as a distinct advantage, that we are in fact, you know, showing all of our cards while we are allowing them to restrict our capabilities. I mean, isn't that a significant concern, is we are letting somebody else see what we are doing and we are not getting to see what they are doing, supposedly that was permitted under a treaty?

Mr. MCKEON. Well, Congressman, we are overflying the Russian Federation territory. In fact, we have more Open Skies flights over Russia than Russia does over the United States. There are restrictions, as you——

Mr. TURNER. I think it isn't an issue just of number of flights, but isn't it an issue of advanced sensors? I mean, hasn't the Supreme Allied Commander indicated he has concerns over the advanced sensors that might be used in overflights over Europe?

Mr. MCKEON. Yes. As you will recall, Congressman, a couple of years ago, the Russians sought to certify an electro-optical sensor on the plane they used to fly over Europe. It is a digital rather than using wet film. And we went through the certification process on that and learned a lot of lessons from that for possible certification of a plane that would overfly the United States with a similar capability.

Mr. TURNER. Mr. McKeon, obviously since we have concerns that Russia may be violating the Open Skies Treaty, and from the testimonies we have been receiving, there are serious concerns about what Russia learns in the Open Skies Treaty. And also the administration now, although it took forever, is finally acknowledging Russia's violating of the INF Treaty.

Shouldn't there be a concern for a pause in extending the START [Strategic Arms Reduction] Treaty for an additional 5 years? And could you please tell us if you believe it is premature of the administration? I understand that they are pushing for a 5-year extension of the New START Treaty. Is there concern that we might be needing to evaluate Russia's actions, especially in their aggressiveness that we are seeing in Ukraine and the overflights? We all just watched the news and watched their planes buzzing us. Is there a point where we might—should be pausing?

Mr. MCKEON. Congressman, as an administration, we have not made a decision about whether to seek the extension of the New START Treaty, which does not expire until 2021. I think——

Mr. TURNER. Would your recommendation be that it is premature to do that now?

Mr. MCKEON. Again, sir, I don't want to give you what my recommendation would be in internal deliberations. What I would say is that one of the factors that we need to take into account is the concerns that you have identified and——

Mr. TURNER. Mr. McKeon, I just want you to know that——

Mr. MCKEON [continuing]. We share.

Mr. TURNER [continuing]. I think it is really difficult for us as policymakers to have people like yourself that have such important positions as the Principal Deputy Under Secretary of Defense for Policy to say that you don't want to tell us what your recommendations are with respect to policy.

Thank you, Mr. Chairman.

Mr. ROGERS. The gentleman's time has expired.

The Chair now recognizes the gentleman from Louisiana, Mr. Fleming, for 5 minutes.

Dr. FLEMING. Thank you, Mr. Chairman.

And, Admirals Gortney and Syring, this question is for you. Recently, Bill Gertz of the Washington Free Beacon reported that North Korea has displayed a new road-mobile ICBM. And does

North Korea, in fact, have such capability and is it testing solid rocket motors for such a missile?

Admiral GORTNEY. Sir, the Intel [Intelligence] Community assesses the probability of North Korea fielding a successful road-mobile ICBM with a miniaturized nuclear device that can range the homeland as low.

As the commander accountable for defending the homeland, I choose to assess that he does have that capability. And I think it is the prudent course of action, it is what I think the American people would like me to base my readiness assessment on, to be prepared to engage it. So we are prepared to engage it today, 24 hours a day, 365 days out of the year.

As it progresses, the real key piece here is he hasn't tested the end-to-end capability in order to do it. He has displayed the ability through the TD–2 space launch to put that in there, but the reentry vehicle that needs to go with it, the solid rocket fuel, we need to see that test, that end-to-end test. But I am not waiting for that end-to-end test on my assessment.

Dr. FLEMING. Okay. And sort of an extension of that question, can North Korea's KN–08 road-mobile ICBM target all of the United States if indeed—or I guess a better way to put it based on your response is, are you assuming that it can target anywhere in the United States, including the continental United States?

Admiral GORTNEY. Yes, sir. I assess that it can range the homeland that I am tasked to defend, and we are prepared to engage it for the area that we assess it to be able to reach.

Dr. FLEMING. Okay. And can you remind this committee why road-mobile missiles are a defense challenge for us?

Admiral GORTNEY. Because they are mobile and they are very easy to conceal. Previously, you know, when North Korea assembles a rocket, we have intel that we can detect through all forms of intel. When you get into a road-mobile target, it is very, very difficult to be able to track, quickly set up, and shoot. Most of my career, I dropped bombs for a living, and mobile targets are what always caused me pause. And that is exactly why this is a tough challenge for us.

Dr. FLEMING. So while it may be difficult to detect, you suggested a little earlier that its payload may not be as significant as something that would be ground based. Would that be fair to say, or what is your opinion on that?

Admiral GORTNEY. No, sir. We assess that they have the ability on the KN–08 to—I assess that he has the ability to miniaturize a nuclear weapon and range to homeland with that warhead.

Dr. FLEMING. I see. Okay.

Admiral GORTNEY. Again, but we have not seen the end-to-end test of that.

Dr. FLEMING. Right. Okay. Thank you, and I yield back.

Mr. ROGERS. I thank the gentleman.

The Chair now recognizes the gentleman from Colorado, Mr. Coffman, for 5 minutes.

Mr. COFFMAN. Thank you, Mr. Chairman.

Mr. McKeon and Admiral Gortney, in your written statement, you both mentioned, quote, "left-of-launch," unquote, capabilities. Can you elaborate? Are you talking about destroying ballistic mis-

siles on the ground before they are launched at us? Is that the point?

Admiral GORTNEY. I can go into some detail at the unclass [unclassified] level and I will go into much greater detail for you in the classified level. But the current path that we are on with both theater ballistic missile defense and ballistic missile defense for the homeland against the ICBM threat is a very expensive approach. We are shooting down with very expensive rockets, potentially very inexpensive rockets, and we are only engaging it in midcourse. For both types of threats it is midcourse as we go forward.

What we need to be able to do is engage it throughout its particular kill chain, so keep them from getting on the rails, detect them, and get them on the rails, hit them while they are still on the rails before launch, provided we have the rules of engagement to do that; boost phase engagement, which is why the laser designation—laser approach that MDA is doing is so important, multiple times, knock down the raid count; and then continue to engage it in midcourse, but with more warheads in space, smarter, more reliable multi-object kill vehicle, maybe five warheads in space that are actually communicating with each other to drive the raid count down significantly. And those are the investments that MDA, with your all's full support, have put in place to see which of those technologies throughout a flight of the missile is so important for us.

Mr. COFFMAN. Okay. What kind of intelligence would we need for the President to order a preemptive attack against a state preparing to launch a missile against the United States?

Admiral GORTNEY. I am going to have to take that at the classified level.

Mr. COFFMAN. Okay. How well are we postured to execute left-of-launch operations? Could we execute left-of-launch operations today if we had to?

Admiral GORTNEY. I will defer to the classified session and answer you there, sir.

Mr. COFFMAN. What more can Congress do to ensure our military forces have the capabilities and intelligence they would need to execute left-of-launch operations?

Admiral GORTNEY. Continue to make the investments from the MDA realm, support those investments that we are asking for, particularly the—make what we have the best as what we possibly can make it, and then those investments in R&D [research and development].

Now, there is another avenue that we can talk about in classified for those same sorts of investments are absolutely critical. But I also think it is important to highlight that what Admiral Syring has put in the budget is research and development to see what technologies will play out. Once we make a decision of which of those are going to give us the best value, then we will be having to come to your committee again for investments to actually field those capabilities.

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

Mr. ROGERS. I thank the gentleman.

Admiral Syring, how much longer would it take and how much more would it cost for you to develop, test, and field a long-range discrimination radar in the 5000 series in a redesigned kill vehicle?

Admiral SYRING. If I can just clarify, Mr. Chairman, in DOD 5000?

Mr. ROGERS. Yes.

Admiral SYRING. Sir, I haven't done that analysis, but I would be happy to. We were able to—and I will just reiterate this. We were able to, with Mr. Kendall's help, Admiral Winnefeld's help at the time, turn our requirement through the JROC [Joint Requirements Oversight Council] process in about 6 weeks, 6 weeks, and that is giving me the top cover for this radar.

And our decision to use existing technology, I thought, was huge in terms of not having to go through the risk reduction phase between Milestone A and B, where we chose—and I think I got a question over here—the similar GaN [gallium nitride], S-band technology that is in the AMDR [Air and Missile Defense] radar. So there were some decisions that we made both in the requirement and in the technology that we chose that enabled us to go to contract award in less than 2 years.

Mr. ROGERS. Okay. Admiral, recently the press reported that Russian Foreign Minister Lavrov said he had obtained an agreement with Secretary Kerry to launch a dialogue about the U.S. missile defense shield in Eastern Europe. Moscow argues the system is a threat to its security.

As the director of Missile Defense Agency, what do you know about this dialogue and what has the United States signed up to discuss?

Admiral SYRING. I am not aware of the dialogue, and my answer is, nothing.

Mr. ROGERS. Mr. McKeon, what can you tell us about that, if anything?

Mr. MCKEON. Mr. Chairman, we have been talking to the Russians on and off since 2009 about what the EPAA [European Phased Adaptive Approach] is and is not. And I think they have a pretty clear understanding of the system, but they continue to make various arguments that it is a threat to them or a violation of the INF [Intermediate-Range Nuclear Forces] Treaty, or other statements that we don't agree with and find unacceptable. Just in the last couple of days, there was an assertion made by some senior Russian security official that we were going to put nuclear warheads on missiles at the site in Romania and threaten Russia, which is just nonsense.

Mr. ROGERS. Mr. McKeon, do you understand that in any way that the United States is willing to depart from its current position on the EPAA, what we will have laid out to happen with that?

Mr. MCKEON. No.

Mr. ROGERS. Okay. Admiral Syring, Secretary Kerry has been spending quite a bit of time focused on missile defense lately. He has also invited the People's Republic of China to receive technical briefings on the capability of THAAD, including if deployed in South Korea. What do you know about the briefings the Secretary has offered, if anything?

Admiral SYRING. Nothing, sir. We haven't been asked.

Mr. ROGERS. All right. Admiral, you are aware of MDA or MDA contractors being targeted or, quote, "hacked," by groups or entities linked to China or the Chinese military?

Admiral SYRING. Yes, sir.

Mr. ROGERS. You are. Can you tell us anything about that in open session?

Admiral SYRING. Let me just give you the answer unclassified, and then we can go deeper classified, if that is okay, Mr. Chairman.

Mr. ROGERS. Okay.

Admiral SYRING. I testified yesterday that I viewed the cyber threat that I specifically faced with MDA and the systems that we are fielding on par with any intercontinental ballistic missile threat that either Iran or North Korea possess. We have taken inordinate steps to protect both our classified and unclassified networks from attack, constant 24/7 monitoring with teams in place, plus good materiel protections of those systems.

My biggest concern remains in our cleared defense contractor base and their protections. I think my view is, is that they are continuing to try to attack my government networks every day, classified and unclassified, but where they are going next, and we have gotten examples of this, is to my cleared defense contractors with the unclassified controlled technical information. And what we have got to do is get them up to where we are in terms of our protection levels. And I view it as a very near term, very real requirement across the BMDS [Ballistic Missile Defense System].

Mr. ROGERS. Thank you.

The ranking member is recognized for any additional questions he may have.

Mr. COOPER. Thank you, Mr. Chairman. I appreciate the expeditious nature of this public portion of the hearing. I am going to hold my further questions to the classified session.

Mr. ROGERS. Are there any other members that have questions in this open session?

Mr. MCKEON. Mr. Chairman, I could address the question you gave to Admiral Syring about——

Mr. ROGERS. Please do.

Mr. MCKEON [continuing]. Secretary Kerry and China and THAAD.

Mr. ROGERS. Please.

Mr. MCKEON. Similar to the Russians, we have offered to explain to them what THAAD is and is not and why it is not a threat to their deterrent were we to deploy it in the Republic of Korea. They have not taken us up on this offer. We have a firm view, as expressed previously, this is about protecting our deployed forces and our Korean partners, and has nothing to do with China or China's deterrent, and they shouldn't worry about it.

Mr. ROGERS. But we are going to talk more about that in the classified session, but I appreciate that comment.

We are supposed to be called for votes at any minute, so I think what I will do is rather than get us into the classified setting and then have to be pulled away, we will just adjourn until 10 minutes after the next vote series concludes. If they call us in the next 5 or 6 minutes, you are looking at about 45 minutes after that, so

it will be around 3:45 to 3:50 when we reconvene for the classified portion of this hearing.

And with that, this hearing is suspend—no, it is not adjourned. We are not——

Admiral GORTNEY. Recessed.

Mr. ROGERS. Recessed. There you go. I knew you was good for something.

[Whereupon, at 3:00 p.m., the subcommittee proceeded in closed session.]

A P P E N D I X

APRIL 14, 2016

PREPARED STATEMENTS SUBMITTED FOR THE RECORD

APRIL 14, 2016

Statement of Chairman Mike Rogers
as prepared for delivery
Hearing on
The Missile Defeat Posture and Strategy of the United States—The Fiscal Year 2017 President's Budget Request
April 14, 2016

Good afternoon. I call to order this hearing of the Subcomittee on Strategic Forces.

We are here today for our oversight hearing on "The Missile Defeat Posture and Strategy of the United States—the FY17 President's Budget Request."

This is a different hearing than we've conducted before and it's a different group of witnesses as a result.

This year, we are focusing on the integration and inter-relationship of U.S. missile defeat programs. This is different than just ballistic missile defense; we are looking at left- and right-of-launch capabilities and programs; we are looking at Army and MDA missile defense; cruise missile defense of the homeland; and, how offense and defense are integrated in our missile defeat enterprise.

This is not a new thought, though. This is the vision of the Chairman of the Joint Chiefs of Staff that he laid out for an integrated air and missile defense in 2020.

So, we have today an outstanding panel of witnesses to help us assess the progress we're making in implementing this vision and to inform this subcommittee as it drafts the Fiscal Year 2017 National Defense Authorization Act.

The witnesses are:

The Honorable Brian McKeon
Principal Deputy Under Secretary of Defense for Policy
Department of Defense

Admiral Bill Gortney, USN
Commander,
North American Aerospace Defense Command, U.S. Northern Command

Vice Admiral James Syring, USN
Director, Missile Defense Agency

Mr. Barry Pike
Principal Executive Officer, Missiles and Space
U.S. Army

Rear Admiral Edward Cashman, USN
Director, Joint Integrated Air and Missile Defense Organization (JIAMDO)

And Lt. Gen. Mann, I appreciate you attending today in your capacity as the Joint Functional Component Command Commander for Integrated Missile Defense from U.S. Strategic Command. I look forward to your contributions in our closed session after this hearing.

Before I turn it over to Mr. Cooper and we get started with opening statements and questions, a few observations about where are today.

In calendar year 2015, there were over 300 foreign ballistic missile launches and almost 70 foreign space launches.

We have unprecedented activity from the North Koreans – if we have a policy to deal with the nut job in charge of that country, it can't be considered anything but a failure.

Admiral Gortney, I'll just say you scared the Hell out of me in our conversation yesterday. The North Koreans now have, what, three different ICBMs, and two of them are road-mobile?

President Obama's deal with Iran is living up to all the worst predictions about what it would mean for Iran's funding of terrorism, instability in the Middle East, and it's ballistic missile program—even now, we have a Simorgh ICBM—what the Iranians like to refer to as a space launch vehicle— sitting on the launch pad.

If you believe the mullahs plan to go to the moon, please raise your hand. I didn't think so.

And yet, at the start of this Administration, we had a budget request for MDA of approximately $10 billion. This year, we have a budget request of about $7.5 billion.

And Mr. Pike, you have a radar system where no component of it is younger than the soldiers who man it. If you assume that your average Army E-4 is about 21 or 22, his daddy may not have been born when the Army bought its Patriot radars. And we may not replace the radar until that E-4's son puts on the uniform in 2028?

We need to be doing better. And we need to hear from you all not whether you can make this budget request work, but, what do you really need. Of course you'll make it work.

The U.S. military doesn't say no. It doesn't say it's too hard or too cold or too far.

But how many casualties will you suffer because you didn't have what you needed and we didn't know to provide it to you?

If OMB gives you any trouble about that, tell them to give me a call. That's what I expect to hear from you today.

Not for Public Release until Approved by the
House Armed Services Committee

STATEMENT OF

BRIAN P. MCKEON

PRINCIPAL DEPUTY UNDER SECRETARY OF DEFENSE

FOR POLICY

BEFORE THE HOUSE

ARMED SERVICES

SUBCOMMITTEE ON STRATEGIC FORCES

APRIL 14, 2016

Chairman Rogers, Ranking Member Cooper, members of the Subcommittee, thank you for the opportunity to testify on the Fiscal Year (FY) 2017 budget request for ballistic missile defense and the Defense Department's continuing efforts to sustain and modernize our homeland missile defense capability so that we remain ahead of the threat while providing effective, integrated, and interoperable regional ballistic missile defense (BMD) capability. I am grateful for your consistent attention to, and continuing support of, the critical mission of defending the homeland, our allies and partners, and our deployed forces from a growing ballistic missile threat.

I will begin with a discussion of ballistic missile threats and trends, and then focus on several key policy priorities: defending the United States against limited long-range ballistic missile attacks, strengthening defense against regional missile threats, fostering defense cooperation with allies and partners, and examining how to advance the missile defense technology base in a cost-effective manner. I will also briefly address issues associated with other non-BMD tools the Department is examining to assist in the broader effort to defeat ballistic missiles.

Ballistic Missile Threats

Ballistic missiles continue to pose a significant security challenge as nations pursue efforts to make them more survivable, reliable, mobile, and accurate at greater ranges.

North Korea

North Korea's weapons and missile programs pose a growing threat to the United States and to our allies in East Asia. North Korea has conducted four nuclear tests. It is also seeking to develop longer-range ballistic missiles capable of delivering nuclear weapons to the United States, and continues efforts to bring its KN08 road-mobile ICBM to operational capacity. Although the reliability of an untested North Korean ICBM is likely to be very low, North Korea has used its Taepo-Dong-2 launch vehicle to put a satellite in orbit, thus successfully demonstrating technologies applicable to a long-range missile.

Iran

The Joint Comprehensive Plan of Action reached by the P5+1, the EU and Iran last summer effectively cuts off all of Iran's potential pathways to developing a nuclear warhead, thereby removing the greatest danger previously posed by Iran's ballistic missile program. At the same time, Iran already has the largest inventory of ballistic missiles in the Middle East and today can potentially reach targets throughout the region and into southeastern Europe. Iran is seeking to enhance the lethality and effectiveness of existing systems with improvements in accuracy and warhead designs. Iran also has an anti-ship ballistic missile that can potentially threaten maritime activity in the Persian Gulf and the Strait of Hormuz. Although Iran does not yet possess an intercontinental ballistic missile (ICBM), its progress on space launch vehicles

(SLV) – along with its desire to deter the United States and its allies and partners – provides Iran with the potential means and potential motivation to develop longer-range missiles, including an ICBM. Iran has stated publicly that it intends to launch the Simorgh SLV this year, which would be capable of ICBM ranges if Iran chose to configure it as a ballistic missile.

Syria

Although Syria does not pose a ballistic missile threat to the U.S. homeland, the Assad regime does possess short-range ballistic missiles, and has shown a willingness to use them repeatedly against its own people. Syria has several hundred short-range ballistic missiles, all of which are mobile and can reach much of Israel and large portions of Iraq, Jordan, and Turkey from launch sites well within Syria.

Other Trends, including Cruise Missiles

As Secretary Carter noted in his posture hearing before this committee, the Department confronts evolving challenges – China, Russia, North Korea, Iran, and countering terrorism – that are now driving the focus of the Department's planning and budgeting. The first two of these challenges reflect a return to great power competition, and both China and Russia are investing in anti-access/area denial capabilities. China is introducing qualitative advances into its nuclear and conventional military capabilities as it continues its rise in the Asia-Pacific region, and is making significant investments in anti-ship ballistic and cruise missiles, which will improve China's ability to strike regional targets at greater ranges.

Russia is making significant investments in cruise missiles, including a cruise missile that violates the Intermediate-Range Nuclear Forces (INF) Treaty, which eliminated an entire class of U.S. and Russian missiles nearly three decades ago. In light of Russia's INF Treaty violation and overall aggressive behavior, we are developing and implementing a strategy to address Russian military actions that includes modifying and expanding air defense systems to deny Russia offensive capabilities; placing an increased emphasis on working with allies and partners to improve our collective capability to counter complex cruise missile threats; working with other departments and agencies to encourage and facilitate allied acquisition of advanced capabilities by those most concerned with Russian behavior; and investing in the technologies that are most relevant to Russia's provocations.

Homeland Missile Defense

The U.S. homeland is currently protected against potential ICBM attacks from States like North Korea and Iran if it was to develop an ICBM in the future. To ensure that we stay ahead of the threat, we are continuing to strengthen our homeland defense posture and invest in technologies to enable us to address emerging threats more effectively in the next decade. This requires continued improvement to the Ground-based Midcourse Defense (GMD) system,

including enhanced performance of the Ground-Based Interceptor (GBI) and the deployment of new sensors.

We remain on track to deploy 14 additional interceptors in Alaska by the end of 2017. These interceptors, along with the 30 that are currently deployed, will provide protection against both North Korean and potential Iranian ICBM threats as they emerge and evolve. This year's budget request also reflects Department of Defense's (DoD's) commitment to modernizing the GMD system. It will move us towards a more reliable and effective defense of the United States. It includes funding for development of a new Long-Range Discrimination Radar (LRDR) being installed in Alaska. The LRDR will provide persistent sensor coverage and improve discrimination capabilities against North Korea. It also continues funding for the redesign of the kill vehicle known as Redesigned Kill Vehicles (RKV) for the GBI. Although we have addressed the causes of past failures in the GBI related to the Exoatmospheric Kill Vehicle, the RKV will have greater performance and discrimination capability.

As directed by statute, the Missile Defense Agency (MDA) is also preparing environmental impact statements (EIS) for sites in the eastern United States that could host an additional GBI missile field. The EISs will be completed later this year. No decision has been made to deploy an additional missile field in the United States. The highest priorities for the protection of the homeland are improving the reliability and effectiveness of the GBI and improving the GMD sensor architecture, which yield the greatest benefit against existing threats. The current GMD system provides coverage of the entire United States from North Korean and potential Iranian ICBMs. If an ICBM threat were to emerge in numbers that necessitated the deployment of additional interceptors, the steps being taken now, including conducting EISs, will shorten the construction timelines associated with deployment of a new missile defense site.

Regional Defense

The Department's FY 2017 budget request also continues to deploy missile defenses that are tailored to the security circumstances in Europe, the Middle East, and the Asia-Pacific region. Our focus is on developing and fielding missile defense capabilities that are mobile and relocatable, which allows us to address crises as they emerge. Systems such as Patriot, Terminal High-Altitude Air Defense (THAAD), and our Aegis BMD ships allow us to have flexible, layered missile defense capabilities tailored to specific regional threats. We are also encouraging our allies and partners to acquire missile defense capabilities, and to strengthen operational missile defense cooperation. In a regional context, we know that we will not be able to purchase enough interceptors to rely purely on missile defense for the duration of a conflict. In such a situation, we must protect our most valuable assets while also drawing on our other capabilities to provide a comprehensive military approach to defeating the threat from ballistic missiles.

Europe

We are continuing to implement the European Phased Adaptive Approach (EPAA), and we are working in close collaboration with our North Atlantic Treaty Organization (NATO) Allies to develop an advanced network of sensors and interceptors – on land and at sea – to protect NATO European territory and our military forces and facilities.

Technical capability of EPAA Phase II, which includes the Aegis Ashore site in Romania, was declared in December 2015. The site is undergoing operational readiness testing for integration into the NATO BMD architecture. The President's budget request also supports the Aegis Ashore site that will be deployed in Poland in the 2018 timeframe and the development of the SM-3 Block IIA interceptor that will be deployed on land and at sea later this decade. As these capabilities become operationally available, they will increase BMD coverage of NATO European territory.

The United States conducts exercises designed to hone our Alliance missile defense capabilities and integration. U.S. European Command is engaged with NATO in the development of a biennial NATO-led BMD exercise event that serves to reinforce and expand upon other, routine BMD training evolutions that take place on a quarterly and semi-annual basis.

Many NATO Allies also participate in the NIMBLE TITAN exercise, an unclassified, two-year, multinational, BMD campaign. The overarching purpose of NIMBLE TITAN is to serve as a venue for collaboration, exchange of views, and coordination of BMD policy and operational development among participating nations and organizations, along with U.S. Government departments, agencies, and military organizations. NIMBLE TITAN has 25 participating nations and organizations, including NATO.

Since 2011, the United States has operated a forward-based radar in Turkey and maintained a sea-based missile defense presence in Europe. And we now have a total of four U.S. Aegis BMD capable destroyers forward-deployed to the naval facility at Rota, Spain. These multi-mission ships support the missile defense mission, as well as other maritime missions.

Spain and Germany have committed Patriot PAC-3 systems to NATO missile defense as demonstrated through the ongoing NATO deployment in defense of Turkey. Spain recently replaced the Netherlands in the defense of Turkey mission through its deployment of a Patriot system, and is strengthening its air and missile defense capabilities by acquiring additional Patriot systems from Germany.

France is planning to provide its Spirale satellite detection system and a long-range radar for NATO territorial missile defense and has offered the SAMP/T air and missile defense system, which was fielded in 2013, to NATO BMD.

Several Allies have modern surface combatant ships that could be equipped with BMD sensor or interceptor capability upgrades. The Netherlands and Denmark have committed to upgrading the SMART-L radars on their frigates to contribute to NATO BMD.

Beyond hosting the second Aegis Ashore site in Europe, Poland has also announced its intention to spend up to $8 billion to acquire advanced air and missile defense capabilities.

The United States will continue to encourage its NATO Allies to do more to cooperate and invest in missile defenses that will contribute to Alliance security.

Asia-Pacific

In the Asia-Pacific region, our force posture includes Aegis BMD-capable ships, along with Patriot batteries deployed in Japan and South Korea. We have also maintained the THAAD battery deployment to Guam in response to North Korean provocations.

The cornerstone of our security and diplomacy in the region has been our strong bilateral alliances, including with South Korea, Japan, and Australia. All three of these nations play an important role in our regional efforts to achieve effective missile defense.

South Korea has an immediate, proximate stake in preventing missile strikes from North Korea. We have worked closely with South Korea to ensure that our alliance maintains the capacity to do just that. The United States deploys Patriot PAC-3 batteries in South Korea to defend U.S. and South Korean forces. In addition, South Korea is taking steps to enhance its own air and missile defense systems, which include sea- and land-based sensors and Patriot PAC-2 batteries. DoD has been consulting with South Korea about how it can upgrade its missile defense capabilities as part of an Alliance response to the growing North Korean missile threat. On February 7, 2016, in response to the evolving threat posed by North Korea, the United States and South Korea made an Alliance decision to begin formal consultations regarding improvements to the alliance missile defense posture, specifically exploring the viability of deploying to South Korea a THAAD system to be operated by U.S. Forces Korea.

Japan has its own layered missile defense system, which includes Aegis BMD ships with Standard Missile-3 interceptors, PAC-3 batteries, early-warning radars, and sophisticated command-and-control systems. Japan is upgrading two ATAGO-class Aegis destroyers to BMD capability with certification scheduled for Japan FY 2018 and Japan FY 2019, and plans to build two additional Aegis BMD ships, which would increase its inventory to a total of eight BMD-capable ships. Japan also hosts two U.S. missile defense radars.

Additionally, Japan is a critical international partner for BMD development. One of our most significant cooperative efforts is the co-development of an advanced version of the SM-3 interceptor, the SM-3 Block IIA.

The United States and Australia have forged a longstanding partnership on missile defense research and development – most notably with regard to sensors. In addition, Australia is involved in a trilateral discussion on missile defense in the Pacific involving the United States, Australia, and Japan.

We will continue to emphasize the importance of developing a regional ballistic missile defense system that includes the sharing of sensor data among allies to take full advantage of the benefits of system interoperability and integration.

Middle East

We also maintain a robust missile defense presence in the Middle East, including land- and sea-based assets deployed in defense of our forward-deployed forces, and our allies and partners. This is in addition to our efforts to build the capacity of those allies and partners that will ultimately contribute to their ability to defend themselves.

The United States maintains a strong defense relationship with Israel, and our cooperation on missile defense has resulted in one of the most sophisticated missile defense systems in the world. Since 2009, the United States has provided more than $3 billion in missile defense assistance to Israel, which has supported the joint development and production of David's Sling and the Arrow Weapon System as well as joint production of Iron Dome. This support, in conjunction with operational cooperation, gives Israel the ability to respond to simultaneous missile and rocket attacks from Hamas or Hezbollah, and from the longer-range ballistic missiles being developed by Iran. During the summer conflict in 2014, Iron Dome had a 90 percent success rate and saved countless Israeli lives. Missile defense was also the central focus of the JUNIPER COBRA exercise conducted in Israel last month – which is an important U.S.-Israeli military exercise that allows us to work through key interoperability challenges in responding to a potential missile crisis with Israel.

The United States is also working with a number of Gulf Cooperation Council (GCC) countries on missile defense, including supporting the purchase of missile defense systems through the Foreign Military Sales program. The United Arab Emirates (UAE) is procuring the THAAD system. This is in addition to the UAE's earlier purchase of Patriot systems. Saudi Arabia is in the process of upgrading its existing Patriot PAC-2 batteries to the PAC-3 configuration. Kuwait is also purchasing Patriot PAC-3 batteries. Qatar also joined the group of U.S. Patriot partners late last year, a group that includes Kuwait.

U.S. Air Forces Central Command maintains a series of regular exchanges between U.S. and GCC air defense officers at the Combined Air Operations Center located at Al Udeid Air Base in Qatar. These exchanges provide an opportunity for increased situational awareness of missile threats in the region as well as the potential for future BMD planning and operational cooperation.

As the GCC States begin to field more capable systems, the United States and its Gulf partners must work toward greater integration of those capabilities across the region. Following the Camp David Summit in 2015, the United States and GCC States agreed to study Ballistic Missile Early Warning System (BMEWS) requirements, including sensor and command and control architectures. The study will inform potential GCC-wide BMEWS acquisition plans. MDA has been working on the BMEWS architecture study since September – and is in the process of presenting results of the study to the GCC. The desired end-state is a regional missile defense architecture in which GCC Member States participate and contribute to the extent practical, leading to a networked, layered defense of key strategic centers that strengthens deterrence and increases our collective ability to defeat a ballistic missile attack.

Technology Development

We must continue to look ahead. This means ensuring that our investment strategy and priorities balance the needs of addressing the most dangerous threats we confront today while positioning us to respond to threat developments in the next decade. Areas for priority technology investment include persistent discrimination in the current and future Ballistic Missile Defense System sensor architecture; high-power lasers for multiple BMD applications; common kill vehicle technology leading to a multi-object kill vehicle; advanced technology for high-risk/high-pay-off breakthroughs; and a rail gun to lower the cost per kill.

Additionally, we are looking to invest in our cruise missile defense architecture—especially as it relates to the National Capital Region. Given the threat facing the U.S. homeland, we require persistent surveillance and detection of cruise missiles. To that end, we are working with North American Aerospace Defense Command and others to identify technologies that give us this persistent surveillance and detection. We are also working closely with our Canadian partners to examine future technologies to cover the northern approaches.

As we confront the growing complexity and size of ballistic and cruise missile threats in the next decade, the Department will continue to fund investments in new technologies as well as adapting current technologies to new purposes. As Secretary Carter stated in his testimony in February on the President's Budget request for FY 2017, the Department remains committed to continued investments directly supporting efforts to defeat missiles by using innovative technologies and operational concepts to lower the cost-per-round. This includes investments in directed energy/high-powered lasers, rail and powder guns, and enhanced munitions as well as employing systems like the Navy's SM-6 interceptor that can operate not only against a range of tactical missiles (air and ballistic), but can support anti-surface ship capacity as well.

This leads to a larger point the Secretary has made – that today's security environment is dramatically different than the one in which we have been engaged over the last 25 years. It requires new ways of thinking and acting. It also requires new ways of acquiring and employing capabilities. Given this new security environment, we must also look at new ways to support our

U.S. defense strategy. In the case of defeating ballistic missiles, we need to develop a wider range of tools and that includes the efforts underway to address such threats before they are launched, or "left of launch." The development of left-of-launch capabilities will provide U.S. decision-makers additional tools and opportunities to defeat missiles. This will in turn reduce the burden on our "right-of-launch" ballistic missile defense capabilities. Taken together, left-of-launch and right-of-launch will lead to more effective and resilient capabilities to defeat adversary ballistic missile threats.

CONCLUSION

The President's FY 2017 Budget Request supports our strategies for protecting vital U.S. interests. It continues funding missile defense capabilities to ensure we remain well ahead of adversary ballistic and cruise missile defense developments and lays the foundation for investment in innovative programs to lower the cost-per-intercept and defeat emerging ballistic and cruise missile threats.

We request the Committee's support for this budget.

Thank you for the opportunity to appear before you today. I look forward to your questions.

Brian P. McKeon
Principal Deputy Under Secretary of Defense for Policy

Brian P. McKeon was confirmed as the Principal Deputy Under Secretary of Defense for Policy on July 28, 2014. He is responsible for advising the Under Secretary of Defense for Policy and the Secretary of Defense on all matters pertaining to the development and execution of U.S. national defense policy and strategy.

Previously, Mr. McKeon served as Deputy Assistant to the President, Executive Secretary of the National Security Council (NSC), and Chief of Staff for the National Security Council staff at the White House, a position he held from 2012-2014. In this position, he was the Chief Operating Officer for two National Security Advisers, managing all administrative, budget, and personnel matters for the NSC staff. Prior to joining the NSC staff, Mr. McKeon served as the Deputy National Security Advisor to the Vice President from 2009 to 2012, where he advised Vice President Biden on all national and homeland security matters.

Before serving in the Executive Branch, Mr. McKeon was Chief Counsel for the Democratic members of Senate Foreign Relations Committee from 1997 to 2009; he served concurrently as Deputy Staff Director from 2007 to 2009. In addition to helping to manage the Committee's agenda and staff, he played a lead role on nominations, treaties, the management and operations of the Department of State, and was deeply involved in a broad range of regional and functional issues.

Mr. McKeon served as a law clerk to U.S. District Judge Robert G. Doumar of the Eastern District of Virginia in 1995 to 1996. Earlier in his career, he worked for Senator Joseph R. Biden, Jr. in various capacities from 1985 to 1995, including seven years as a Legislative Assistant for Foreign Policy and Defense.

Mr. McKeon received a B.A. in Government and International Studies from the University of Notre Dame and a J.D. from the Georgetown University Law Center.

STATEMENT OF

ADMIRAL WILLIAM E. GORTNEY, UNITED STATES NAVY

COMMANDER,

UNITED STATES NORTHERN COMMAND

AND

NORTH AMERICAN AEROSPACE DEFENSE COMMAND

BEFORE THE HOUSE ARMED SERVICES COMMITTEE

STRATEGIC FORCES SUBCOMMITTEE

APRIL 14, 2016

INTRODUCTION

Chairman Rogers, Ranking Member Cooper, and distinguished members of the Committee, I appreciate the opportunity to appear before you today to discuss the posture of United States Northern Command (USNORTHCOM) and North American Aerospace Defense Command (NORAD). I am here representing the Commands' Soldiers, Sailors, Airmen, Marines, Coast Guardsmen, National Guardsmen, Reservists, and civilians safeguarding our nation amidst the most diverse and challenging security atmosphere in our history. Brave men and women are confronting this rapidly changing defense environment head-on. It is an honor and a privilege to serve alongside them and I am grateful to the Committee for the support you provide.

North America is increasingly vulnerable to a vast array of evolving threats--from highly capable, national powers to disaffected individuals who act in response to extremist propaganda. These threats are growing and becoming much more diffuse and less attributable. Moreover, I believe that many of the crises originating as regional conflicts elsewhere in the world are rapidly manifesting themselves here at home and they continue to challenge our ability to warn and defend.

The complexity and volatility of our strategic environment demands that we advance and sustain the capabilities to protect our Homelands. I believe the President's FY17 budget represents a balanced approach to maintaining our strategic advantage within the realities of a fiscally-constrained environment. We are still feeling the impacts of sequestration, primarily because the majority of the Services' cuts were from the operations and maintenance accounts, which directly impedes their ability to provide trained and equipped service members to

Combatant Commands. I thank the Committee for your support in passing the Bipartisan Budget Act of 2015, which represents another important step toward permanent relief from the sequestration caps in the Budget Control Act of 2011.

We are resolute in our commitment to deter, prevent, and defeat attacks against the United States and Canada. We stand ready to provide rapid and robust support to the primary lead agencies responding to domestic disasters and the law enforcement agencies (LEAs) charged with combating transnational organized crime. And we continue to strengthen our regional and homeland partnerships; they are our center of gravity.

STRATEGIC ENVIRONMENT

The expansive complexity of the contemporary security environment makes defending the Homeland a continual challenge. The spectrum of threats to our national security ranges from traditional nation-state military capabilities to individuals with access to increasingly destructive technologies. The diffusion of capability, the inexact art of predicting intent, and the complications of attribution all contribute to a blurring of lines between traditional military threats and asymmetric threats that trigger military support or response. Technological advances and proliferation coupled with pockets of instability will generate a growing array of potential threats against which we must posture ourselves. Many of our potential adversaries are pursuing advanced weapons development not seen in decades. Individually, they pose serious concerns to our national security and the international community. Collectively, they represent a vast spectrum of complex and volatile threats that I believe will only continue to grow and threaten the homeland if we hesitate to act decisively.

RUSSIA

A resurgent Russia continues to assert itself on the world stage. No longer content merely to pursue primacy within its near abroad, Russia's forays into Syria highlight Vladimir Putin's willingness to employ military power to advance his agenda outside Russia's near abroad. Last year I stated that Russia is progressing toward its goal of deploying long-range, conventionally armed cruise missiles comparable to Western systems. In 2015 these efforts came to fruition, as Russia employed heavy bombers, surface vessels, and a submarine to launch advanced conventional cruise missiles at targets in Syria. These operations served as a proof-of-concept for weapons systems and tactics ultimately intended to provide flexible deterrent options in a future crisis.

Russia's strategic nuclear forces remain the only foreign military threat that could imperil our nation's existence, and Moscow continues to spend significant resources to modernize its nuclear arsenal and delivery systems. While Russia seeks to avoid a strategic conflict with the United States, Moscow perceives itself to be threatened by a coordinated Western effort to erode its sovereignty, weaken its economy, and undermine its regime. I am concerned these threat perceptions could prompt Russia's leaders to misinterpret our intentions in a crisis, leading to inadvertent escalation.

CHINA

As part of its long-term, comprehensive military modernization program, China continues to modernize and expand its strategic forces with a focus on improving its ability to survive a first strike and penetrate United States' missile defenses. Concerned that that United States precision strike and missile defense capabilities undermine its strategic deterrent, Beijing is

working to improve the survivability of its nuclear force to ensure a credible second-strike capability.

China continues to supplement its modest silo-based intercontinental ballistic missile (ICBM) force with a growing number of road-mobile ICBMs and is now in the process of operationalizing its first viable class of ballistic missile submarines, which, if successful, would be China's first sea-based strategic nuclear deterrent. China is also developing a range of anti-access and area-denial weapons which, along with its cyber, counter-space, and strategic nuclear capabilities, are designed to discourage United States intervention in a regional crisis. Meanwhile, Beijing's diplomatic strategy appears to be focused on limiting U.S. options by denying physical and political access in key regions around the globe.

NORTH KOREA

North Korea's recent hostile cyberspace activity, nuclear testing, and continued ballistic missile development represent a dangerous threat to our national security. North Korea's recent nuclear test and satellite launch demonstrate Kim Jong Un's commitment to developing strategic capabilities, as well as his disregard for United Nations Security Council resolutions. The regime's efforts to develop and deploy the road-mobile KN08 ICBM have profound implications for homeland missile defense, primarily because the missile obviates most of the pre-launch indicators on which we have traditionally relied to posture our defenses. While the KN08 remains untested, modeling suggests it could deliver a nuclear payload to much of the Continental United States. We assess Kim Jong Un is unlikely to attack our Homeland unless he perceives an imminent threat to his regime's survival. However, we are concerned the possession of a nuclear ICBM could embolden the regime's intransigence below the nuclear threshold and complicate our response to a crisis on the peninsula. While I do not believe that

North Korea's efforts to develop a submarine-launched ballistic missile represent a near-term threat to the U.S. Homeland, the program underscores the level of effort and resources the regime is willing to devote to developing advanced weapon systems. As the combatant commander charged with defending the homeland, I take this threat very seriously, particularly in light of North Korea's unpredictable leadership.

IRAN

Iran poses multiple significant security concerns to the United States, and I remain wary of its strategic trajectory. Last year's conclusion of the Joint Comprehensive Plan of Action was a welcome development, but, Iran's continuing pursuit of long-range missile capabilities and ballistic missile and space launch programs, in defiance of United Nations Security Council resolutions, remains a serious concern. Iran has successfully orbited satellites using a first-generation space launch vehicle and announced plans to orbit a larger satellite using its ICBM-class booster as early as this year. In light of these advances, we assess Iran may be able to deploy an operational ICBM by 2020 if the regime choses to do so. Additionally, Iran has invested in developing advanced offensive cyberspace capability and has demonstrated cyberspace operations that could threaten our critical civil infrastructure.

LINES OF OPERATION

In my statement last year, I described the unique aspects of USNORTHCOM as the nation's homeland geographic combatant command (GCC) and NORAD as the nation's oldest bi-national

USNORTHCOM and NORAD
Lines of Operation
- → Defense of our Homelands
- → Defense Support of Civil Authorities
- → Homeland Partnerships
- → Regional Partnerships
- → The Arctic
- → Professionalism and Excellence
- → Warfighters and Families

command. I explained the importance of prioritizing our complementary and individual functions with a focus on our shared end states. Our key Lines of Operation are more critical than ever to our mission success. We map all of our activities to these Lines of Operation, which shape our activities and effort.

DEFENSE OF OUR HOMELANDS

As the Commander of USNORTHCOM and NORAD, my primary task is to defend the homelands. *Defense of our Homelands* is our dominant line of operation, and it is the core focus of USNORTHCOM and NORAD primary missions. We are ever mindful of the supreme responsibility we have of defending the security of the United States, our citizens, and our allies and partners. In 2015, we celebrated NORAD's 57th year defending North America against attack through our no-fail aerospace warning and aerospace control missions. NORAD was born in the Cold War and expanded to an internal threat focus after 9/11. By contrast, USNORTHCOM was born in the aftermath of 9/11 and shaped by the seminal nature of those attacks. Both Commands are ever-adapting within the strategic environment, and we work hard to develop our capabilities to outpace threats.

MISSILE DEFENSE

USNORTHCOM's most prominent homeland defense mission is *Ballistic Missile Defense (BMD)*. Currently, our BMD architecture is designed primarily to defend against limited long range ballistic missile attacks from North Korea and Iran. In light of an evolving threat and the increasingly enigmatic and unpredictable nature of North Korea's dictator, Kim Jong Un, I believe it is imperative that the United States continue to develop more capable forces and broader options for effective ballistic missile defense. Our BMD architecture is comprised of a group of independent, yet interrelated components that form a complex and unified

defensive network. This system of systems cannot be modernized and maintained sequentially; each component must be improved concurrently to outpace the evolving threat. I agree with and support the modernization priorities set by Vice Admiral Jim Syring and his team at the Missile Defense Agency (MDA), including improvement in our discrimination sensors, lethality of our kill vehicles, sustainment of the BMD architecture, and development of our kinetic and non-kinetic options. I am grateful to this committee for your support and commitment to modernizing our Ballistic Missile Defense System (BMDS).

We are on the right path to improving our sensors through the development and deployment of the new Long Range Discrimination Radar (LRDR). This critical midcourse sensor is expected to provide persistent sensor coverage and vastly improve our target tracking and discrimination capability. The LRDR will help us evaluate our countermeasure options and increase the capability of our Ground-based Midcourse Defense (GMD) interceptors.

We remain on track to deploy the final 14 interceptors in Alaska, which will give us 44 missiles in the ground by the end of 2017. Finishing the inventory is a big step toward the robust BMDS of the future, but it is critical that we not stop there. We need to continue working on enhancements to the current Exo-atmospheric Kill Vehicle (EKV), and investments in the future Redesigned Kill Vehicle (RKV). We need to invest in the lethality of our kill vehicles, and in ways to get us to the right side of the cost curve. Our adversaries are developing relatively inexpensive technologies, which we assess can reach the homeland. By contrast, our interceptors are vastly more expensive. Today, our BMDS is investing in new technologies and adapting current technologies to new purposes which will enable us to meet the advancing threat and lower the cost per round.

I believe that homeland defense is fundamentally an "away game", and missile defense is no exception. Today's GMD system is designed to intercept incoming threats after the launch is initiated. While that approach offers us sufficient decision space, we need to augment our defensive posture with one that is designed to defeat ballistic missile threats in the boost phase as well as before they are launched, known as "left of launch." In concert with our public and private stakeholders, MDA is working on an emerging technology that will enable us to employ non-kinetic methods to defeat ballistic missile threats when we receive indications that a launch is imminent. I believe this technology will reduce the overall cost of engagement-based missile defense and provide us options to defeat ballistic missiles that continue to proliferate around the world.

We work closely with other GCCs, functional combatant commands, and partner nations to leverage capabilities that enable us to protect the Homeland. Thanks to agreements with the government of Japan, United States Pacific Command (USPACOM) was able to deploy a second Army Navy/Transportable Radar Surveillance and Control Model 2, or AN/TPY-2 to Japan, which dramatically improved our ability to "defend forward."

In addition to the proliferation of ballistic missile threats, I am deeply troubled by the development of advanced long-range cruise missiles and the growing threat they represent to North America. Russia possesses both conventional and nuclear cruise missiles with the range to reach North America and it has proliferated some advanced cruise missile technologies to other actors. This threat is real and it is imperative that we develop effective response options to outpace the threat and enhance our deterrence. We are working with the Joint Integrated Air and Missile Defense Organization (JIAMDO), MDA, and other stakeholders to improve our *Cruise Missile Defense (CMD)* capabilities.

Effectively countering and defeating cruise missiles requires a layered and integrated architecture that can defend across the full spectrum of the engagement sequence. Cruise missiles represent a real operational challenge because of their increased standoff capability, low altitude and small radar signatures. Although no single system can counter all cruise missiles, we have confidence in our layered architecture to defend the homeland. To defeat this more capable threat, we are working on enhancements to each of the individual systems, including our Indications and Warnings capabilities, wide-area-surveillance, and advanced fire control infrastructure.

We are in the first segment of our three-phase Homeland Defense Design (HDD) effort, which will improve our capability to find, fix, track, target, and engage growing air threats, such as those posed by cruise missiles, low-slow aircraft, and long-range aviation. In this first phase, we are testing and evaluating advanced sensors as well as integrated command and control capabilities. In addition to the new STateside Affordable Radar System (STARS), we had begun a three-year operational exercise of the Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System (JLENS). This exercise had been an opportunity for us to see how well JLENS can fit into the existing Integrated Air Defense System (IADS) of the National Capital Region (NCR), including deployment of a JLENS Fire Control System aerostat, which is designed to work in tandem with the surveillance aerostat.

Unfortunately, on October 28, 2015, the JLENS Fire Control System aerostat detached from its mooring station on Aberdeen Proving Ground, Maryland, and eventually grounded in a wooded area in northeast Pennsylvania. The Army is now finishing up the last of their investigations to determine the root causes of the incident. However, with the recent congressional disapproval of the FY16 above-threshold-reprogramming request, termination of

the JLENS operational exercise is now underway and the Department is working to determine the way ahead.

CONCLUSION

We are very fortunate to be able to depend on the brave men and women who choose to wear the cloth of their nation and defend their fellow citizens, despite what is likely to be an onerous fight against increasingly diffuse threats. We embrace our no-fail mission at a time when our unique capabilities are needed most, and with your support, together with the exceptional men and women of USNORTHCOM and NORAD and our trusted partners, we will remain the greatest force for freedom, safety, and security for North America. I look forward to your questions.

Admiral Bill Gortney
Commander, North American Aerospace Defense Command
U.S. Northern Command

Adm. Bill Gortney graduated from Elon College in North Carolina, earning a Bachelor of Arts in History and Political Science in 1977. He entered the Navy as an aviation officer candidate, received his commission in the United States Naval Reserve in 1977, and earned his wings of gold in 1978.

On three different occasions, Gortney commanded forces in the U.S. Central Command area of operations, providing support to Maritime Security Operations and combat operations for Operations Enduring Freedom and Iraqi Freedom. These assignments included commander, U.S. Naval Forces Central Command / U.S. 5th Fleet / Combined Maritime Forces, Bahrain, 2008-2010; commander, Carrier Strike Group 10, on board USS Harry S. Truman (CVN 75), 2007-2008; and commander, Carrier Air Wing 7, on board USS John F. Kennedy (CV 67), 2002-2003.

Additional command tours included VFA-106, the East Coast FA-18 Fleet Replacement Squadron, NAS Cecil Field, Florida, 1996-1997; and VFA-15, 1994-1995, on board USS Theodore Roosevelt (CVN 71).

Gortney's fleet assignments included VA-82, 1981-1984, on board USS Nimitz (CVN 68); VFA-87, 1988-1990, on board USS Theodore Roosevelt; executive officer, VFA-132, 1991-1992, on board USS Forrestal (CV 59); executive officer, VFA-15, 1992-1994, on board USS Theodore Roosevelt; and deputy commander, Carrier Air Wing 7, on board USS Dwight D. Eisenhower (CVN 69).

Other overseas assignments included deputy for Current Operations, Joint Task Force Southwest Asia, Saudi Arabia, 1999; chief, Naval and Amphibious Liaison Element to the Combined Forces Air Component Commander, U.S. Central Command, for the opening months of OIF at Prince Sultan Air Base, Saudi Arabia; and chief of staff, U.S. Naval Forces Central Command / U.S. 5th Fleet, NSA Bahrain, 2003-2004.

Shore assignments included VT-26, NAS Beeville, Texas, 1978-1980; VFA-125, NAS Lemoore, California, 1984-1988; Aide and flag lieutenant to the assistant chief of Naval Operations (Air Warfare), Washington D.C., 1990-1991; Joint Staff, J-33 Joint Operations Department CENTCOM Division, 1998-1999. A 1996 graduate of the Naval War College, he earned a Master of Arts in National Security and Strategic Studies. His first flag tour was as the deputy chief of staff for Global Force Management and Joint Operations, U.S. Fleet Forces Command, Norfolk, Virginia, 2004-2006. From 2010-12 he served as director, Joint Staff. His most recent assignment was as commander, U.S. Fleet Forces Command, 2012-2014.

Gortney has flown over 5,360 mishap-free flight hours and completed 1,265 carrier-arrested landings, primarily in the A-7E Corsair II and the FA-18 Hornet. He is authorized to wear the Defense Distinguished Service Medal, Navy Distinguished Service Medal (two awards), Defense Superior Service Medal, Legion of Merit (four awards), Bronze Star, Defense Meritorious Service Medal (two awards), Meritorious Service Medal (three awards), Air Medal (three awards: Gold Numeral One, two Strike/Flight), Defense Commendation Medal (three awards), Navy and Marine Corps Commendation Medal, Navy and Marine Corps Achievement Medal, Sea Service Ribbon (8 awards), and the Overseas Service Ribbon (2 awards).

Updated: 5 December 2014

Unclassified Statement of

Vice Admiral J.D. Syring, USN

Director, Missile Defense Agency

Before the

House Armed Service Committee

Subcommittee on Strategic Forces

Thursday, April 14, 2016

Embargoed Until Released by the
House Armed Services Committee
United States House of Representatives

Vice Admiral J.D. Syring, USN
Director, Missile Defense Agency
Before the
House Armed Services Committee
Strategic Forces Subcommittee
April 14, 2016

Good afternoon, Chairman Rogers, Ranking Member Cooper, distinguished Members of the subcommittee. I appreciate this opportunity to testify before you today.

Our current budget request of $7.5 billion for Fiscal Year (FY) 2017 will continue the development of defenses for our Nation, deployed forces, allies, and international partners against increasingly capable ballistic missiles. The FY 2017 missile defense program will continue to support the Warfighter and needs of the Combatant Commanders with the development, testing, deployment, and integration of interceptors, sensors, and the command, control, battle management and communications (C2BMC) system for the Ballistic Missile Defense System (BMDS).

Ballistic Missile Threat

The threat continues to grow as potential adversaries acquire a greater number of ballistic missiles, increasing their range, incorporating BMD countermeasures, and making them more complex, survivable, reliable, and accurate. Space-launch activities involve multistage systems that further the development of technologies for intercontinental ballistic missiles (ICBMs). In addition to the Taepo Dong 2 space launch vehicle/ICBM, North Korea is developing and has paraded the KN08 road-mobile ICBM and an intermediate-range ballistic missile (IRBM) with a range greater than 3,000 km. Last October North Korea paraded a previously unseen, new, or modified road-mobile ICBM. North Korea has recently assumed an aggressive posture, having conducted rocket and ballistic missile launches in addition to the launch of the Taepo Dong 2

space launch vehicle/ICBM this past February. Today it fields hundreds of Scud and No Dong missiles that can reach U.S. forces forward deployed to the Republic of Korea and Japan.

Iran has successfully orbited satellites and announced plans to orbit a larger satellite using a space launch vehicle (the Simorgh) that could be capable of intercontinental ballistic missile ranges if configured as such. Iran also has steadily increased its ballistic missile force, deploying next-generation short- and medium-range ballistic missiles (SRBMs and MRBMs) with increasing accuracy and new submunition payloads. Tehran's overall defense strategy relies on a substantial inventory of theater ballistic missiles capable of striking targets in southeastern Europe and the Middle East, including Israel. Iran continues to develop more sophisticated missiles and improve the range and accuracy of current missile systems, and it has publicly demonstrated the ability to launch simultaneous salvos of multiple rockets and missiles. Demonstrating it is capable of modifying currently deployed ballistic missile systems, Iran has flight-tested a Fateh-110 ballistic missile in an anti-ship role. By adding a seeker to improve the missile's accuracy against sea-based targets, Iran could threaten maritime activity throughout the Persian Gulf and Strait of Hormuz.

Support for the Warfighter

Our priority is to continue to deliver greater missile defense capability and capacity to the Warfighter for employment in support of Combatant Command priorities. This budget maintains the commitment to build out homeland defenses to 44 Ground Based Interceptors (GBIs) by the end of 2017 and enhance GBI reliability. To strengthen regional defenses, we plan to deliver a total of 39 SM-3 Block IBs to the Navy in FY 2017 for use on Aegis BMD ships and at the Aegis Ashore site, for a total of 146 delivered since December 2013. MDA also will deliver in FY 2017

61 additional Terminal High Altitude Area Defense (THAAD) interceptors to the Army, for a total of 205 delivered since May 2011.

On 18 December last year, we delivered the Aegis Ashore system in Romania in support of Phase 2 of the European Phased Adaptive Approach (EPAA). The technical capability declaration included the Aegis Ashore Romania missile defense complex, Aegis BMD 5.0 (Capability Upgrade, or CU) weapon system, as an integrated component of Aegis Baseline 9, and Standard Missile (SM)-3 Block IB (with a Threat Upgrade). This is the first EPAA land-based interceptor component, and it is mission capable today. On 30 December 2015, the U.S. Navy accepted ownership of the Aegis Ashore site in Romania. U.S. Warfighter acceptance is expected in May 2016. MDA will continue to support the Navy and NATO through the operation of the system. Also, plans remain on track to deliver a second Aegis Ashore site in Poland along with an upgraded missile defense system and the initial Standard Missile-3 (SM-3) Block IIA missiles by the end of 2018 to support EPAA Phase 3.

MDA routinely provides Warfighter operational support by performing the mission essential functions of BMDS configuration control, asset management, and operational readiness reporting and by providing an operational-level interface to United States Northern Command (USNORTHCOM), European Command (USEUCOM), Central Command (USCENTCOM), and Pacific Command (USPACOM) and facilitating increased Warfighter participation in development of future missile defense capabilities. MDA will continue to lead the integration of evolving MDA, Service, and COCOM command and control capabilities through systems engineering analysis and development of technical integration requirements and interface control documents to address the continued fielding by U.S. adversaries of air, missile, and rocket capabilities.

MDA executes a fully integrated test program that synchronizes the system with the Warfighters trained to operate the system under varying wartime conditions against current and emerging threats. This ensures that BMDS capabilities are credibly demonstrated and validated prior to delivery to the Warfighter. We continue to work closely with independent testers within DoD -- the Director, Operational Test and Evaluation; Deputy Assistant Secretary of Defense, Developmental Test & Evaluation; Service Operational Test Agencies; and Combatant Commands, represented by the Joint Forces Component Commands Integrated Missile Defense -- to develop an Integrated Master Test Plan to execute a robust, cost-effective flight test program. Our flight tests feature operationally realistic conditions and integrate U.S. government stakeholders – to include Soldiers, Sailors, Airmen, and Marines – and allies to prove BMD capabilities before they are fielded. From October 2014 to the present, we have executed 25 flight tests. For the remainder of FY 2016 we will conduct six more flight tests, and in FY 2017 16 flight tests. In addition to 22 element level ground tests, we conducted 11 developmental and operational system-level ground tests from October 2014 to the present. There are three more system-level ground tests scheduled for this fiscal year, and four more planned for FY 2017. Last year we also conducted or participated in more than 20 multi-event exercises and wargames, which are critical to the Warfighter and the intensive engineering efforts across the Agency.

Increasing Reliability and Confidence in the System

Before I review our FY 2017 program, I want to give you a brief overview of what we are doing within the current program to increase reliability and confidence in the system and how we are developing technologies to get ahead of what is sometimes referred to as the kinetic (hit-to-kill) cost curve.

We are working hard to find more cost-effective ways to do the missile defense mission. There are challenging scenarios where adversaries will be able to launch large numbers of relatively cheap and increasingly complex missiles and our only option is to intercept them with very expensive weapon systems. MDA is making critical investments in future system development that we believe will significantly improve system performance and effectiveness. By improving reliability, enhancing discrimination, and expanding battle space to make possible a re-engagement firing strategy, I believe we can reduce the cost per kill. We also need to investigate solutions that help reduce reliance on expensive kinetic intercept solutions.

Reliability is paramount and a critical part of how the warfighter decides upon a shot doctrine, that is, the estimation of how many shots it will take to defeat a credible threat. With a highly reliable interceptor, fewer shots would be required. As we are able to decrease the number of shots we must take against each threatening missile, we can increase overall warfighter confidence in the effectiveness of the system. The work we are doing to improve GBI reliability and develop the Redesigned Kill Vehicle (RKV) will help us reach this objective. We can also improve the missile defense cost curve by increasing the number of kill vehicles we place on a single interceptor. This is the rationale behind the Multi-Object Kill Vehicle (MOKV) program – the more kill vehicles we can put on an interceptor, the greater raid capacity our Ground-based Midcourse Defense system will have. I will address both of these efforts in more detail below.

We must also take steps to improve the discrimination and assessment capabilities of the system. The better Warfighters are able to determine the lethal payload in a target cluster and assess whether it has been actually hit, the fewer interceptors they will need to expend. With our investments in radars while developing advanced electro-optical sensors, we are striving for a diverse sensor architecture that eventually will provide highly accurate midcourse tracking and

discrimination. Development of the Long Range Discrimination Radar and our advanced discrimination sensor technology and space-based kill assessment programs will improve system target discrimination and assessment capabilities. Improved sensor coverage and interceptor capabilities will help the warfighter expand the battle space in order to reengage threats as needed.

The development of non-kinetic technologies, such as directed energy, and new concepts of operation, such as boost-phase intercept and left-of-launch missile defeat, are game-changing and would have a dramatic effect on the need to rely exclusively on expensive interceptors.

I will address all of these development efforts and initiatives below.

Homeland Defense

MDA remains committed to operating, sustaining, and expanding our nation's homeland missile defenses and requests $1.32 billion in FY 2017 for the Ground-based Midcourse Defense (GMD) program, or $440 million below what we requested in PB 16. The FY 2017 budget request is lower than the FY 2016 budget due to the fact that the FY 2016 budget provided a significant increase to historical funding to improve overall reliability and performance and extend the service life of the GMD system. Last year's larger request was driven by the developmental content required to reach 44 GBIs by the end of 2017, the first full year of the RKV program, ground system modernization, completion of Capability Enhancement (CE)-II Block 1 design and full-rate manufacturing as well as CE-II upgrades, development, and procurement. This year we will continue efforts to expand the GBI fleet to 44 by the end of 2017 for Enhanced Homeland Defense, continue flight and system ground testing, undertake RKV and C3 Booster development, enhance the Stockpile Reliability Program, expand the battle space to enable later GBI engagements, upgrade the GMD ground system, and deploy upgraded GMD fire control software to enhance our ability to use land-based sensor discrimination data. We will

continue to add precision and confidence in our reliability assessments by performing failure modes and process analyses, reliability testing, short-circuit and grounding analyses, and verification of our on-going development efforts.

Increasing GBI Capacity

We resumed interceptor manufacturing following the successful intercept in the June 2014 FTG-06b flight test. Since October 2014 we have delivered eight GBIs equipped with the CE-II Exo-atmospheric Kill Vehicle (EKV) identical to the configuration flown in that test. We have also removed eight previously delivered CE-II GBIs and are modifying them to match the FTG-06b configuration. These upgraded GBIs began delivery in March 2016. We are completing development of the CE-II Block 1 EKV and Configuration 2 (C2)/Consolidated Booster Avionics Unit (CBAU) for the Integrated Boost Vehicle (IBV) to address parts obsolescence and eliminate several reliability concerns found in the older GBIs. Our confidence in the CE-II Block 1 IKV design changes was enhanced by the results of the GM Controlled Test Vehicle flight test (GM CTV-02+) earlier this year. We expect the FTG-15 intercept test planned for the end of this calendar year using a CE-II Block 1 EKV and C2/CBAU IBV to boost that confidence level even further. Upon a successful FTG-15 flight test, we plan to deliver ten GBIs configured with CE-II Block 1 EKV and C2/CBAU IBV.

GMD Testing

This past January we successfully executed GM CTV-02+, a non-intercept flight test involving the launch of a GBI from Vandenberg Air Force Base and an air-launched IRBM target over the Pacific Ocean. We were able to exercise fully the new Alternate Divert Thruster in the CE-II EKV in a flight environment and undertake an early evaluation of near term discrimination

improvements for homeland defense. The EKV used SPY-1, SBX, and AN/TPY-2 data for target selection.

The next intercept flight test of the GMD system will take place later this calendar year. FTG-15 will be the first intercept flight test for the CE-II Block 1 EKV and the C2/CBAU IBV. It also will be the first intercept of an ICBM range target by the GMD system or any other BMDS element. A successful test will allow MDA to meet the commitment to deliver 44 GBIs by the end of 2017. Following FTG-15, MDA, in collaboration with DOT&E, plans to conduct the FTG-11 operational intercept flight test in the first quarter of FY 2018, which will demonstrate the full capability of the GMD system with a two GBI salvo for an engagement of an ICBM.

Redesigned Kill Vehicle

The primary objective for the RKV is to improve reliability. Its development will make homeland defenses more robust. We plan to employ a modular design made up of mature subsystems and components to improve producibility, maintainability, and reduce unit cost. The RKV program will strive for performance improvements by incorporating on-demand communications between the kill vehicle and the ground, a wide field of view seeker, improved data processing and discrimination algorithms, and enhanced survivability. We established a cross-industry team to develop the RKV. We will then compete the production of an RKV-equipped GBI all-up round. The program schedule includes a controlled test vehicle flight test of the RKV in 2018 (GM CTV-03) and first intercept flight test in 2019 (FTG-17) to demonstrate the RKV, with a second intercept flight test in 2020 (FTG-18). We plan initial deliveries of the RKV in the 2020 time frame.

In order to achieve full capability of the RKV, improvements are needed in other areas of the GMD program. We will modify the booster so that it can fly in either a selectable two-stage or

three-stage mode and match survivability of the RKV. Additionally, we will upgrade the GMD fire control software to enable mixed engagements with RKV and EKV capabilities, utilize improved sensor data for on-demand communications, and provide improved situational awareness information to the Warfighter. We will modify components of the In-Flight Interceptor Communications System Data Terminals (IDT) to enable on-demand communications.

Ground System Upgrades

The Ground System hardware at Fort Greely and Vandenberg Air Force Base is 1990s technology installed in the early 2000s. We have parts obsolescence challenges and the operating systems are no longer supported by the original manufacturers. Without an upgrade, ground system reliability would decay and impact GBI availability to the Warfighter.

Plans include the refurbishment of Missile Field 1 at Fort Greely, upgrades to the GMD ground system hardware, improvements to the fire control software, and substantial reliability testing and assessments to characterize the reliability and performance of the system. The work on Missile Field 1 began last year. We will complete the refurbishment and reactivation of Missile Field 1 in 2016 to provide sufficient silos for 44 GBIs. We have cleaned out the rust and mold in the utilidor and upgraded the climate control system to match what we have in Missile Field 2 and Missile Field 3. (A utilidor is an underground man-made structure used in extreme cold climates to run utilities lines between facilities. If the utilities -- communications lines, power, heating and ventilation (HVAC) -- were buried into the ground the freeze and thawing of the ground would crush the plastic casings.) The old Mechanical Electrical Building (MEB) was demolished and the new MEB completed in March 2016. We will complete replacement of Command and Launch Equipment, GMD Fire Control (GFC) equipment, and IDT equipment by 2017. The Fort

Drum, New York IDT construction is complete and now operationally available to the Warfighter. This new IDT will enable communication with GBIs launched from Fort Greely, Alaska and Vandenberg Air Force Base in California over longer distances and improve defenses for the eastern United States.

We are also initiating a longer term effort to replace the GMD Communications Network equipment by 2019. We will deliver two significant upgrades to the GFC software. The first, GFC 6B3, provides the Warfighter the capability to operate with 44 GBIs, improves discrimination capability, and adds several warfighter requested upgrades to improve operational capability. The second, GFC 7A, improves fail-over between redundant systems and system availability by removing the aging Command and Launch Equipment and streamlining the GMD fire control system architecture. Ground Systems Build 7B is also underway and will be in full development in 2017. The 7B build includes upgrades for two- or three-stage selectable boosters and associated flyouts, improved nuclear weapons effects planning, improved battle management, additional target discrimination capabilities, and the new RKV On-Demand Communications.

Homeland Defense Sensors

Last year we integrated, tested, and delivered the capability for the Warfighter to manage the second PACOM AN/TPY-2 radar in Japan and introduced the boost phase cue capability of that radar site into the BMDS. This radar and the new C2BMC capability will enhance the overall performance of the two Japan radar sites when operating in a mutually supporting AN/TPY-2 dual radar mode, providing improved tracking coverage for all ballistic missile launches out of North Korea.

The Cobra Dane Early Warning Radar is now operating new software to enhance object classification for the Discrimination Improvement for Homeland Defense (DIHD)-Near Term

capability. We will continue missile defense upgrades of the Early Warning Radars in Clear, Alaska and Cape Cod, Massachusetts. We completed Cape Cod UEWR facilities design in August 2015 and began facility modifications in September 2015. We expect to complete the Clear radar upgrade in second quarter FY 2017 and the Cape Cod upgrade in the fourth quarter of FY 2017.

With our budget request of $68.8 million in FY 2017 for the Sea Based X-band (SBX) radar, we will continue to support flight testing with SBX to demonstrate improvements to discrimination and debris mitigation and be available for contingency operations. SBX will continue development of Discrimination Improvements for Homeland Defense. This past year the U.S. Coast Guard and American Bureau of Shipping five-year recertification of SBX vessel was completed. SBX also completed significant industrial work, including overhaul of two thrusters and three diesel generators, hull preservation, upgrade of the radar cooling system, and replacement of obsolete computer components.

In FY 2017 we request $162.0 million to continue the development of the Long Range Discrimination Radar (LRDR), the new midcourse tracking radar that will improve discrimination capabilities against threats to the homeland from the Pacific theater. LRDR will provide larger hit assessment coverage enabling improved warfighting capability to manage GBI inventory and improving the capacity of the BMDS. The Deputy Secretary of Defense approved designation of the U.S. Air Force as the Lead Service for the LRDR this past August. Supported by system trade studies and with concurrence from the USSTRATCOM, USNORTHCOM and USPACOM Commanders, the Clear Air Force Station, Alaska was selected as the future site of the LRDR. We are also requesting $155.0 million MILCON in 2017 for construction of the LRDR System Complex at Clear AFS, to include the mission control facility, the radar foundation, site

infrastructure and security, along with the necessary utilities to provide initial operations of the radar. We request the MILCON be fully funded to ensure an on-time delivery of the facilities, which in turn allows the Radar Prime contractor to erect the radar equipment shelter and install the radar components to meet the 2020 operational requirement. The LRDR System Complex Phase 2 project is planned in 2019 to provide a permanent shielded power plant for the radar system.

Homeland Defense C2BMC

We request $439.6 million in FY 2017 for Command, Control, Battle Management and Communications (C2BMC). We are fielding C2BMC Spiral 8.2-1 capabilities to NORTHCOM and PACOM in the 4th quarter of FY 2017 to support an enhanced homeland defense capability. This will allow C2BMC to integrate data from multiple TPY-2 radars, SBX, UEWRs, Cobra Dane, and space sensors to increase system raid size and tracking capacity by a factor of five. It will also improve the system information security posture. We also are developing C2BMC Spiral 8.2-5 to support LRDR sensor management and enhanced engage-on-remote and support a more robust homeland defense by December 2020.

Regional Defenses

Our FY 2017 budget request continues to prioritize deployment of regional defenses to protect our deployed forces, allies and international partners against SRBMs, MRBMs, and IRBMs in support of Combatant Commanders' near-term and future priorities.

Terminal High Altitude Area Defense

We have delivered and started training for the fifth Terminal High Altitude Area Defense (THAAD) Weapon System Battery and completed training on the fourth battery now under Army

control. To meet the demand for THAAD, MDA recently delivered 12 THAAD interceptors for U.S. batteries and 24 for THAAD batteries operated by the United Arab Emirates (UAE). This past year we also delivered the latest evolution in THAAD software, SW B2.2.1 Debris Mitigation Phase I capability and flight-tested SWB2.7.0. MDA continued to provide maintenance and supply support of the first deployed THAAD battery (comprising the THAAD system and AN/TPY-2 radar) in Guam.

This past fall THAAD added two more successful intercepts, improving its hit-to-kill record since 2006 to 13 for 13. FTO-02 Event 2a was our first operational test of integrated regional BMD capabilities, with the THAAD and Aegis BMD weapon systems sharing common defended areas. Two air-launched ballistic missile targets and one cruise missile target were launched in this scenario. The THAAD battery destroyed the first ballistic missile target, demonstrating its advanced algorithm capability and satisfying a condition for the Army's materiel release of the THAAD weapon system. Following receipt of the remote cue, the Aegis BMD ship, USS JOHN PAUL JONES, operating in the Integrated Air Missile Defense mode, launched to engage the second target, but the SM-3 Block IB Threat Upgrade missile experienced an anomaly early in flight. The THAAD battery crew, which also had launched a second THAAD interceptor at the medium-range ballistic missile, located this second target and destroyed it. The crew of the USS JOHN PAUL JONES then used the SM-2 Block IIIA guided missile to destroy a cruise missile target. The test, conducted at Wake Island, also involved the THAAD Terminal Mode AN/TPY-2 Radar, the Forward Based AN/TPY-2 Radar, and Aegis BMD Spy-1 Radar, and the C2BMC infrastructure, as well as space sensor assets. Warfighters representing the entire chain of command operated the BMDS system while using tactics,

techniques and procedures and successfully defended against air and missile attacks. This test was a valuable demonstration of the benefits of layered, integrated missile defenses.

In FY 2017 THAAD will participate in two flight tests, FTT-18 and FTT-15. In FTT-18 THAAD will demonstrate an intercept of a separating IRBM target using the THAAD radar, launcher, fire control and communication, interceptor operations and engagement operations. Turbulent weather in the Pacific Ocean precluded the timely execution of FTO-02 E2, which forced the delay of FTO-02 E2a. The turbulent weather forced the delay of FTO-02 E2 into the FTT-18 window in late fourth quarter FY 2015, effectively forcing the re-planning of FTT-18 into FY 2017. In FY 2017, we will conduct FTT-15 to demonstrate the capability of the system to do an endo-atmospheric intercept against an MRBM target with associated objects.

For FY 2017, MDA is requesting $369.6 million for THAAD procurement, which includes the purchase of 24 THAAD interceptors. By the end of FY 2017, MDA will deliver an additional 61 THAAD interceptors to the U.S. Army, for a total of 197 interceptors in inventory (this total does not include interceptors expended in flight-testing including two we plan to expend in FTT-18 and FTT-15). We will deliver and initiate training for the 7th THAAD Battery and complete training for the 6th THAAD Battery and turn it over to the Army by the end of FY 2017. We will also complete the training of the 2nd UAE THAAD Battery and continue to support the forward deployed THAAD battery in Guam.

We are requesting $270.3 million in RDT&E funding in FY 2017 as part of the continued development and testing of THAAD baseline 2.0 capabilities. THAAD will continue activities to explore and mature the design concept of expanding THAAD system interoperability with air and missile defense systems and expanding the battlespace and defended area of the current baseline

THAAD Weapon System. We are also requesting $72.1 million for THAAD operations and maintenance for delivered batteries.

Aegis Ballistic Missile Defense

Aegis BMD continues to be the backbone of the Nation's regional defense for our deployed forces, allies, partners and friends, and directly supports and expands our homeland defenses with long range surveillance and track capability. The FY 2017 budget request supports continued advancement of the system to counter the growing threats.

In FY 2015, MDA expanded global BMD capability for the Aegis Fleet. Together with the U.S. Navy, we completed four BMD Weapons System upgrades on Aegis ships -- two Aegis BMD 3.6 to 4.0 ships (ships with 4.0 can cover a wider threat set compared to the initial weapon system), and two Aegis BMD 3.6 to Aegis Baseline 9.C1 (BMD 5.0 Capability Upgrade (CU)) ships (ships with Baseline 9 and 5.0 CU can conduct the anti-air warfare and ballistic missile defense missions concurrently). We also commenced four additional upgrades, one from 3.6 to 4.0 and three from 3.6 to Aegis Baseline 9.C1 (BMD 5.0 CU). All upgrades were done to the existing BMD fleet of 33 BMD-capable Aegis ships. To meet an ever-growing demand by the Combatant Commanders, we continued delivery of Standard Missile-3s, including eight Block IAs and 20 Block IBs. FY 2015 also marked the end of manufacturing for SM-3 Block IA rounds. We completed 26 Block IA recertifications and will continue to support maintenance for the deployed SM-3 Block IA rounds. In 2016, we expect to complete analysis that would support the extension of service life of the SM-3 Block IAs from 8 to 12 years, leaving these critically needed assets in the Fleet 50% longer.

MDA conducted several critical flight tests this past year to prove the operational effectiveness of Aegis BMD and support certification of the at-sea and ashore versions of Aegis

Baseline 9 (BMD 5.0 CU) Weapon System. Starting with FTM-25 on November 6, 2014, we successfully executed integrated air and missile defense (IAMD) by intercepting one short-range ballistic missile target with an SM-3 Block IB, while simultaneously engaging two air-breathing threats with SM-2 Block IIIAs. For this test, the Aegis Baseline 9 ship, USS JOHN PAUL JONES, was configured in IAMD mode, which provides the ship the ability to manage SPY-1 radar resources to conduct both anti-air warfare and ballistic missile defense concurrently. All three targets were successfully intercepted, and we met all primary and secondary objectives.

In FTX-19, conducted in February 2015 off the coast of Virginia at NASA's Wallops Island facility, MDA successfully simulated engagements against a raid of three short-range targets using the Aegis BMD 4.0 Weapons System, demonstrating coordinated SM-3 engagements between two Aegis BMD ships utilizing the Distributed Weighted Engagement Schema between two Aegis ships coordinating engagements. This weapon system functionality will be used, particularly in raid scenarios, when more than one ship is able to engage inbound threat missiles, and it determines a Preferred Shooter solution for SM-3 engagements. During this test, an Aegis Baseline 9 (BMD 5.0 CU) ship also participated, performing IAMD by simultaneously conducting simulated engagements of the three SRBM targets and four simulated anti-air warfare targets.

In July MDA and the Navy conducted a series of four flight test events to verify the Sea-Based Terminal capability. The Sea Based Terminal program delivers an added layer of defense for Aegis BMD to engage short range threats in the terminal phase of flight and defend the sea base and high value assets ashore. During this series, the USS JOHN PAUL JONES used Aegis Baseline 9 (BMD 5.0 CU) to search, detect, track, and discriminate two short-range ballistic missile targets and two cruise missile targets. In four separate flight test events we verified the

Sea Based Terminal capability using the SM-6 Dual I and the SM-2 Block IV missiles, successfully destroying the short-range ballistic missile and cruise missile targets and demonstrating the ability of Aegis Baseline 9 (BMD 5.0 CU) and the SM-6 to conduct both terminal ballistic missile defense and anti-air warfare. This campaign marked the first flight of the SM-6 Dual I missile, and it was the first demonstration of the tactical interface between the Aegis Baseline 9.C1 Weapons System and the SM-6 and SM-2 Block IV guided missiles. The SM-6 is a dual-use (anti-air warfare and BMD) missile that provides an accurate and highly capable BMD capability. It will replace the legacy SM-2 Block IV for terminal defense as those missiles reach the end of their service life. We are planning additional flight tests in 2016 for SM-6 Dual I missiles, which will enter the fleet inventory this spring.

This past December we successfully conducted the Standard Missile-3 (SM-3) Block IB Threat Upgrade (TU) controlled test vehicle (CTV) test, which we launched to engage a simulated ballistic missile target. The simulated engagement was controlled by the Aegis Ashore Missile Defense Test Complex with Aegis Baseline 9 (BMD 5.0 CU) to verify G-switch operation of the SM-3 Block IB TU. This test put us in a confident position later in the day to conduct the operationally realistic FTO-02 E1a intercept test. The Aegis Ashore missile defense test complex at the Pacific Missile Range Facility in Hawaii fired the SM-3 Block IB interceptor for the first time to collide with and destroy an air-launched MRBM target. This operational flight test was the first to demonstrate an intercept using the Aegis Ashore test complex and demonstrated important modernization updates to the Aegis Weapon System.

In FY 2017, we will continue our commitment to develop, test, and deliver global naval capability to the Warfighter and support defense of our deployed forces and European NATO allies through supporting operational readiness of EPAA Phase 2 and delivery of Phase 3. In FY

2016, following successful flight testing of the redesigned SM-3 Third Stage Rocket Motor nozzle to increase overall missile reliability, MDA anticipates a full-rate production decision for the SM-3 Block IB. Anticipating that authorization, we request $463.8 million in FY 2017 to procure 35 SM-3 Block IBs and supporting material, for a total of 256 procured (235 Defense Wide Procurement plus 21 RDT&E) and 146 delivered by the end of FY 2017. To recertify SM-3 rounds that have been previously delivered and deployed to the Fleet, MDA requests $38.9 million in FY 2017 for sustainment of SM-3 assets.

We request $106.0 million for the SM-3 Block IIA Cooperative Development (SCD) effort with the Japan Ministry of Defense. In FY 2015, the SM-3 Block IIA executed a controlled test vehicle, in which controlled first-stage flight through nosecone separation was successfully demonstrated. In December of 2015, a second controlled flight test was conducted to further test the Kinetic Warhead and Throttleable Divert and Attitude Control System. We will complete flight testing for the SCD Project with two intercept tests scheduled for the fourth quarter in FY 2016 and second quarter in FY 2017. In FY 2017, we will begin transition to testing the SM-3 Block IIA within the U. S. BMDS architecture with the upgraded Aegis Baseline 9 weapon system and BMD 5.1, for at sea and ashore deployment, and we request $254.7 million in RDT&E funding to continue manufacturing rounds to support flight testing and EPAA Phase 3.

MDA is strongly committed to further enhancing capability of the Aegis BMD weapon system to give Sailors the tools needed to successfully execute their mission. In FY 2015, we delivered the BMD 4.0.3 weapon system, which further enhances Aegis BMD's homeland defense role by improving long range surveillance and tracking capability to provide data to the GMD system for longer range and more sophisticated threats. MDA requests $28.3 million in FY 2017 for the BMD 4 series weapon systems to bring advanced threat and raid scenario capability

to the legacy Aegis BMD Fleet. Having certified the Aegis Baseline 9.C1 (BMD 5.0 CU) weapon system in November of 2015, MDA is shifting focus towards delivering BMD 5.1 capability on schedule and requests $92.4 million to continue software development and testing to certify in FY 2018 and meet the delivery timeline of the SM-3 Block IIA for deployment on ships and at Aegis Ashore sites. In addition to weapon system development, MDA requests $50.1 million to procure weapon system equipment for installation and upgrade to the BMD Fleet and $19.9 million to sustain BMD specific equipment on the existing Fleet.

Adding an additional layer to the Aegis BMD weapon system, we are using an incremental development approach integrated within the Navy's Baseline 9 architecture to develop and deliver a Sea Based Terminal capability. By expanding the capability of the SM-6 guided missile and BMD 5 series weapon systems, we are delivering capability to protect maritime forces against anti-ship ballistic missiles and provide layered defense for forces ashore. We will further test the first increment of Sea Based Terminal with follow-on performance testing in FY 2016 during FTX-21. Sea Based Terminal Increment 2 is on schedule to be certified and operational in the 2018-2019 timeframe.

European Phased Adaptive Approach

We will continue to support the EPAA as a U.S. contribution to NATO BMD to provide full coverage and protection of NATO European territory, populations, and forces from the increasing threat of ballistic missile proliferation from outside of the Euro-Atlantic area by investing resources for EPAA development, testing and deployment. It is important to emphasize that this capability is not capable of threatening, nor is it intended to threaten, Russia's strategic nuclear deterrent. EPAA Phase 1 was implemented in 2011 with the fielding of an AN/TPY-2 radar in Turkey and stationing of an Aegis BMD ship in the Eastern Mediterranean. EPAA Phase

2 achieved technical capability declaration in 2015, which enhances U.S. and NATO capabilities with the addition of Aegis Ashore in Romania, additional deployment of Aegis BMD ships home-ported in Rota, Spain, more capable Aegis BMD SM-3 Block IBs, and an upgraded Baseline 9 weapon system with BMD 5.0 CU. With Aegis Ashore Romania turned over to the Navy for operations, in FY 2017 we have requested $13.9 million for sustainment of the system. To augment needed ship stationing requirements of EPAA Phase 2, MDA is providing sustainment support for BMD specific equipment to the four ships that shifted home ports to Rota, Spain.

Although not directly in support of the BMDS architecture for EPAA Phase 2, MDA assisted the Maritime Theater Missile Defense Forum and U. S. Navy in a multi-national, two month long event. At-Sea-Demonstration 15 (ASD-15) met its objective to prove multi-national interoperability for air and ballistic missile defenses. During the seven weeks of live fire events, four IAMD scenarios were exercised. The capstone IAMD event was an SM-3 Block IA intercept of a short range threat by the USS ROSS cued by Netherlands' HNLMS DE ZEVEN PROVINCIEN, with simultaneous engagements of air breathing targets by the USS THE SULLIVANS and Canada's HMCS MONTREAL. United Kingdom and Spanish ships sent track data for analysis back to Dahlgren, Virginia. In all, ASD-15 demonstrated the power of a multi-national maritime task force to share information and work cooperatively in a complex integrated air and missile defense environment.

EPAA Phase 3 will improve defensive coverage against medium- and intermediate-range threats with the deployment of a second operational Aegis Ashore site in Poland, equipped with the upgraded Aegis Baseline 9 weapon system with BMD 5.1 and capability to launch SM-3 Block IIAs. These Aegis Weapon System upgrades are further enhanced by spiral upgrades to the C2BMC network enabling Engage on Remote capability and extended defensive coverage for

NATO Europe. In FY 2016 we requested $169.2 million for the construction of the Aegis Ashore site in Poland. The MDA MILCON contract for the Redzikowo, Poland Aegis Ashore site was awarded on February 10, 2016, and construction start was March 2016. We request $57.5 million in FY 2017 for procurement of Aegis Ashore equipment. We plan to complete this site by the end of 2018 and will upgrade the Aegis Ashore Romania site to BMD 5.1 when operationally feasible.

Command, Control, Battle Management, and Communications and Sensors

C2BMC provides persistent tracking, cueing, discrimination, and fire control quality data to Aegis BMD, GMD, THAAD, and coalition partners to support homeland and regional defense objectives. We continue to support Warfighter command, control and battle management needs across the globe by providing the strategic BMD planner, which provides Combatant Commanders situational awareness tools to support weapons release authority for homeland defense and control and tasking of forward-based AN/TPY-2 radars. C2BMC operators and maintainers are deployed forward in some of the world's highest threat spots and continue to provide around-the-clock support to the local commanders.

As the BMDS integrating element, C2BMC has demonstrated proven interoperability across regional BMD architectures. Of note this past year in the regional defense area, we integrated with Aegis Ashore to support Aegis Launch on Remote capability required for EPAA Phase 2 declaration in December 2015. MDA also fielded Cross-Area of Responsibility capability to USEUCOM and USCENTCOM C2BMC, allowing each Combatant Command to take advantage of the other's BMD assets. We also supported enhancements to the BMDS to keep pace with emerging threats worldwide by investing in the development, integration, and testing of advanced algorithms to improve discrimination capabilities and enhance the use of

space-based sensor data using the BMDS Overhead Persistent InfraRed (OPIR) Architecture (BOA). MDA's C2BMC engineers continued to make progress in the Simultaneous Correlation of Unambiguous Tracks (SCOUT) algorithms and Aggregated Discrimination. SCOUT is a multiphase activity to develop a physics-based capability to identify the lethal object(s) of a threat complex in a moderately complex countermeasure environment.

We will field C2BMC Spiral 8.2-1 to USNORTHCOM and USPACOM in the fourth quarter of FY 2017 in support of enhanced homeland defense. Spiral 8.2-1 is a complete hardware update to the C2BMC System that will allow C2BMC to integrate data from multiple TPY-2 radars, SBX, UEWR, Upgraded Cobra Dane, and BMDS OPIR architecture. It will increase system raid size and tracking capacity by a factor of five and will improve the system Information Assurance/Cyber security posture. Continued development, integration and testing of C2BMC Spiral 8.2-3 (Engage on Remote) will support the EPAA Phase 3 capability declaration in December 2018. Development of C2BMC Spiral 8.2-5 (LRDR Sensor Management and Enhanced Engage on Remote) will enable us by December 2020 to reach a robust homeland defense capability. Finally, we will continue to support incremental improvements to the BMDS to keep pace with emerging threats world-wide by investing in the development, integration and testing of advanced algorithms to improve discrimination capabilities and to enhance the use of space based sensor data using the BMDS OPIR architecture.

We request $32.1 million for continued operation of the Space Tracking and Surveillance System (STSS) in FY 2017. STSS satellites operate in low earth orbit and continue to collect valuable test data. STSS collected data on the most complex scenes to date during the FTX-20 test event in October 2014. (FTX-20 involved the launch of a separating MRBM and the

simulation of an exo-atmospheric engagement by an Aegis Baseline 9.C1 configured destroyer. GM CTV-02+ involved a non-intercept test of a Ground Based Interceptor against a complex target scene presented by an air launched IRBM.) STSS also successfully tracked and collected data during Glory Trips 215 and 212, and participated in two other Air Force Global Strike Command flight tests of the Minuteman III.

In FY 2015, we began the process of decommissioning the Near-Field Infrared Experiment (NFIRE) satellite that MDA launched in April 2007. This satellite captured high resolution phenomenology data from the exhaust plumes of boosting ballistic missiles. The NFIRE satellite was decommissioned in August 2015 and safely deorbited this past November. Looking to the future, we completed the Critical Design Review for the Spacebased Kill Assessment (SKA) in January 2015 and the SKA Flight Model Manufacturing Review in April 2015; delivered the first shipset of flight models to the payload integrator in November 2015 and the second shipset in January 2016. The SKA experiment is comprised of a network of sensors hosted on commercial satellites to collect data on missile intercepts, make an independent kill assessment, and pass that information on to the BMDS to support a multi-sensor kill assessment of the target. In FY 2017 we will complete the integration and testing of SKA payloads onto hosted payload modules and satellites and conduct on-orbit deployment, checkout, calibration and commissioning of the SKA sensor network.

The Services and COCOMs, with logistical support from MDA, are operating forward based X-band radars (AN/TPY-2(FBM)) in Japan, Israel, Turkey, and United States Central Command. All of these radars contribute to regional defense, and some also provide a significant contribution to the defense of the U.S. homeland. Last year we completed the integration and performance characterization testing of the 2nd AN/TPY-2 radar to Japan, located at

Kyogamisaki (Site KCS). In order to reduce noise levels at a seaside community near the KCS site, we completed muffler installation on Mobile Electric Power (MEP) -810 power generators in March 2015. MDA increased environmental protection for the radar equipment by coordinating and receiving approval for construction and modification of the Prime Mission Equipment/Rubb structure at Site KCS. In FY 2015 we delivered new operational mission profiles that provided cooperative coverage/capability for USEUCOM and USCENTCOM sensors and successfully completed operational flight testing of new capabilities in operational flight tests (FTO-02 events) and ground test campaigns, improving cross-Area Of Responsibility operational mission profiles, debris mitigation logic and increases operational availability. Last year we completed the THAAD Reliability Growth Test and critical maintenance periods on Radars #2, #3 and #5 at Guam. We also delivered Radar #11 to THAAD Battery #6 and continued production of Radar #12 (the final U.S. production AN/TPY-2).

We request $653.4 million in FY 2017 to develop, deploy, test, and sustain BMDS sensors (this includes $162.0 million for the continued development of the Long Range Discrimination Radar), and $172.6 million to sustain the twelve (terminal mode and forward-based mode) AN/TPY-2 radars and support the UEWRs and Cobra Dane radar. We expect to complete development efforts for the next incremental software build (CX3.0), which will expand electronic protection functionality and further improve discrimination and debris mitigation capabilities to handle more advanced threat set requirements. We will also develop common U.S. and FMS software architecture for AN/TPY-2 to improve synergy and achieve cost savings for future software builds. In FY 2017 we also will deliver the operational Float Antenna Equipment Unit (AEU) to improve Warfighter operational/maintenance flexibility; continue fleet-wide depot maintenance to retrofit Electronics Equipment Units with new signal data processors; and retrofit

a product redesign for AN/TPY-2 AEU transformers with upgraded reliability improvements across the fleet. AN/TPY-2 radars will participate in three BMDS flight tests (FTG-11, FTG-15, and FTT-18).

Developing New Capabilities

MDA is developing technology to address gaps in the BMDS and drive the cost of defending the homeland down dramatically. MDA's goal for these investments is to deploy a future BMDS architecture more capable and cost-effective that instills warfighter confidence in the ability of the BMDS to defeat missile attacks. Our vision is to shift the calculus of our potential adversaries by introducing directed energy into the BMDS architecture. This would revolutionize missile defense by dramatically reducing, if not eliminating, the role of very expensive interceptors. Our long-term goal is to deploy lasers on high altitude, long endurance Unmanned Aerial Vehicle (UAV) platforms to destroy ICBMs in the boost phase. To achieve this vision we must demonstrate two key elements: laser scaling with high efficiency and excellent beam quality, and high altitude, long endurance aircraft to carry the laser system.

We request $71.8 million in Weapons Technology to continue development and test of our high-powered directed energy program to build the foundation for the next-generation UAV-borne laser system. A UAV-borne laser would be capable of acquiring, tracking and eventually destroying an enemy missile at a much lower cost than the existing BMDS. Within the Directed Energy project, we will collaborate with our Air Force and DARPA partners to develop and demonstrate the technology necessary to scale laser power to a level required for speed-of-light missile defense. In FY 2015, the Massachusetts Institute of Technology's Lincoln Laboratory (MIT/LL) Fiber Combining Laser achieved 44 kilowatts (kW) continuous power with near perfect beam quality, a record for fiber combined lasers. In 2017, MIT/LL will demonstrate a 30 kW,

low Size Weight and Power (~ 7 kg/kW) fully packaged fiber laser. They also will demonstrate a flight qualified 1 kg/kW fiber amplifier traceable to BMDS high energy laser system requirements. The Lawrence Livermore National Laboratory (LLNL) achieved similar success with their Diode Pumped Alkali Laser (DPAL) system, reaching 14 kW, a record for the DPAL system. In FY 2017, LLNL will demonstrate a DPAL system at 30 kilowatts average power, more than double the power ever achieved by a hybrid laser. The Agency also will make technology investments in Divert and Attitude Control Systems for future BMD interceptors and kill vehicles.

In our effort to mature laser technology for missile defense, we awarded five contracts with key aerospace partners to produce concepts for an airborne low power laser demonstrator. We will use these concepts to guide our requirements for the follow-on competitive design contracts in FY 2017 under our Technology Maturation Initiatives program element. MDA requests $90.3 million in FY 2017 for Technology Maturation Initiatives to build on the successes in weapons technology and discrimination sensor technology. Our vision is to add high altitude airborne or space-based electro-optical sensors into the BMDS architecture that can acquire, track, and discriminate ballistic missile targets.

One of the goals of the Discrimination Sensor Technology flight test development program is to demonstrate that the Aegis Weapon System can launch an SM-3, engage and destroy a ballistic missile solely on tracks from remote airborne sensors. Test campaigns exercise the test analog of the BMDS architecture using operationally proven Multispectral Targeting System sensors aboard MQ-9 Reapers as the tracking element. During FTX-20, FTM-25, and GM CTV-02+, the Reapers received cues, acquired and tracked the target and transmitted these tracks to the BMDS C2BMC laboratory at Schriever Air Force Base. C2BMC fused the tracks

and transmitted them via Link 16 to the Aegis Ballistic Missile Test Bed at Space and Naval Warfare Systems Command (SPAWAR) in San Diego, CA where the engagements were simulated in real-time. During GM CTV-02+ the Aegis Weapon System authorized Remote Engage Doctrine within 30 seconds of target burnout.

Over the next two years, we will incrementally demonstrate the value of increasingly more capable electro-optical/infrared sensors while developing tactics and procedures for future operational use. This work will culminate in a real time Aegis SM-3 engagement using tracking information from airborne sensor data in 2017 and again using higher precision, advanced sensor data in 2019. These tests are a crucial step in developing persistent sensor technology to defeat the evolving ballistic missile threat first from aircraft and eventually from space. Finally, MDA will contract with industry to begin the design of an airborne laser demonstrator to quantify the target acquisition, tracking, and handover performance required for boost phase missile defense.

MDA requests $71.5 million for the MOKV effort. We have made considerable progress on the development strategy for the next generation exo-atmospheric kill vehicles. In FY 2015, we awarded three contracts with industry to define concepts for deploying multiple kill vehicles from a single booster. In FY 2016, industry delivered their MOKV concepts, and we are evaluating those concepts. The next step will be to focus on reducing component technical risk in critical areas identified by industry, which is necessary to make this revolutionary concept a reality. By 2017 we will develop and test MOKV command and control strategies in both digital and Hardware-in-the-Loop venues that will prove we can manage the engagements of many kill vehicles on many targets from a single interceptor. We will also invest in the communication architectures and guidance technology that support this game changing approach. Ultimately, MOKVs may revolutionize our missile defense architecture.

MDA requests $23.4 million for Advanced Research and development that capitalizes on the creativity and innovation of the Nation's small business community and academia to enhance the BMDS. We are also fostering research between U.S. and foreign universities of allied nations through international cooperative science and technology projects. We awarded nine new contracts and exercised continuation options on ten additional contracts for innovative new research that can transition onto the BMDS.

MDA also requests $17.9 million for the Advanced Concepts & Performance Assessment effort, which models the capability of advanced BMD technology to address evolving threats to the warfighter. The request will fund the digital simulation and hardware-in-the-loop framework and models required for testing of the Airborne Advanced Sensor, Kill Vehicle Modular Open Architecture test bed, and maturing sensor fusion algorithms.

International Cooperation

The FY 2017 budget request includes funding for regional missile defense capabilities to protect deployed U.S. forces, reassure allies and partners, and build cooperative regional security architectures. MDA is engaged with over twenty countries and international organizations, such as NATO and the Gulf Cooperation Council (GCC). MDA is committed to expanding work with our international partners, to include conducting joint analyses to support partner missile defense acquisition decisions, cooperative research and development projects, deploying BMD assets, Foreign Military Sales (FMS), and co-production efforts. Our major international efforts reflect the Department's goals in the Asia-Pacific, Middle East, and European Areas of Responsibility and will enable implementation of EPAA, build partner capacity, and support the strategic shift to Asia-Pacific.

The investments of our allies and partners in their own missile defense capabilities allow us to build more effective regional security architectures that complement U.S. regional missile defense capabilities. MDA is currently executing an FMS case with the United Arab Emirates for two THAAD batteries and accompanying launchers, radars, and interceptors. MDA is actively engaged with several nations, particularly those in the Arabian Gulf region, to provide program information and cost data that may inform future decisions to procure THAAD and other missile defense systems. We are currently conducting a Ballistic Missile Early Warning Study for the GCC, analyzing sensor and C4I architecture options for defense of the region.

We continue to have a very strong cooperative missile defense partnership with Israel. Over the past year, the Israel Missile Defense Organization (IMDO) and MDA successfully completed the third and fourth series of tests of the Stunner Interceptor for the David's Sling Weapon System (DSWS). IMDO and MDA also achieved the successful first engagement of a ballistic missile target with the Arrow-3 interceptor in December 2015. This was a major milestone in the development of the Arrow Weapon System and provides confidence in future Israeli capabilities to defeat developing threats. The Department continues to support the critical Iron Dome Program to defeat short-range rockets and artillery through co-production efforts.

We are making significant progress with our Japanese counterparts on the SM-3 Block IIA, our largest co-development effort. The development work, which remains on track for first delivery in the 2018 time frame, will expand extended deterrence to our friends and allies and establish an important vehicle for closer defense cooperation ties. Once deployed at the Aegis Ashore site in support of EPAA Phase 3 and on ships, the SM-3 Block IIA will improve and expand defenses against MRBM and IRBM threats.

We continue to work on meeting our EPAA commitments with our NATO Allies. In December 2015, we completed major weapon system construction and achieved Technical Capability Declaration of the Aegis Ashore site in Romania. We anticipate declaring Initial Operating Capability of EPAA Phase 2 as well as beginning work on the Aegis Ashore site in Poland in support of EPAA Phase 3 this year. In addition to our interoperability activities with NATO, MDA continues to work with our European allies collectively as we build upon the synergy and lessons learned from ASD-15 as well as bilaterally to further individual national progress with missile defenses.

Cybersecurity/ Supply Chain Risk Management

We are very cognizant of the growing cyber threat and aggressively working to ensure the Nation's missile defenses are resilient and able to operate in a highly contested cyber environment. Potential adversaries are developing cyber forces as part of their military structure and integrating them into their overall strategy. We are working very closely with the Armed Services, the Combatant Commands, especially Strategic Command's USCYBERCOM, and other agencies in DoD and the Federal Government to counter this growing threat.

We are improving the cyber hygiene of our missile defense capabilities by ensuring our cybersecurity infrastructure has the latest security upgrades and patches. We are assessing our systems, our suppliers, and our overall acquisition processes. We are ensuring robust and secure configurations of our critical software and hardware to reduce the risk of malicious activities. We also have a rigorous cyber and supply chain risk management inspection program to examine everything about our systems from the trusted supply chain to the fielded capability. This helps us ensure the highest possible levels of compliance.

In support of the DoD Cybersecurity Culture and Compliance Initiative signed out by the Secretary of Defense on September 28, 2015, we are developing a cybersecurity program that focuses on the five operational excellence principles: Integrity, Level of Knowledge, Procedural Compliance, Formality and Backup, and Questioning Attitude. These principles are fundamental to the DoD cyber enterprise.

We are also instituting the DoD Cybersecurity Discipline Implementation Plan to mitigate risks for the information systems we own and manage. Our program implements the DoD campaign four lines of effort: 1) Strong Authentication, to degrade the adversaries' ability to maneuver on DoD information networks; 2) Device Hardening to reduce internal and external attack vectors into DoD information networks; 3) Reducing the Attack Surface, to lessen external attack vectors into MDA information networks; and 4) Alignment to Cybersecurity / Computer Network Defense Service Providers, to improve detection of and response to adversary activity. These efforts run across all facets of MDA and the BMDS mission systems and general services infrastructures. We also created five additional Lines of Effort critical to MDA and the BMDS including: 1) Safeguarding BMD information in the defense industrial base; 2) Positioning, Navigation, and Timing; 3) Transitioning to Risk Management Framework; 4) Cybersecurity Testing and 5) Cybersecurity Workforce Management (training and certification).

We are also increasing efforts to establish additional cybersecurity awareness training in support of the DoD Cybersecurity Culture and Compliance Initiative to improve the individual human performance and accountability within the DoD cyber enterprise. This applies to our leaders, service providers, cyber warriors, and all of our general users. Our efforts align to the DoD Cyber Strategy program and are meant to enable and augment the existing mandated cyber training efforts. Our training reinforces DoD training and exists to shift cybersecurity cultural

norms at all levels to increase cybersecurity situational awareness across all personnel and inculcate a high level of personal responsibility.

MDA has established an insider threat program in accordance with the DoD Directive 205.16, "The DoD Insider Threat Program." We are leveraging computer network defense capabilities, in addition to other information streams to proactively detect, mitigate and defeat potential insider threats. This program also ensures that only trusted individuals have access to MDA program information and systems.

The MDA Computer Emergency Response Team (CERT) continues to provide Computer Network Defense (CND) services as an accredited Tier II CND service provider to MDA programs of record. The MDA CERT executes a battle rhythm that includes daily monitoring and collaboration with USCYBERCOM, Joint Forces Headquarters DoD Information Networks, and other sources for latest threats to DoD and the MDA. As a result, the MDA CERT tracked and managed 109 cyber taskings in FY 2015, contributing to the overall cybersecurity posture of MDA networks and resources. From August to November 2015, the Information Security Oversight Office (ISOO) inspected MDA. The ISOO is responsible to the President for policy and oversight of the Government-wide security classification and the National Industrial Security Program and is a component of the National Archives and Records Administration. In addition to security classification and Industrial Security, the ISOO reviewed MDA's cybersecurity program. ISOO's review confirmed that the MDA operates a robust CNSI program, one that enjoys leadership support and utilizes numerous best practices. Nearly all of the program elements are very strong, and the personnel who implement the program are dedicated and innovative. The Agency's Security Classification Guides are developed and updated utilizing a sound process and those that ISOO reviewed were current, very well prepared, and included all of the elements

required by Executive Order 13526 and ISOO Directive 1. As with any program, there are areas for improvement. MDA is working those areas for improvement based on the findings and recommendations.

Over the last year we also conducted two Enterprise Cyber Range Environment (ECRE) experiments with independent, DOT&E red team penetration testing on the Joint Information Operations Range (JIOR). The purpose of these experiments is to determine the BMDS cyber robustness to both external and insider threats. We are planning an additional ECRE for the GMD program in May 2016. MDA also completed 85 cybersecurity inspections worldwide to ensure compliance with DoD and MDA cybersecurity standards. We follow up on these inspections to ensure remediation of all identified cybersecurity risks.

We must build resilient cyber defenses that are capable of detecting and mitigating threats without impeding operations in order to "fight through" the cyber threat. MDA collaborates with the Director of Operational Test and Evaluation to conduct cyber penetration testing on key missile defense capabilities. We then use the results of those tests to conduct risk assessments to prioritize cybersecurity improvements, develop mitigation strategies, and improve cyber training. We are also working to develop better cyber concept of operations to ensure every network defender in every location knows how to react to cyber challenges.

MDA is working hard to incorporate cybersecurity requirements early into our acquisition lifecycle. We are focused on ensuring we are designing and building cybersecurity into missile defenses, rather than adding it after the fact. In addition, we are working closely with our industry partners in the defense industrial base to ensure they can protect both classified and unclassified information they are processing on their systems to ensure that it will not be exposed to potential adversaries. We know that malicious cyber actors are constantly attempting to

exfiltrate information from U.S Industry. We will continue to work with the defense industrial base, the FBI, and other partners to identify these issues and raise the costs of this behavior to those responsible, in coordination with national authorities and in accordance with national policy.

We are working diligently with the COCOMs, Services, and other agencies in the Federal Government to ensure the missile defense capabilities we field will operate successfully in a highly contested cyber environment. We have structured and continue to improve an ongoing robust cybersecurity program to protect information about current and future missile defense capabilities and ensure a persistent state of enterprise cybersecurity readiness. This ensures that the Agency remains a strong mission partner, protects and defends MDA information systems and networks, and optimizes cybersecurity management and processes at a level commensurate with our critical national defense mission.

Program Oversight

There continues to be significant interest in MDA's development and deployment of the BMDS and management of the missile defense program. MDA is highly visible and one of the most scrutinized agencies within the Department of Defense. Each year, throughout the budget hearing cycle and congressional mark-ups and floor debates of the defense authorization and appropriations bills, there is intense congressional oversight of the missile defense program. MDA is also subjected on an annual basis to numerous Government Accountability Office audits, the support of which has required MDA to expend significant time and enormous resources. Dozens of MDA personnel are engaged in supporting 21 GAO audits and answering more than 750 inquiries. Just within the past year MDA has provided nearly 11,000 pages of internal

documents and prepared responses. MDA has concurred or partially concurred with all 21 GAO recommendations in their annual Mandate Report since 2011.

In addition, the National Defense Authorization Act for Fiscal Year 2010 requires that Defense Department financial statements be validated as ready for audit no later than September 30, 2017. The Office of the Under Secretary of Defense (Comptroller), Financial Improvement and Audit Readiness (FIAR) Directorate, initiated the Statement of Budgetary Activity (SBA) Examination for the MDA in April 2015 to evaluate the Agency's readiness for audit. In December 2015, the audit firm conducting the SBA reported that MDA management's assertion is fairly stated, which is a successful audit opinion. The Missile Defense Agency continues to make significant progress with FIAR initiatives and new Department policies. The successful SBA examination confirmed the Agency is on track to meet financial statement requirements and full auditability by the end of Fiscal Year 2017.

MDA also annually delivers the congressionally mandated Baseline Acquisition Review (BAR) reports to Congress and GAO. We released the latest BAR in early March. MDA and the Department also continue to produce and deliver, as required by the annual defense bills, on average, over 30 reports to congress on missile defense.

Conclusion

Mr. Chairman and Members of the Subcommittee, in closing, I want to assure Congress that MDA programs are cost-effective, efficient, and managed in accordance with the Missile Defense Executive Board process set up by the Department to ensure all missile defense programs and operational requirements are validated, adhere to sound acquisition practices, and can meet warfighter demand in a cost effective manner. Our budget request for Fiscal Year 2017 will continue to increase the capability and capacity of fielded homeland and regional missile defense

systems and make measured investments in advanced technology to reverse the adversary's numerical advantage. I look forward to answering the committee's questions. Thank you.

Vice Admiral James D. Syring
Director, Missile Defense Agency

Vice Admiral James Syring is from Muncie, Indiana. A 1985 graduate of the United States Naval Academy with a Bachelor of Science degree in Marine Engineering, he received his commission as an ensign. Subsequent to commissioning, he was designated an engineering duty officer. In 1992, Syring earned his Master of Science degree in Mechanical Engineering from the Naval Post Graduate School.

Ashore, Syring served in numerous engineering duty officer assignments including: ship superintendent for USS Port Royal (CG 73); Aegis test officer for new construction DDG 51 class ships; combat systems, test and trials officer in the DDG 51 Aegis Shipbuilding Program Office; Combat Systems Baseline manager in the Aegis Technical Division; director for Surface Combatants, Office of the Assistant Secretary of the Navy (Research, Development and Acquisition). Syring served as the technical director for the U.S. Navy's DDG 1000 Shipbuilding Program and followed that tour as the DDG 1000 major program manager.

Upon selection to flag rank in 2010, Syring served as the program executive officer for Integrated Warfare Systems, responsible for acquiring, developing, delivering and sustaining integrated weapons systems for ships, submarines, carriers and aircraft within the Fleet and Joint Force.

In November 2012, Vice Admiral Syring became the 9th director of the Missile Defense Agency (MDA), Office of the Secretary of Defense, Pentagon, Washington, D.C. In this capacity, he oversees the MDA's worldwide mission to develop a capability to defend deployed forces, the United States, allies, and friends against ballistic missile attacks.

Syring's personal awards include the Distinguished Service medal, Legion of Merit (2 awards), the Meritorious Service medal (4 awards), Navy and Marine Corps Commendation medal, and Navy and Marine Corps Achievement medal.

Updated: 20 November 2014

RECORD VERSION

STATEMENT BY

MR. BARRY J. PIKE

U.S. ARMY
PROGRAM EXECUTIVE OFFICER,
MISSILES AND SPACE

BEFORE THE

COMMITTEE ON ARMED SERVICES
STRATEGIC FORCES SUBCOMMITTEE
UNITED STATES HOUSE OF REPRESENTATIVES

SECOND SESSION, 114TH CONGRESS

ON THE MISSILE DEFEAT POSTURE AND STRATEGY OF THE UNITED STATES –
THE FY17 PRESIDENT'S BUDGET REQUEST

APRIL 14, 2016

NOT FOR PUBLICATION UNTIL RELEASED BY THE
HOUSE ARMED SERVICES COMMITTEE

Chairman Rogers, Ranking Member Cooper, and distinguished Members of this Subcommittee, thank you for the opportunity to testify before you today. Thank you for your continued support of our great Soldiers, civilians, and their families.

It is my privilege to provide my assessment of how the President's Fiscal Year 2017 (FY17) budget request for the Army Program Executive Office (PEO) for Missiles and Space programs ensures a robust and modernized integrated air and missile defense capability against emerging threats.

As the PEO, my responsibility is to lead the materiel development, production, fielding, and sustainment of missile and space systems for U.S. Army, Joint, and Coalition Warfighters that provide a decisive battlefield advantage. This includes centralized management for Army Air and Missile Defense (AMD) programs as well as other Army and Joint missile programs and designated space programs. We are responsible for the full life-cycle management of assigned systems and provide worldwide support of fielded weapon systems. We also serve as a key link between the Warfighter and the technology base.

To meet the Army's AMD materiel development needs, I lead a diverse, talented, and dedicated workforce committed to our Warfighters and our taxpayers. Our ability to meet the Army's AMD requirements and the needs of the Warfighter is only possible with the continued support of your Committee and other Congressional Committees.

To meet the Army's AMD requirements within our portfolio, we focus on the following four priorities: 1) support combat operations and homeland defense; 2) develop, deliver, and sustain best value products and services to the Army, Joint, and International Partners; 3) align and leverage investments in capabilities and technology development; and 4) continue to improve efficiency, effectiveness, and agility.

Air and Missile Defense is an inherently Joint and increasingly International Coalition mission. The Army AMD environment continues to evolve in terms of threats, operational demands, strategic guidance, and fiscal realities. Major changes include: the appearance of complex integrated air, missile, cyber, and electronic warfare attacks used in a synchronized manner; shifting geographical focus; budget uncertainty; major operations by state and non-state actors; rapid advancements in adversary air and missile technologies; anti-access/area denial challenges; and high operational demands

on the Army AMD force. These changes have increased the Army's emphasis in developing and fielding new AMD capabilities. Within the Army, there is an increased focus, as well as increased funding, to address the emerging threats. The risk that these threats pose and the urgency to field new capabilities to address them are clearly understood across the Department of Defense.

Although the environment continues to rapidly change, the Army's 2015 Waypoint #1 assessment of the 2012 AMD Strategy confirmed that the Army is investing in the right efforts and that the strategy remains valid and on track. Consistent with the Army's AMD Strategy, the FY17 President's Budget requests resources for PEO Missiles and Space to continue to develop, produce, modernize, and enhance capabilities for Army AMD forces that are integrated with Joint and Coalition partners, operate at all levels of war, and are effective across multiple domains to defeat our adversaries.

The FY17 budget request for AMD programs managed by PEO Missiles and Space is $1.8 billion. This includes funding requests for the Army Integrated Air and Missile Defense (IAMD) Battle Command System (IBCS); PATRIOT Missiles and Ground System modernization and modification; the Lower Tier Air and Missile Defense Sensor (LTAMDS); the Indirect Fire Protection Capability (IFPC); Sentinel Radar improvements; Counter-Rocket, Artillery, and Mortar capability; and the Joint Tactical Ground Station (JTAGS).

By the end of 2016, we will complete the Engineering and Manufacturing Development (EMD) phase of IBCS including completion of the Limited User Test (LUT); field 92 PAC-3 Missile Segment Enhancement (MSE) missiles in addition to the over 1,400 PAC-3 missiles already fielded; and complete the IFPC Engineering Demonstration flight tests and Technology Maturation and Risk Reduction (TMRR) phase. We will continue to deliver PATRIOT Ground System improvements including Post Deployment Build software improvements (PDB-8), Radar Digital Processor (RDP), Modern Man Station (MMS), and additional PAC-3 Enhanced Launcher Electronic Systems (ELES) all of which enable our ability to maximize utilization of the latest PAC-3 MSE missile capabilities. Across all Army AMD programs, we are improving our resilience and ability to mitigate cyber and electronic warfare attacks.

The FY17 Budget Request continues IBCS development and begins Low Rate Initial Production (LRIP) toward an Initial Operational Capability in 2018. The IBCS remains the Army's number one priority AMD developmental effort and serves as the foundation for Army AMD modernization. The program will field an Integrated Fire Control Network that will integrate Army AMD sensors and shooters through a common mission command system. When fully fielded, IBCS will enable a tailorable, flexible, task-organized Army AMD force, breaking the current system-centric paradigm. The IBCS will also facilitate affordable, competitive modernization at the AMD component level. The IBCS common mission command system will be fielded to all echelons of Army AMD battlefield forces to defend against cruise missiles; manned and unmanned aircraft; air-to-ground missiles; tactical ballistic missiles; and Rockets, Artillery, and Mortars.

In early FY16, we successfully completed New Equipment Training, Collective Training, and Customer Test as well as search/track developmental tests in preparation for the IBCS Limited User Test that began in March and is scheduled to be completed in early May. In 2015, we successfully executed two IBCS developmental flight tests. In May 2015, IBCS was used as the mission command and integrated fire control system to successfully intercept a surrogate Tactical Ballistic Missile target utilizing a PATRIOT radar and interceptor. In November 2015, IBCS was used as the mission command and integrated fire control system to successfully intercept a surrogate Cruise Missile target utilizing Sentinel Radars and a PATRIOT interceptor. This was a first of its kind engagement with a PATRIOT missile intercepting an air target using composite track data from Sentinel radars. Ground test efforts were initiated in 2015 and are continuing in 2016 to demonstrate IBCS interoperability with the Ballistic Missile Defense System via IBCS and the Missile Defense Agency's Command, Control, Battle Management, and Communications (C2BMC) system. This capability for IBCS/C2BMC interoperability is scheduled to be available for fielding beginning in 2020. Additionally, integrated planning between the Terminal High Altitude Area Defense (THAAD) System planner and the IBCS integrated defense designer is anticipated in 2019.

Today, the Army's PATRIOT force continues to be the cornerstone of AMD protection for our deployed forces, friends, and allies. As such, PATRIOT is in high

demand with more than half of the force deployed, forward stationed, or on prepare to deploy orders. To relieve stress on the PATRIOT force, the Army initiated three efforts this year. Beginning next fiscal year, the Army will field five Dismounted PATRIOT Information Coordination Centrals (DPICCs) among three Army Air and Missile Defense Commands. The DPICC capability provides the ability to deploy a PATRIOT firing battery without a full battalion-level command and control element which provides the AMD force with greater strategic flexibility until IBCS is fully fielded in 2028. The second initiative is the acceleration of the planned modernization of the 35th Air Defense Artillery Brigade on the Korean peninsula, which reduces deployment of a PATRIOT Battalion from the U.S. The third initiative is the establishment of a dedicated Test Detachment in the first quarter of FY18 that will support AMD modernization in the high operational demand environment and return a PATRIOT Battalion to the operational force pool.

The Army initiated a modernization strategy several years ago that will completely replace PATRIOT's command and control hardware with IBCS and allow future competitive development of net-centric radar, launcher, and interceptor components. The result will be increased reliability, reduced operations and sustainment costs, and viability well into the future. Each element of the strategy is critical to our Nation's ability to provide our Combatant Commanders with more flexibility, innovation, and capability in the face of an ever-changing threat. Consistent with the strategy, the FY17 budget request supports two critical lines of effort for PATRIOT: near-term modification of existing components; and long-term competitive modernization.

The need for near-term PATRIOT ground system modifications before the Department of Defense makes a decision on a Lower Tier Air and Missile Defense Sensor is based upon the need to counter current threats that have created critical performance gaps in today's PATRIOT system. These performance gaps are exacerbated without funding for near-term PATRIOT modification efforts since an Analysis of Alternatives (AoA)-informed materiel solution is not expected to begin fielding until the late 2020s. Until the new or improved battlefield sensor is fielded in sufficient quantities, the Army must continue to incrementally modernize the existing PATRIOT capability to keep pace with the evolving threat. Stable, sufficient funding is

critical to enable the Army to modify the existing system to counter evolving threats in the near term while long term improvements are developed and tested. The Lower Tier Air and Missile Defense Sensor AoA is expected to be completed in April 2016 and will inform a program decision later this year.

A number of significant PATRIOT capability enhancements have been accomplished over the past year. We completed the planned fielding of Post Deployment Build-7 (PDB-7) software and the Modern Adjunct Processor to all fifteen PATRIOT battalions. Last October, we achieved the PAC-3 MSE First Unit Equipped two months ahead of schedule with initial fielding to 3-2 Air Defense Artillery. We are on track to achieve PAC-3 MSE Initial Operational Capability in First Quarter FY17. To make maximum use of the PAC-3 MSE missile and the radar upgrades, the Army is testing the next version of the PATRIOT ground system software, PDB-8. In developmental testing last November, both tactical ballistic missiles and air breathing threats were simultaneously engaged. More recently, on March 17, 2016, we successfully intercepted a tactical ballistic missile with a PAC-3 MSE in a ripple fire engagement with a PATRIOT GEM-T missile using PDB-8. Successful testing and fielding of this software will support the Full Rate Production decision for PAC-3 MSE.

Integration of Terminal High Altitude Area Defense (THAAD) and PATRIOT capabilities (such as Tactical Ballistic Missile engagement coordination) began in the 1990s. The concept of integration was initially implemented and fielded in PATRIOT Post Deployment Build – 5 (PDB-5) software in 1999. Since then, PATRIOT and THAAD have participated in joint flight testing and continue to look for opportunities to combine flight tests in the future. The Army and Missile Defense Agency (MDA) are coordinating for PATRIOT participation in the FY17 THAAD Flight Test-15/18 scheduled for Third Quarter FY17 (3QFY17). There are currently no identified barriers to PATRIOT participation in this flight test. Additionally, the PATRIOT P8-OT2&3 flight test scheduled for 3QFY17 will provide an opportunity for THAAD to participate in a PATRIOT operational flight test to demonstrate interoperability. Currently, there are no identified barriers to THAAD participation in this test. The Army and MDA are in the early planning stages for PATRIOT to participate in MDA's Operational Flight Test-03 in 2018. Finally, IBCS and PATRIOT routinely participate in the MDA-sponsored ground

test program to demonstrate interoperability among ballistic missile defense components.

The FY17 President's Budget requests funds to conduct IFPC Increment 2-Intercept (Inc 2-I) Engineering and Manufacturing Development. The IFPC Inc 2-I program is developing a mobile, ground-based weapon system designed to provide 360-degree protection capability to defeat Cruise Missile; Unmanned Aircraft System (UAS); and Rocket, Artillery, and Mortar threats. The IFPC Inc 2-I program will provide the first of three planned block capabilities (Cruise Missile Defense and Counter-UAS) in FY20. In 2016, we will complete the Technology Maturation and Risk Reduction phase of the program including completion of the Engineering Demonstration flight testing of multiple missiles from the Multi-Mission Launcher using IBCS as the common mission command/integrated fire control network capability and multiple sensors.

The Sentinel radar is employed in an air defense role against cruise missile, UAS, and fixed/rotary wing aircraft threats and in a force protection role in support of the Counter-Rocket, Artillery, and Mortar (RAM) capability. It is a highly mobile radar system that provides 360 degree coverage at shorter ranges and lower altitudes than the PATRIOT radar. The FY17 President's Budget requests funding for continued development and modification of the Sentinel radars to address capability gaps and obsolescence issues in target detection, tracking, net-readiness, electronic countermeasures, and counter-UAS/counter-RAM capabilities.

The Counter-Rocket, Artillery, and Mortar (C-RAM) program continues to provide sense & warn and intercept capabilities in support of Operation Freedom's Sentinel and Operation Inherent Resolve. The C-RAM capability is comprised of a combination of multi-service fielded and non-developmental item sensors, command and control equipment, warning systems, and a Land-Based Phalanx Weapon System (LPWS, a modified U.S. Navy gun system). The FY17 President's Budget requests funding for Advanced Electronic Protection Enhancements as well as continued software development, testing, and fielding of the Rocket, Artillery, and Mortar Warn (RAM Warn) and C-RAM Intercept (LPWS) programs of record.

The Joint Tactical Ground Station (JTAGS) provides ballistic missile warning message data for the AMD architecture and Theater Combatant Commanders. The

FY17 President's Budget requests funding for the fielding of the Block 2, Phase 1 capability, modernizing JTAGS, and the continued development and testing of the Block 2, Phase 2 capability which utilizes both scanning and staring sensors from the Space Based Infrared System (SBIRS) constellation of satellites.

Mr. Chairman, Ranking Member Cooper, and Members of this Subcommittee, thank you for the opportunity to provide insight into the AMD portion of the PEO Missiles and Space portfolio. I look forward to addressing your questions.

Mr. Barry J. Pike
Program Executive Officer, Missiles and Space

Mr. Pike is the Program Executive Officer, Missiles and Space, Redstone Arsenal, Al. He is responsible for the development, production, fielding, sustainment, and international program aspects for assigned missile and space systems. In January 2016, Mr. Pike was promoted to Senior Executive Service, Tier II.

Prior to his current assignment, Mr. Pike was the Deputy Program Executive Officer, Missiles and Space, which he assumed in 2010. Mr. Pike was selected for the Senior Executive Service in January 2010.

Mr. Pike served as the PEO MS Chief of Staff from 2005-2010. From 1992-1999, he served in a variety of key leadership positions in the Army National Missile Defense Ground Based Elements Program Office including the Deputy Program Manager, Chief of the Program and Acquisition Management Division, Assistant Program Manager for Program Planning, and Chief of the System Engineering and Analysis Branch. In the DPM position, he shared responsibility with the SES Program Manager in directing the development, testing, integration, and deployment planning of the ground-based NMD elements including the ground-based interceptor, ground-based radar, and associated battle management/command, control, and communications capability.

In 1991, Mr. Pike was selected for a prestigious one-year developmental assignment in the Office of the Under Secretary of Defense for Acquisition at the Pentagon. He led the THAAD Milestone I Defense Acquisition Board (DAB) coordination efforts across the Services, Joint Staff, and OSD Staff.

From 1988-1991, Mr. Pike led the Army's Anti-Satellite (ASAT) Initiative and was assigned as the Army focal point for ASAT management. He led the program through the Milestone 0 and Milestone I DAB Reviews resulting in the initiation of the Kinetic Energy (KE) ASAT program and the establishment of the KE ASAT Joint Program Office. In the KE ASAT JPO, Mr. Pike led various systems engineering teams.

Mr. Pike has received numerous government and defense industry awards including two Meritorious Civilian Service Awards, two Superior Civilian Service Awards, two Commander's Awards for Civilian Service, the OSD Award for Excellence, the National Defense Industrial Association Materiel Acquisition Award, and the Ancient Order of Saint Barbara's for Air Defense Artillery. He has also been nominated three times for the Redstone/Huntsville AUSA Civilian of the Year Award. He is Level III certified in Program Management and Systems Planning, Research, Development, and Engineering career fields.

Mr. Pike is a native of Hartselle, Al. He graduated with honors from Auburn University with Bachelor's and Master's Degrees in Chemical Engineering. While at Auburn, he was elected to the Student Government Association Senate and was a member of numerous professional engineering organizations and honor societies including Tau Beta Pi. He is a graduate of the Defense Acquisition University Program Management Course and is a member of the Army Acquisition Corps.

STATEMENT OF
RDML EDWARD CASHMAN, USN
DIRECTOR
JOINT INTEGRATED AIR AND MISSILE DEFENSE ORGANIZATION
BEFORE THE
HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON STRATEGIC FORCES
14 APRIL 2016

Thank you, Chairman Rogers, Ranking Member Cooper, and distinguished members of the subcommittee. I appreciate the opportunity to testify. It is an honor to discuss how the Joint Staff and the Joint Integrated Air and Missile Defense Organization (JIAMDO) contributes to the Air and Missile Defense mission.

JIAMDO's Role in Integrated Air and Missile Defense (IAMD) as part of the Joint Staff

As a part of the Joint Staff, JIAMDO supports the Chairman of the Joint Chiefs of Staff, through the Director for Resources, Force Structure, and Assessments (J8), in his responsibility to coordinate development of Joint Air and Missile Defense requirements and capabilities. JIAMDO facilitates collaboration between Services, Combatant Commands (CCMDs), and Agencies to identify existing and emerging capabilities and supports integration through simulations and technology demonstrations.

In support of the Chairman and the Joint Staff, JIAMDO provides expertise, analysis, and coordination across the CCMDs and the Services. JIAMDO is focused on assisting the Department in delivering capabilities that support CCMD operational plans and address air and missile defense capability gaps. JIAMDO's activities are aligned along three main lines of effort

– Requirements Development; Simulations and Analysis; and Doctrine, Architecture, and Concept of Operations (CONOPs) Development.

Regarding requirements, JIAMDO provides Air and Missile defense expertise and coordinates with CCMDs and Services as part of the Joint Capabilities Integration and Development System (JCIDS) process, which includes regular assessment of Capability Gaps, Force Sufficiency, and Portfolio Management. These processes assist the Chairman in his responsibility to provide military advice in areas such as risk assessment and program recommendations. In support of JIAMDO's role in the Joint Staff capabilities and requirements processes, we have liaison personnel at Central Command, European Command, Pacific Command, Northern Command, and U.S. Forces Japan. These liaisons provide a direct link between JIAMDO and the CCMDs as they work air and missile defense issues.

Working with the CCMDs, Services, and the Missile Defense Agency (MDA), JIAMDO also helps develop and assess the doctrine, CONOPs, and architectures needed to guide the development and employment of the Joint Force. Activities include coordination of revisions to Joint Doctrine publications, development of operational concepts, and completion of Capabilities Based Assessments, which translate CONOPs into capability requirements. JIAMDO also works closely with the Missile Defense Agency – in its role as the IAMD Technical Authority – to develop technical requirements leading to incremental improvements in IAMD and to support synchronized development, integration, and fielding of those improvements in the existing programs of record. Lastly, as representative to the NATO Air and Missile Defense Committee, JIAMDO supports alignment and development of capabilities and policies with our NATO Allies.

Through the Simulation and Analysis line of effort, JIAMDO executes studies which require integration of multiple modeling and simulation tools in order to inform Service programs and CCMD plans and requirements, such as the recently completed Joint Capability Mix IV (JCM IV) Study to assess the evolving regional ballistic missile capability and capacity of potential adversaries. Additionally, NIMBLE FIRE is a classified operator-in-the-loop simulation where Service tactical experts come together to execute joint air and missile defense missions using program of record systems and capabilities in a near-future scenario developed in support of and approved by a CCMD. This yields data to inform capability gaps, requirements, concepts, and in some instances, employment techniques. The simulation executes a combined air, cruise missile, and ballistic missile defense event which has run in conjunction with MDA's Missile Defense Integrated Operations Center simulation at Colorado Springs.

JIAMDO also sponsors the annual Black Dart Counter-UAS technology demonstration – a Joint, interagency, live fly/live fire event which includes participation from international partners and industry representatives who have the ability to bring emerging Counter UAS technologies and demonstrate them to Service, Combatant Command, and interagency representatives. This venue enables testing and evaluation of sensors, data link and command and control systems, as well as kinetic and non-kinetic negation capabilities.

Integrated Air and Missile Defense topics of interest

Emerging left-of-launch capability

IAMD is designed to first deter an adversary from employing their aircraft and missile capabilities, and failing that, to prevent an adversary from effectively employing them. Air and Missile Defense operations can be broken down into three phases – Prevent, Defeat, and Minimize. Prevention of an adversary from launching an intended attack – through kinetic or

non-kinetic means; Defeating an attacking aircraft or missile after it has been launched; and Minimizing the impact on friendly force operations if an attack occurs. Each of these tenets is necessary, and each is insufficient without the others.

Prevention – sometimes referred to as "left of launch" operations – is the process of neutralizing an adversary's missile forces through strikes on their launchers, storage, support, or C2 systems. "Prevent" operations are an essential part of air and missile defense because of the size of potential adversary weapons inventories and because no "defeat" capability will be 100% effective. This link between offensive and defensive operations for IAMD is critical. Defense system capability and capacity must provide Commanders with time and space to bring offensive systems to bear in order to achieve military objectives – defense alone cannot prevail in a campaign. Neutralizing an adversary's offensive capabilities – or their willingness to employ them – is the only practical means to defeat an adversary with a large inventory of offensive weapons.

Though the prevention concept and the imperative of defeating adversary air and missile threats "left of launch" is not new, we continue to be challenged by the use of mobile launchers, camouflage and deception, and the employment of hardened or deeply buried storage and support facilities. The use of dedicated tactical aircraft, Special Forces, and UAVs in western Iraq to neutralize mobile SCUD launchers in 1991 and again in 2003 are the most recent examples. Our adversaries developed these passive defense measures in response to the overwhelming superiority the United States enjoyed for decades in long range, precision strike capability. They understand that fixed systems are inherently vulnerable, even when protected by active defense systems.

Attack Operations – designed to degrade an adversary's air and missile capabilities – are an integral part our doctrine, CONOPS, and plans. Prioritization of specific targets – missile storage, support facilities, and C2 – is part of the work intelligence analysts and operational planners conduct continuously. Modeling, estimating, and predicting the impact of Attack Operations on adversary air and missile capabilities is complex and uncertain. The process to destroy mobile ballistic and cruise missile launchers is part of the Time Sensitive Targeting (TST) process. Again, there is well established doctrine and procedure to conduct TST. The resources a Joint Commander dedicates to TST versus degrading known, fixed targets, will vary over time and is a function of variables such as the threat they pose compared to other objectives, our ability to detect and target these mobile systems, and the degree to which we have degraded an adversary's air defense systems and established freedom of action in the airspace above potential storage and launch sites.

Overcoming these passive defense measures requires the right combination of persistent sensors tied to a rapid processing and fusion of visual, electromagnetic, and other data to produce target-quality locating information in support of an engagement decision, as well as the precision weapons with the speed and range required to complete the kill chain in a timeframe measured in minutes.

The cruise missile threat to the homeland

The missile threat to the homeland has historically been limited to Russian and Chinese ICBMs. Our defense against these weapons was – and remains – our own strategic nuclear deterrent. As North Korea worked to develop nuclear weapons and long-range ballistic missiles, the United States decided not to rely on deterrence alone, but rather to build a limited defensive capability against these ICBMs – a capability which will also provide defense against a potential

future limited Iranian ICBM threat. Advances in long-range, precision cruise missiles now bring the United States within range of these conventional and nuclear-capable weapons. We are entering an era where many potential threats – not only advanced, long range cruise and ballistic missiles, but also cyber and other threats – now have worldwide reach. As this trend continues to develop, our national policy, plans, and force structure should be reviewed to determine how best to balance the ability and utility of providing active defense of the United States with the capability to hold potential adversaries at risk in order to deter and defeat these potential threats overseas.

As those plans take shape, JIAMDO remains engaged with NORAD and their work to develop prioritized homeland air defense systems. The Joint Air Defense Operations Center maintains oversight of the National Capital Region Integrated Air Defense System, which consists of surveillance and fire-control radars as well as communication with fighters on alert and surface-to-air missile systems. The Joint Staff is actively engaged with NORAD in further defining the requirements and improving the capabilities of our homeland defense capabilities.

The organization and oversight structure of missile defense programs

The traditional definitions and threat characteristics which have defined our capability development and organizational structures are breaking down. With the development of depressed-trajectory ballistic missiles, guided and maneuvering re-entry vehicles, hypersonic glide weapons, as well as supersonic and very-long-range subsonic cruise missiles, the threats present a complex and nearly continuous threat spectrum across the characteristics of altitude, speed, propulsion type, and range. We also expect potential adversaries to employ these weapons in a coordinated fashion, with evolving manned and unmanned platforms.

While our interceptors are typically optimized for one type of threat or another, most of our sensors, C2 systems, and air and missile defense platforms and units are multi-functional, designed to operate either across the threat spectrum or as part of a "system of systems." Our organizational structures, which were originally based on these traditional definitions of "Ballistic Missile Defense" or "Air and Cruise Missile Defense," will continue to evolve into specific roles within the "Integrated Air and Missile Defense" mission area. I do not suggest any single organization will or should have overall responsibility, merely that they will have defined roles and responsibilities in the IAMD mission area. Services will continue to have the mission to field, train, deploy, and sustain warfighting capabilities, focused on their unique operational environments and core missions. MDA is a superb research, development, testing, and fielding organization, and has already been designated as the IAMD Technical Authority, working on not only Ballistic Missile Defense capabilities but also on architectures to support Air and Cruise Missile defense requirements. The Combatant Commands focus on operational plans and C2 of forces, while identifying capability gaps caused by our adversaries' investment in new air and missile systems. JIAMDO, as part of the Joint Staff, supports the Chairman in his responsibility to provide best military advice to the President and Secretary, and by facilitating Joint IAMD coordination, information sharing, simulation, and analysis.

I look forward to answering the committee's questions. Thank You.

Rear Admiral Edward Cashman
Director, Joint Integrated Air and Missile Defense Organization (JIAMDO), Joint Staff, J8

Rear Adm. Edward Cashman is a native of Brockton, Massachusetts. He is a 1987 graduate of the Massachusetts Institute of Technology in Cambridge, Massachusetts, where he received a Bachelor of Science in Mechanical Engineering. He was commissioned through Officer Candidate School in 1988 and holds a Master of Science in Nuclear Engineering from the University of Maryland and a Master of Arts in National Security Studies from the Naval War College in Newport, Rhode Island.

At sea, Cashman commanded USS Mustin (DDG-89) operating as part of the Forward Deployed Naval Force from Yokosuka, Japan. He also commanded Destroyer Squadron (DESRON) 50, forward deployed in Manama, Bahrain. As DESRON-50, he commanded Task Force 55 under U.S. 5th Fleet and served as deputy commander, Coalition Task Force 152 as part of the Combined Maritime Force (CMF) operating at sea in the Arabian Gulf and from coalition command centers in Kuwait and the United Arab Emirates. Previous assignments at sea include main propulsion assistant, USS Arkansas (CG-41); operations officer, USS Merrill (DD-976); main propulsion assistant, USS John C. Stennis (CVN-74); executive officer, USS Valley Forge (CG-50) and surface operations officer, Carrier Strike Group (CCSG) 3.

Ashore, Cashman's tours include assignments to the U.S. Naval Academy, the Pacific Fleet Nuclear Propulsion Examining Board (NPEB), the Joint Staff Strategic Plans and Policy Directorate (J-5) and the Future Operations directorate at 5th Fleet. Following command of DESRON-50, he served as chief of staff and Maritime Operations Center director at U.S. Naval Forces Central Command and then as a fellow at the Chief of Naval Operations Strategic Studies Group in Newport, Rhode Island.

Cashman currently serves as the director, Joint Integrated Air and Missile Defense Organization (JIAMDO), Joint Staff, J8. JIAMDO plans and coordinates Joint Integrated Air and Missile Defense (IAMD) requirements and operational concepts. He is also the head of the U.S. Delegation to NATO's Air and Missile Defense Committee. He assumed these duties November 13, 2015.

Cashman's decorations include the Legion of Merit, Defense Meritorious Service Medal, Meritorious Service Medal, Navy and Marine Corps Commendation Medal, Navy and Marine Corps Achievement Medal and various campaign, unit and service awards.

Updated: 14 December 2015

WITNESS RESPONSES TO QUESTIONS ASKED DURING THE HEARING

APRIL 14, 2016

RESPONSES TO QUESTIONS SUBMITTED BY MR. GARAMENDI

Admiral SYRING. Yes, the House Appropriations Committee supported MDA's PB16 Request of $19.9 million for Directed Energy Prototype Development in the Technology Maturation Initiatives program element. [See page 7.]

QUESTIONS SUBMITTED BY MEMBERS POST HEARING

APRIL 14, 2016

QUESTIONS SUBMITTED BY MR. ROGERS

Mr. ROGERS. Is the United States willing to depart in any way from the EPAA as laid out and planned today?

Mr. MCKEON. Our commitment to EPAA remains firm. The approach is specifically designed to be able to adapt to the ballistic missile threat posed to our deployed forces and allies in Europe. That said, we have no plans to depart from the deployment and sustainment of the missile defense sites in Europe, or any other part of the EPAA, as it is planned today.

Mr. ROGERS. As the ranking DOD witness here today, does the Department support a partnership between the UAE and the U.S. to develop a missile defense capability to respond to emerging threats (e.g., an evolved extended-range THAAD system)?

Mr. MCKEON. DOD does support a partnership between UAE and the United States to develop or acquire missile defense capabilities to respond to emerging threats. It is premature to speculate on the specific systems that might be appropriate for addressing those threats.

Mr. ROGERS. I understand the U.S. is discussing a Foreign Military Sales case with Qatar for THAAD. Why is this case important for Qatar and THAAD? Can we work together to accelerate this case to make sure Qatar has these critical missile defense systems prior to the World Cup in 2022? How?

Mr. MCKEON. Qatar is an important partner in missile defense activities in the Gulf region that has demonstrated its commitment to acquiring a layered missile defense architecture by purchasing PATRIOT PAC–3 systems and exploring the possibility of buying the Terminal High-Altitude Air Defense (THAAD) system and an early warning radar. Qatar has expressed a desire to phase acquisition of these elements. Qatar signed a Foreign Military Sales (FMS) case with the United States Army for PATRIOT PAC–3 and is in ongoing discussions concerning an early warning radar. The Department will continue to support Qatar's acquisition of ballistic missile defense capabilities. Additionally, we will continue working with Qatar within the context of the Gulf Cooperation Council to increase interoperable regional missile defense capabilities.

Mr. ROGERS. Why is it important that the European Phased Adaptive Approach reach its Initial Operating Capability, especially the Romania Aegis Ashore Site, at the Warsaw Summit this summer? Why is that important for the United States, our allies, and the NATO alliance itself?

Mr. MCKEON. NATO Ballistic Missile Defense (BMD) remains critical to U.S. and Allied security. As long as Iran continues to develop and deploy ballistic missiles, the United States will work with our allies and partners to defend against this threat. The aim of NATO BMD is to provide full coverage and protection of all NATO European populations and U.S. forces in Europe from ballistic missiles originating from the Middle East. Moreover, NATO's declaration of BMD Initial Operational Capability (IOC) at Warsaw sends three important messages: first, that the United States is committed to the defense of our deployed forces and Allies by increasing the capability of NATO BMD; second, that Allies recognize the importance of this contribution; third, that NATO follows through on its commitments to field a missile defense command and control capability.

Mr. ROGERS. What is left-of-launch capability? In other words, you're talking about destroying ballistic missiles on the ground before they're launched at us?

Mr. MCKEON. Left-of-launch capabilities contribute to defeating or degrading ballistic missiles before they are launched. These capabilities may be non-kinetic or kinetic; they span a wide range of tools developed across the Department, and include both active and passive activities. These capabilities provide U.S. decision-makers additional tools and opportunities to defeat missiles across the entire kill-chain. This reduces the burden on our "right-of-launch" ballistic missile defenses. Taken together, "left-of-launch" and "right-of-launch" capabilities will lead to a more effective and resilient approach to defeat adversary ballistic missile threats.

Mr. ROGERS. Please detail any exercises, table top exercises, or war games you have participated in concerning left-of-launch ballistic missile defeat. In such exercises, were there any areas in which it was observed that policy guidance was re-

quired to successfully carry out such capability? If so, please identify and describe such observed areas needing policy guidance from OSD.

Mr. MCKEON. Although I have not personally participated in a policy wargame involving left-of-launch missile defense, the recently-completed NIMBLE TITAN 16 wargame examined left-of-launch missile defeat, to include the circumstances under which several partners and allies would support left-of-launch efforts.

I believe we have sufficient policy guidance at this time to carry out left-of-launch ballistic missile defeat successfully.

Mr. ROGERS. Can the KN–08 road-mobile ICBM target all of the United States, including the continental United States? Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Admiral GORTNEY. DIA assesses at the unclassified level that the KN08 ICBM has a maximum range of over 12,000 kilometers, which would enable it to strike all of the continental United States if successfully deployed.

Mr. ROGERS. Recently, Bill Gertz of the Washington Free Beacon has reported that North Korea has displayed a new road-mobile ICBM. Does North Korea have a new road-mobile ICBM? Is it testing solid-rocket motors for such a missile? Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Admiral GORTNEY. During a parade in October 2015, North Korea displayed a multi-stage missile that differed in design from the KN08 ICBMs that were featured in previous parades. However, we don't know how the new missile is configured, what propulsion system it uses, or whether it represents a workable missile design.

Mr. ROGERS. Can you remind this committee why road-mobile missiles are a defense challenge for us? And what about such missiles with solid fuel?

Admiral GORTNEY. Mobile missiles increase an adversary's operational flexibility and survivability. This complicates active defense planning. Changes to fuel types indicate some level of programmatic advancement, potentially increasing their reliability.

Mr. ROGERS. Who is integrating the homeland cruise missile defense program for the DOD? We have Army systems, Air Force systems, Navy systems. Who is in charge? Is there a single acquisition authority?

Admiral GORTNEY. NORAD conducts aerospace warning and control of North America and, in conjunction with USNORTHCOM, determines the operational requirements for defense against aerospace threats, to include cruise missiles. In turn, the Services provide the capabilities to meet the approved defense requirements, and NORAD operationally integrates the homeland cruise missile defense capabilities for the U.S. and Canada. Recommend your acquisition authority questions be addressed to OUSD (AT&L).

Mr. ROGERS. Is JLENS important? Why? Is there a gap in our security architecture without it? Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Admiral GORTNEY. [The information referred to is classified and retained in the committee files.]

Mr. ROGERS. Am I correct that under the current plan for the ground-based midcourse defense system, there are no operational spares GBIs for, is it 5 or 6 years? It's well into the 2020s, right? What happens if there is an unplanned failure? Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Admiral GORTNEY. The Missile Defense Agency (MDA) is leading this effort and thus we recommend contacting VADM Syring for sparing specifics. MDA remains on track for 44 GBIs emplaced and available by 2017, in accordance with Secretary of Defense direction.

Mr. ROGERS. Is this reality (the lack of operational spares referenced in the previous question) an artifact of years of under-investment in the GMD system? What is the best way to mitigate this risk?

Admiral GORTNEY. This question is specific to Ballistic Missile Defense System programmatics; recommend contacting the Missile Defense Agency regarding investments in the GMD system.

Mr. ROGERS. What is left-of-launch capability? In other words, you're talking about destroying ballistic missiles on the ground before they're launched at us?

Admiral GORTNEY. Left-of-launch capabilities encompass all military efforts to deny the adversary the ability to launch ballistic missiles. The development of left-of-launch capabilities provides the U.S. decision-makers additional tools and opportunities to defeat ballistic missiles before they are launched.

Mr. ROGERS. Please detail any exercises, table top exercises, or war games you have participated in concerning left-of-launch ballistic missile defeat. In such exercises, were there any areas in which it was observed that policy guidance was re-

quired to successfully carry out such capability? If so, please identify and describe such observed areas needing policy guidance from OSD.

Admiral GORTNEY. USNORTHCOM participated in the Joint Staff-hosted NIMBLE STAR II TTX (March 2015), as well as the PACAF-hosted NEPTUNE HAWK TTX (July 2015). For execution of our homeland Ballistic Missile Defense mission, we have sufficient policy guidance.

Mr. ROGERS. What kind of intelligence do we need to possess in order for the President to order a preemptive attack on a state possessing nuclear weapons?

Admiral GORTNEY. The President would likely need timely and reliable intelligence on the adversary's intentions, as well as persistent tracking of the adversary's strategic assets to ensure preemptive attack success and also to mitigate risk of retaliation.

Mr. ROGERS. Are we outpacing the threat? How do you evaluate "outpacing" the threat? Based on what criteria? Please provide a detailed list of adversary developments regarding ballistic missile capability that affected our ability to "outpace" the threat. What developments by adversaries, if any, have surprised you? Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Admiral GORTNEY. The Ground-based Mid-course Defense (GMD) system is capable of defeating the ICBM threat currently posed by North Korea. However, the North Korean threat continues to mature, while developments within the Iranian missile program could lead to the emergence of an ICBM threat from that country in the coming years as well. We believe that continued funding of programs, such as the Re-designed Kill Vehicle, Long Range Discrimination Radar, two/three-stage selectable Ground-based Interceptor, and the Space-based Kill Assessment experiment, is necessary to maintain our strategic advantage.

Mr. ROGERS. It has been widely asserted that one of the most likely ballistic missile threats to U.S. forces would be a raid scenario involving several enemy ballistic missiles fired near simultaneously. How is the MDA preparing for this scenario and what testing is planned to validate our BMDS capabilities against this threat?

Admiral SYRING. The BMDS and each of the elements (including Ground-based Midcourse Defense (GMD); Terminal High Altitude Area Defense (THAAD); Aegis; and Command and Control, Battle Management, and Communications (C2BMC)) are designed and tested to provide performance against raids with multiple ballistic missile threats in the air simultaneously. The BMDS Specification includes raid requirements that are allocated to element-level specifications.

MDA has demonstrated raid defense capability in both ground tests and flight tests at the system and element levels. MDA has successfully conducted testing for homeland and regional defense against raids in numerous integrated ground tests that incorporate hardware-in-the-loop assets and threat injection, as well as distributed ground tests that incorporate deployed operational assets. MDA has conducted Flight Test Standard Missile (FTM) 13, demonstrating Aegis against two near simultaneous missile launches. For the THAAD system, MDA conducted Flight Test THAAD (FTT) 12, successfully demonstrating THAAD against multiple near simultaneous missile launches. At the system level, MDA conducted Flight Test Integrated (FTI) 01 in 2012 with Aegis, THAAD, and Patriot engaging three ballistic missile targets and two cruise missile targets. MDA conducted Flight Test Operational (FTO)-01 in 2013 with Aegis and THAAD each engaging a ballistic missile target. MDA conducted Flight Test Operational (FTO) 02 Event 2a in 2015 with Aegis and THAAD engaging two ballistic missile targets and one cruise missile target.

MDA will continue to validate BMDS capabilities against raids in future ground testing. In addition, MDA has planned several flight tests in the Integrated Master Test Plan version 17.1 that involve ballistic missile raid scenarios. FTO 03 Event 1 will test Aegis and Aegis Ashore against two ballistic missiles. FTO 03 Event 2 will test Aegis, THAAD, and Patriot against three ballistic missiles and two cruise missiles. FTO 04 will test GMD simultaneously engaging two long-range ballistic missiles.

Mr. ROGERS. We know that the MDA has utilized several low cost target options to meet schedule and testing requirements against short-range and medium-range range threats in recent years. What steps is the MDA taking to identify and develop new low cost target options to meet emerging testing requirements for intermediate-range (IRBM) and inter-continental (ICBM) ballistic missile threat scenarios.

Admiral SYRING. The Missile Defense Agency (MDA) is coordinating with the Intelligence Community to understand assessments related to emerging threats in order to establish requirements for all target development and testing needs using intermediate-range ballistic missile (IRBM) and intercontinental ballistic missile (ICBM) class targets. Regarding lowering the costs of the current IRBM and ICBM

targets, MDA has implemented innovative solutions to address near-term threat changes by leveraging previously incurred non-recurring engineering and making incremental upgrades to meet target requirements related to evolving missions and threat. Additionally, MDA is conducting market research through a request for information to determine interest and capability to design, develop, produce, and launch multiple range-class targets. The market research will shape future target acquisition decisions to reduce the cost of flight tests.

Mr. ROGERS. We understand that the MDA has successfully flown low cost, subscale targets utilizing surplus solid rocket motor assets to meet specific mission requirements and critical schedule milestones. Is the MDA taking steps to assure that solid rocket motors will continue to be available to be used for low cost targets in support of BMDS testing?

Admiral SYRING. Current Missile Defense Agency (MDA) Integrated Master Test Plan baseline includes low cost targets utilizing surplus solid rocket motors through fiscal year 2022. As a part of the MDA objective to reduce the cost of targets, the program continually monitors U.S. Government surplus and solid rocket motor industry production for applicability to meet MDA's testing requirements to meet current and future acquisition needs.

Mr. ROGERS. Please identify and summarize the studies MDA has conducted or participated in evaluating missile defense options and limitations against boost-glide systems and maneuvering systems.

Admiral SYRING. [The information referred to is classified and retained in the committee files.]

Mr. ROGERS. Are you funded to develop and deploy a defense against boost-glide missiles, like those being developed by Russia and China? What are the anticipated ranges of potential defensive options that have been considered?

Admiral SYRING. [The information referred to is classified and retained in the committee files.]

Mr. ROGERS. Please identify each CAPE review of an MDA program or proposed program over the past five years and the length/duration of such review and its cost to MDA.

Admiral SYRING. The CAPE reviews from 2006 through 2014 are listed below. The total cost to MDA is approximately $430,000.

Review	Review Request Date	CAPE Outbrief to MDA or Report To Congress	Study Duration (Months)	Estimate # Full Time Equalivaents	% Annual Time on CAPE Review Task	Estimated Costs to MDA (Labor + Travel)
Aegis BMD Independent Cost Estimate	6-Jul-06	19-Dec-06	5.5	5	10.0%	$27,288
THAAD Procurement Cost Estimate	21-Sep-09	2-Sep-10	11.5	2	10.0%	$23,748
AN/TPY-2 Procurement Cost Estimate	21-Sep-09	Not Delivered	12.0	2	10.0%	$24,467
Aegis Cost Position	27-May-10	29-Jun-12	25.5	5	10.0%	$103,975
Congressional Request for PTSS Review including a Independent Cost Estimate	23-Nov-11	8-Apr-13	16.7	2	10.0%	$31,751
Congressional Request for EPAA	18-Nov-11	20-Jul-12	8.2	10	10.0%	$68,838
CAPE THAAD Multi Year Procurement	15-Aug-13	18-Sep-14	13.3	5	10.0%	$57,168
CAPE SM3 IB Multi Year Procurement	15-Aug-13	Not Delivered	12.0	5	10.0%	$52,166
Homeland Defense Analysis of	N/A	N/A	N/A	N/A	N/A	$3,360
MDA 15-16 Checkpoint Review	3-4 May	N/A	N/A	N/A	N/A	$11,180
Congressional Request for Updated EPAA Independent Cost Estimate	13-May-14	Jun-15	12.8	2	10.0%	$25,698
					Total	$429,638

Mr. ROGERS. What are current requirements for CAPE AOAs of MDA programs or proposed programs? What document, memoranda, or regulation requires such CAPE AOA review of an MDA program?

Admiral SYRING. There are no requirements that require CAPE led Analysis of Alternatives (AOA) for MDA programs. However, MDA and CAPE periodically receive guidance, and mutually agree to conduct analysis of MDA programs. In addition, Congress periodically mandates CAPE led studies of MDA programs.

Mr. ROGERS. How much do GAO reviews cost MDA each year?

Admiral SYRING. The total approximate annual amount that MDA spends on GAO reviews is $1,754,008. This calculation is based on total man hours needed to support varying requirements for audits, including activities such as composing answers to numerous questions, locating and transmitting previously approved documentation, and supporting various meetings and reviews.

Mr. ROGERS. Are there duplicative reporting requirements that could be consolidated or eliminated? If yes, please identify.

Admiral SYRING. The Missile Defense Agency (MDA) does not currently have any duplicative congressional reporting requirements. However, proposed language in the House FY 2017 National Defense Authorization Act, H.R. 4909, Section 1664, would place significant duplicative reporting requirements on MDA. This provision requires semi-annual reporting on the Ballistic Missile Defense System (BMDS) test plan, costs and test plan changes and rationale, which duplicates existing reporting accomplished through annual submission of the Integrated Master Test Plan and BMDS Accountability Report, the BMDS Quarterly Update briefings and annual Staffer Day presentations.

Mr. ROGERS. We often ask the combatant commanders and military services for their unfunded requirements list. Do you have an unfunded requirements list? What capabilities were requested in the cocom IPLs for FY13–FY17 that didn't appear on the coordinated PCL or ACL? Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Admiral SYRING. [The information referred to is classified and retained in the committee files.]

Mr. ROGERS. What would be the total funding required, by system, to meet the combatant command requirement for THAAD and SM–3s and Aegis BMD software and hardware sets? Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Admiral SYRING. [The information referred to is classified and retained in the committee files.]

Mr. ROGERS. Are there program gaps in ballistic missile defense? Are there gaps you have not yet focused on? Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Admiral SYRING. [The information referred to is classified and retained in the committee files.]

Mr. ROGERS. If MDA was developing and procuring these new Patriot radars with the acquisition authorities you have, how much time would it take you to do it?

Admiral SYRING. Acquisition timelines for development programs vary considerably depending on the maturity of the components being developed and the amount of integration and testing required prior to deployment. It is difficult to predict acquisition schedules without a prior knowledge of these variables. For example, Long Range Discrimination Radar (LRDR) is developing and integrating relatively mature technology. The LRDR program plan for development and integration is less than five years from contract award to Initial Fielding.

Mr. ROGERS. During a recent hearing before the House Armed Services Committee, Under Secretary Sean Stackley testified that, because of the MDA's unique acquisition authorities, you were able to successfully deploy in almost record time the Aegis Ashore site in Romania. Do you agree with this assessment?

Admiral SYRING. Yes, MDA's streamlined acquisition authorities contributed to the rapid development, installation, and deployment of the Romania Aegis Ashore site. Another significant contributor to the shortened timeline is the close collaborative relationship between the MDA Aegis Ashore program office and Navy, including leveraging existing Navy contracts for acquisition of Aegis Ashore weapon system equipment common with Aegis BMD ships.

Mr. ROGERS. How much longer would it take and how much more would it cost to develop, test and field Poland Aegis Ashore site on the planned timeline in the normal 5000 series rules and regulations? Would MDA be able to meet the President's 2018 goal?

Admiral SYRING. It is difficult to assess the additional cost and schedule required to field the Poland Aegis Ashore site under standard 5000-series "rules." Poland-specific activity is estimated to be completed within four years. Initial hardware components were procured in 4th quarter fiscal year 2014 (4QFY14) and first fabrication on site was 1QFY16 with planned operations in 1QFY18. Fielding the Poland site is accelerated because of lessons learned from developing and deploying Aegis Ashore sites at the Hawaiian Pacific Missile Range Facility and Romania. Without this advantage and MDA's streamlined processes and decision making authority, it would be difficult to maintain the aggressive timeline to meet the European Phased Adaptive Approach Phase 3 requirement of December 2018.

Mr. ROGERS. How much longer would it take and how much more would it cost to develop, test and field Long-Range Discrimination Radar in the normal 5000 series and the Redesigned Kill Vehicle?

Admiral SYRING. Acquisition timelines for development programs vary considerably depending on the maturity of the components being developed and the amount of integration and testing required prior to deployment. It is difficult to specify the exact differences but MDA estimates development programs such as LRDR and RKV would take at least 25 percent longer without the streamlined and tailored MDA acquisition processes.

In the case of RKV, the formal OUSD(AT&L) gated reviews required by DOD 5000 series acquisition requirements are estimated to add approximately one year and $200M to the development effort and initial deployment costs. The RKV Acquisition Strategy signed by USD(AT&L) in October, 2015 accounts for streamlined acquisition processes.

Mr. ROGERS. I think you're aware of the planned radar modernization of the Patriot system, which will take as long as 12 years to provide an improved radar to our soldiers; how long would a comparable effort take MDA? I ask you to answer this using in your role as the technical integration authority for IAMD.

Admiral SYRING. Acquisition timelines for development programs vary considerably depending on the maturity of the components being developed and the amount of integration and testing required prior to deployment. It is difficult to predict acquisition schedules without a prior knowledge of these variables. For example, Long Range Discrimination Radar (LRDR) is developing and integrating relatively mature technology. The LRDR program plan for development and integration is less than five years from contract award to Initial Fielding.

Mr. ROGERS. Please provide a detailed explanation of changes to MDA AQ processes with respect to the 5000 series AQ regulations or JCIDS process in your tenure as Director.

Admiral SYRING. MDA's processes are completely consistent with the principles of DOD Directive 5000.01 and DOD Instruction 5000.02, but tailored to match Ballistic Missile Defense System (BMDS)-unique acquisition and requirements characteristics.

The BMDS warfighter requirements generation is explicitly exempt from JCIDS (SecDef memorandum dated January 2, 2002). The BMDS requirements generation process is the USSTRATCOM-led Warfighter Involvement Process (WIP) (ref: STRATCOM Special Instruction 538–1). The WIP is focused on BMD and Integrated Air and Missile Defense.

No significant changes were made to MDA's acquisition or requirements generation processes during my tenure; however several improvements and tailoring updates have been implemented the past several years to include:

- Incorporation of guidance from the recent Defense Acquisition of Services Instruction (DOD Instruction 5000.74, dated January 5, 2016) into MDA acquisition policy and processes.
- Validated that same streamlined processes outlined in the recent update to DOD Instruction 5000.02 (January 7, 2015) are incorporated in MDA processes. For example, the new DOD Instruction 5000.02 describes several acquisition "models" or "tracks" that development programs may follow. Several of these tracks have been in MDA acquisition policy and process since 2009.
- STRATCOM increased frequency of updates to the Prioritized Capability List (annual vice biannual) to better synchronize with the POM cycle.
- Generation of a BMD Homeland Defense Capability Document (CD) which was endorsed by the Joint Requirements Oversight Council (JROC). The VCJCS-signed JROC Memorandum (October 28, 2014) acknowledged that MDA is not bound by JCIDS. This CD specifically addressed Long Range Discrimination Radar (LRDR) and redesigned kill vehicle capability. The CD will be periodically reviewed for update.
- Incorporation of LRDR program reporting in the Defense Acquisition Executive Summary (DAES) on-line reporting system. LRDR is a pilot program for BMDS reporting in DAES.

Mr. ROGERS. Please provide the full list of NDPC-approved BMDS information and sharing with Russia and China?

Admiral SYRING. The Missile Defense Agency (MDA) submitted three requests for Exception to United States National Disclosure Policy (ENDP) from 2007–2011 seeking authority to disclose classified information to the Russian Federation (RF) relating to three ballistic missile defense flight test events. In each case, authority granted by the NDPC was limited to oral and visual disclosure only under controlled conditions. The RF sent attendees to two of the three test events (in 2007 and 2010).

No invitations were extended for the third event (in August 2011), and no disclosure occurred. MDA has not submitted any further requests for ENDP for the RF.

MDA has not sought ENDP for release of any information to the People's Republic of China.

Mr. ROGERS. Is the Russian Federation, under current NDPC policy, permitted to receive any FOUO, ITAR, UCTI, SECRET or TOP SECRET information about any U.S. missile defense system? If your answer is other than "no," please reply in detail.

Admiral SYRING. No. National Disclosure Policy Committee (NDPC) policy prohibits the release of classified information with a foreign government without an explicit authorization, such as an Exception to United States (U.S.) National Disclosure Policy (ENDP), and an information sharing agreement. No such agreement exists with the Russian Federation (RF).

We are not aware of any policy permitting the release of any controlled unclassified information (such as FOUO) or classified information to the RF on any U.S. missile defense system. We defer further response to the Defense Technology Security Administration.

Mr. ROGERS. Is the People's Republic of China, under current NDPC policy, permitted to receive any FOUO, ITAR, UCTI, SECRET or TOP SECRET information about THAAD? Any U.S. missile defense system? If your answer is other than "no," please reply in detail.

Admiral SYRING. No. National Disclosure Policy Committee (NDPC) policy prohibits the release of classified information with a foreign government without an explicit authorization, such as an Exception to United States (U.S.) National Disclosure Policy (ENDP), and an information sharing agreement. No such agreement exists with the People's Republic of China (PRC).

We are not aware of any policy permitting the release of any controlled unclassified information (such as FOUO) or classified information to the PRC on THAAD or any other U.S. missile defense system. We defer further response to the Defense Technology Security Administration.

Mr. ROGERS. Do you support providing the People's Republic of China with any detailed technical information on THAAD, including classified information? Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Admiral SYRING. We have not approved release of any controlled unclassified information (such as FOUO) or classified information to the Peoples Republic of China on THAAD or any other missile defense system.

Mr. ROGERS. Are you aware of MDA or MDA contractors being targeted or "hacked" by groups or entities linked to China or the Chinese military? Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Admiral SYRING. If a loss, theft, or spillage of MDA Unclassified Controlled Technical Information (UCTI) occurs, the Missile Defense Agency (MDA) reviews whether the contractor was in compliance with the contract terms and conditions established for cybersecurity. If the review determines the contractor is non-compliant, they are assessed penalties based on the performance assessment tools defined by the contract. Penalties have ranged from award fee reductions to contract termination based on the severity of the incident. MDA has also utilized the Contractor Performance Assessment Reporting System (CPARS) to rate contractors who do not manage in accordance with their contract terms and conditions. CPARS is the Government-wide repository of contractor performance information. A CPAR, required at least annually during contract performance per Federal Acquisition Regulation (FAR) 42.1502, provides an official record of both positive and negative contractor contract performance during a specific period of time. Past performance information (including the ratings and supporting narratives) is relevant information, for source selection purposes (FAR Part 15), regarding a contractor's actions under previously awarded contracts or orders.

MDA is teaming with our industry partners to strengthen network protections and associated business practices to improve protection of UCTI. MDA is working with industry to implement multiple cyber-related efforts that will improve both the government and our industry partners safeguard Ballistic Missile Defense System information.

Mr. ROGERS. What are the capability gaps that could be filled by a space sensor layer for the BMDS? Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Admiral SYRING. [The information referred to is classified and retained in the committee files.]

Mr. ROGERS. Please identify the studies MDA has carried out on its own or with other agencies or entities on space-based missile defense sensors?

Admiral SYRING. [The information referred to is classified and retained in the committee files.]

Mr. ROGERS. What are the options MDA has studied or is studying to host a missile defense payload on a USG, allied, or commercial space vehicle?

Admiral SYRING. [The information referred to is classified and retained in the committee files.]

Mr. ROGERS. Is it practical to expect MDA to develop and deploy a missile defense-only space-based sensor architecture?

Admiral SYRING. [The information referred to is classified and retained in the committee files.]

Mr. ROGERS. Can you please describe for me why we see reductions in SM–3 procurement quantities in your budget request for fiscal year 2017. Is this budgetary maneuver or is there something else this committee should be aware of?

Admiral SYRING. The Missile Defense Agency (MDA) PB16 input contained an SM–3 Block IB Multi-Year Procurement plan. The decision was made in PB17 to transition back to single year procurement as the Agency completed Third Stage Rocket Motor (TSRM) Engineering Change Proposal (ECP) verification and testing, and quantities were reduced to remain within the Department's overall funding limits. To address SM–3 manufacturing quality to ensure readiness for continued procurement, a comprehensive quality, safety, and mission assurance assessment was recently conducted. This assessment supported continued production of SM–3s.

In addition, PB16 included procurement of 8 SM–3 Block IIA guided missiles in FY17. Included in PB17 is a revised completion plan for SM–3 Block IIA, and under this plan the 8 rounds planned for FY17 were deferred to FY18 to match development milestones. FY17 funds were realigned from Defense Wide Procurement to Research, Development, Test and Evaluation in support of remaining SM–3 Block IIA development to meet the European Phased Adaptive Approach Phase 3 timeline.

Mr. ROGERS. What liability does the contractor bear for quality control failures? Does that liability include costs of failed tests? How much do those cost the taxpayer?

Admiral SYRING. Specific liability is dependent on individual contract terms and conditions including incentive structure. Most BMDS testing is part of developmental tests conducted under cost plus-type contracting vehicles. Tests failed as a result of contractor performance or quality control issues reduce contractor award fee and/or incentive fee and potentially impact Contractor Performance Assessment Report ratings. Additionally, MDA has delayed acceptance of Contractor-produced hardware due to known quality issues.

Mr. ROGERS. What is the current DOD regulation and policy concerning MDA's role to develop and maintain BMD capability and its transfer to the military services? Please detail what systems have been transitioned to the military services and what systems are currently undergoing transition study with the military services.

Admiral SYRING. The Department is using the Deputy Secretary of Defense's September 25, 2008, Ballistic Missile Defense System (BMDS) Life Cycle Management Process (LCMP), and June 10, 2011 memorandum on "Funding Responsibilities for BMDS Elements" to guide program planning and the transfer process.

Under the BMDS LCMP, DOD continues to transition BMDS capabilities to the lead Military Departments. The lead Military Departments are responsible for doctrine, organization, training, leadership, education, personnel and facilities associated with those elements. MDA retains the materiel acquisition responsibilities, unless a decision is made to transfer all responsibilities (full Title 10 Transfer) to the Military Department.

Figure 1 lists the fielded BMDS elements, lead Military Departments and the dates elements entered the transition phase. The Department uses the following terms and definitions to clarify the process, roles and responsibilities:

Entered Transition Phase: The BMDS element normally enters the transition phase when the Deputy Secretary of Defense, or delegated authority, designates a lead Military Department. If not previously approved, entry into the transition phase is coincident with the completion of the lead Military Department-MDA overarching memorandum of agreement (MOA).

Capability Transfer: The BMDS element capability is transferred to the lead Military Department once the Military Department accepts operational responsibility. After the capability transfer, the Military Department and MDA will assume responsibilities as agreed in the Military Department-MDA overarching MOA and respective element annexes. Normally, MDA will retain materiel responsibilities, including Research, Development, Test and Evaluation, produc-

tion, and sustainment of BMD specific equipment. The lead Military Department normally assumes responsibility for military pay and allowances, base operations and operations, and sustainment of common support equipment.

Title 10 Transfer to Lead Service: BMDS element responsibilities are transferred from MDA to the lead Military Department. Unless otherwise specified, the lead Military Department assumes all doctrine, organization, training, materiel, leadership and education, personnel, and facilities responsibilities. The Deputy Secretary of Defense, or a delegated authority, approves the transfer.

Figure 1: BMDS Element Transition and Capability Transfer Status, October 2016

Element or Capability	Lead Service	Entered Transition Phase	Capability Transfer	Title 10 Transfer to Lead Service
Patriot Advanced Capability-3 (PAC 3)	Army	N/A	N/A	February 2003 [1]
AN/TPY–2 (Forward Based Mode)	Army	February 2006	October 2013	Study ongoing [2]
Terminal High Altitude Area Defense (THAAD)	Army	November 2006	October 2014	Study ongoing [2]
Ground Based Mid-Course Defense (GMD)	Army	November 2006	N/A [3]	Not planned [3]
Standard Missile-3 (SM–3)	Navy	November 2006	October 2008	Not planned
Aegis BMD 3.6.X	Navy	November 2006	October 2008	Not planned
Aegis BMD 4.0.X	Navy	March 2007	March 2012	Not planned
Aegis BMD 5.0 (Capability Upgrade)	Navy	January 2008	December 2015	Not planned [4]
Aegis BMD 5.1	Navy	January 2008	FY 18	Not Planned [4]
Aegis Ashore (Romania)	Navy	January 2010	December 2015	Not planned
Sea Based X-Band Radar (SBX)	Navy	December 2008	December 2011	Not planned
Cobra Dane	Air Force	February 2006	February 2009	N/A [5]
Upgraded Early Warning Radars (UEWR)	Air Force	November 2006	September 2008	N/A [5]
Command and Control, Battle Management and Communications (C2BMC)	N/A [6]	N/A	N/A	N/A [6]

Notes:
[1] PAC 3 was already fielded by the Army when MDA was established in 2002 and was immediately transferred back to the Army by mutual agreement.
[2] Army and MDA have completed a study on the merits of a Title 10 Transfer. DOD is reviewing the study results.
[3] The GMD will not be transferred in the foreseeable future. Army and MDA will coordinate on terms of transition and transfer when the program is technically mature.
[4] BMD 5.0CU and 5.1 software packages are integrated into Navy's Aegis Baseline 9 combat system suite. MDA retains materiel developer responsibilities for the BMD software.
[5] Not applicable. Cobra Dane and the Upgraded Early Warning Radars are previously fielded U.S. Air Force assets that were upgraded and adapted by MDA for use with the BMDS. A Title 10 transfer is therefore, unnecessary,
[6] The C2BMC Tri-Service Structure was approved by the Deputy Secretary of Defense in March 2014.

Mr. ROGERS. Virtually every part of DOD has been the subject of cyber attacks, whether for espionage or other purposes. Is MDA any different? Can you describe what you've done to keep MDA ahead of this threat? Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Admiral SYRING. The Missile Defense Agency (MDA) has been targeted for cyber-attack like the rest of DOD; however, MDA has successfully defended or mitigated cyber threats against our internal government networks and systems. Similar to other DOD programs, persistent cyber threats directed against defense industry base operated or owned unclassified networks are a continual vulnerability. MDA is very cognizant of the growing cyber threat and is aggressively working to ensure the Ballistic Missile Defense System (BMDS) information is protected, and that missile defenses can operate in a highly contested cyber environment. To keep MDA ahead of the threat, we have implemented a rigorous cybersecurity program as described below.

MDA is using and sharing cyber intelligence to reduce our vulnerabilities. We use cyber intelligence to tune our cyber defenses and focus our information protection efforts. These efforts are accomplished in concert with DOD cyber forces (especially U.S. Strategic Command's USCYBERCOM), intelligence community assets, and law enforcement authorities.

MDA is improving the cyber hygiene of our missile defense capabilities by ensuring our cybersecurity infrastructure has the latest security upgrades and patches. MDA continually assesses our systems, suppliers, and overall acquisition processes. We are ensuring robust and secure configurations of our critical software and hardware to reduce the risk of malicious activities. MDA also has a rigorous cyber and Supply Chain Risk Management inspection program to examine everything about our systems from the trusted supply chain to the fielded capability. This ensures the highest possible levels of compliance.

MDA is instituting the DOD Cybersecurity Discipline Implementation Plan to mitigate risks for the information systems we own and manage. MDA's program implements the DOD four Lines of Effort campaign: Strong Authentication (to degrade the adversaries' ability to maneuver on DOD information networks); Device Hardening (to reduce internal and external attack vectors into DOD information networks); Reducing the Attack Surface (to reduce external attack vectors into MDA information networks); and Alignment to Cybersecurity/Computer Network Defense Services (to improve detection of and response to adversary activity). These efforts run across all facets of MDA and the BMDS mission systems and general services infrastructures.

MDA has established an Insider Threat Program in accordance with the DOD Directive 205.16, "The DOD Insider Threat Program." MDA is leveraging computer network defense capabilities, in addition to other information streams, to proactively detect, mitigate, and defeat potential insider threats. This program also ensures that only trusted individuals have access to MDA program information and systems.

The MDA Computer Emergency Response Team (CERT) continues to provide Computer Network Defense (CND) services as an accredited Tier II CND Service Provider to MDA Programs of Record. The MDA CERT executes a battle rhythm that includes daily monitoring and collaboration with USCYBERCOM, Joint Force Headquarters-Department of Defense Information Networks (JFHQ–DODIN), and other sources for the latest threats to DOD and MDA. As a result MDA CERT tracked and managed 109 cyber taskings in fiscal year 2015 and approximately 77 cyber taskings to date in fiscal year 2016, contributing to the overall cybersecurity posture of MDA networks and resources.

MDA is incorporating cybersecurity requirements early into our acquisition lifecycle. We are designing and building cybersecurity into missile defenses, rather than adding it after the fact. MDA is ensuring that we build cyber resilience into our systems and verifying cybersecurity protection of deployed systems through realistic cybersecurity testing.

We are working closely with our industry partners in the Defense Industry Base (DIB) to ensure they can protect both classified and unclassified information stored on their systems to prevent exposure to potential adversaries. MDA knows that malicious cyber actors are constantly attempting to exfiltrate information from U.S. Industry. We will continue to work with our DIB partners, the FBI, and other associates, to identify these issues and reduce the chances of success for those responsible, in coordination with U.S. National Authorities and in accordance with U.S. National Policy.

MDA continues to execute a rigorous cybersecurity controls validation testing program on MDA networks and the BMDS in compliance with the National Institute of Standards and Technology (NIST) Special Publication 800–53, Revision 4, "Security and Privacy Controls for Federal Information Systems and Organizations." We

recently established a mandatory baseline set of technical cybersecurity controls for implementation within the BMDS system specification.

Moreover, MDA is supporting BMD Warfighters with the joint development of the Cyber BMD Concept of Operations (with Joint Functional Component Command–Integrated Missile Defense and Joint Functional Component Command–Space) to ensure cyber threats can be rapidly detected, contained, and defeated. These efforts ensure the Agency remains a strong mission partner, protects and defends MDA information systems and networks, and optimizes cybersecurity management and processes at a level commensurate with our critical national defense mission.

Mr. ROGERS. What consequences have there been for contractor responsibility for such data loss/theft/spillage?

Admiral SYRING. Available tools to address Contractor liability include reducing award and incentive fee, negative Contractor Performance Assessment Report ratings, decision to not exercise contract options, and potential debarment from receiving Government contracts. MDA has used these tools recently to hold Contractors responsible for data lost/theft/spillage. MDA mandates the inclusion of Defense Federal Acquisition Regulations Supplement clause 252.204–7012 (Safeguarding of Unclassified Controlled Technical Information) in existing and future contracts and other MDA-specific requirements

Mr. ROGERS. How concerned are you that it is too easy for the bad guys to get access to "unclassified controlled technical information" about our missile defense systems? Have you seen examples of where they have improved their systems thanks to this sort of U.S. data? If yes, including if based on your suspicion, please provide as much detailed information as possible concerning such examples.

Admiral SYRING. We are very concerned about protecting Unclassified Controlled Technical Information (UCTI). The Missile Defense Agency (MDA) is working to ensure our Critical Covered Defense information is appropriately protected and working Defense contractor supply chain to implement oversight of defense contractor unclassified and development, manufacturing, and administrative networks.

The Department issued a new Defense Federal Acquisition Regulation Supplement clause in August 2015 to protect UCTI, which MDA is incorporating into every new contract we award.

We have held an MDA Industry Day to discuss protection of UCTI and appropriate program protection and cybersecurity controls. MDA has formed an alliance with our key prime contractors and government partners to assess both technical and non-technical protection countermeasures that can be implemented to reduce the risk of information loss and to help mitigate the risks of potential for cyber exploitation.

A key part of this effort is the requirement to implement the National Institute of Standards and Technology Special Publication 800–71 security requirements by December 2017 and to implement appropriate supply chain risk management countermeasures throughout our Defense Industrial Base. These efforts should assist in providing enhanced protection measures that are both cost-effective and reduce the risk of critical information loss. MDA is leading an effort with our primes and subcontractors to identify where MDA specific covered defense information (CDI) has the greatest protection risk and ensuring additional security protection measures are implemented where appropriate to provide better protection for both MDA and our industry partners' critical information.

MDA defers to the Intelligence Community on how other countries improve their systems.

Mr. ROGERS. In a response to a request for information, MDA indicated that planned Patriot-THAAD integration will consist of being able to pass planning data between units via compact disc. It is understandable that the document describes this as "very limited THAAD integration with IBCS". Is that correct? Is that acceptable? Does this demonstrate the Chairman of the Joint Chief's vision of integrated air and missile defense?

Admiral SYRING. MDA's response was accurate in that THAAD battle plans are currently passed via compact discs to Army units. The capability MDA and the Army are building for future increments does not use CDs. The Army and MDA have jointly developed an initial integration plan to provide shared defense design/battle planning and situational awareness improvements by 2020.

The first integration step includes modification of THAAD software; adding the Common Integrated Air and Missile Defense (IAMD) XML Schema (CIXS) 3.6 interface to the THAAD Portable Planner; modification of the IBCS Integrated Defense Design algorithms and user interface; and remoting of THAAD workstations into a collocated IBCS Engagement Operations Center functioning as the THAAD Battery command post.

Subsequent integration steps will be defined as part of the requirements analysis in conjunction with the development of the Army IAMD System of Systems Increment 3 Capabilities Production Document in 2018. This plan supports the Chairman of the Joint Chief's vision of integrated air and missile defense.

Mr. ROGERS. I understand the United Arab Emirates has indicated its willingness to make a considerable investment in development of an evolved extended-range THAAD system. Can you afford an extended-range THAAD given your current budget profile?

Admiral SYRING. The Department recently received a letter from the United Arab Emirates (UAE) expressing interest in the Terminal High Altitude Area Defense (THAAD) Extended Range (ER) concept. In response, the Department clarified that while THAAD ER is not currently a program of record, the Missile Defense Agency (MDA) is conducting a THAAD follow-on study to assess alternative future capabilities to further enhance the THAAD weapon system against current and future threats. The Department committed to continue to keep the UAE informed through ongoing dialogue. MDA is assessing affordability as part of the THAAD follow-on study.

Mr. ROGERS. Is it the case the Army Vice Chief of Staff and STRATCOM have both stated that they need such a capability (e.g., an evolved extended-range THAAD system)? What capability gaps have they identified to MDA? Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Admiral SYRING. [The information referred to is classified and retained in the committee files.]

Mr. ROGERS. Do you support such a partnership between the UAE and the U.S. (e.g., to develop an evolved extended-range THAAD system)?

Admiral SYRING. The United Arab Emirates is an important partner in ballistic missile defense and leader in the region as the first country to purchase THAAD batteries and interceptors through the Foreign Military Sales program. While the Department of Defense is not currently pursuing THAAD ER as a program of record, we are conducting a THAAD follow-on study to assess alternative future capabilities to further enhance the THAAD weapon system. As the Department evaluates findings from the THAAD follow-on study, we have committed to keeping the UAE informed and ensure that dialogue remains open.

Mr. ROGERS. I understand the U.S. is discussing a Foreign Military Sales case with Qatar for THAAD. Why is this case important for Qatar and THAAD? Can we work together to accelerate this case to make sure Qatar has these critical missile defense systems prior to the World Cup in 2022? How?

Admiral SYRING. [The information referred to is classified and retained in the committee files.]

Mr. ROGERS. Recently, Bill Gertz of the Washington Free Beacon has reported that North Korea has displayed a new road-mobile ICBM. Does North Korea have a new road-mobile ICBM? Is it testing solid-rocket motors for such a missile? Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Admiral SYRING. The Missile Defense Agency defers to the Department of Defense Intelligence Community.

Mr. ROGERS. Can you remind this committee why road-mobile missiles are a defense challenge for us? And what about such missiles with solid fuel?

Admiral SYRING. Mobile ballistic missile technology advances and associated proliferation poses a growing threat to United States, our allies, and partner forces and territory including the homeland. Road mobile launchers enable potential adversaries to launch missiles from unexpected locations. Solid fuel provides more flexibility to the threats we face by reducing the time required to prepare and launch these missiles

Mr. ROGERS. Am I correct that under the current plan for the ground-based midcourse defense system, there are no operational spares GBIs for, is it 5 or 6 years? It's well into the 2020s, right? What happens if there is an unplanned failure? Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Admiral SYRING. The Missile Defense Agency (MDA) will not have operational spare Ground Based Interceptors (GBIs) until 2020. In President's Budget 2017, MDA plans to deliver three initial production Redesigned Kill Vehicle (RKV) units in fiscal year 2020 (FY20) and two initial production Configuration 3 (C3) boost vehicles in FY23. One of the RKVs and one of the C3 boosters will be designated as an operations/test spare.

In the event of an unplanned failure for one of the operational GBIs, Ground-based Midcourse Defense Program Manager for Readiness would task the GBI con-

tractor to repair the interceptor. During the timeframe for the repair, the warfighter would lose one interceptor from inventory.

Mr. ROGERS. Is this reality (the lack of operational spares referenced in the previous question) an artifact of years of under-investment in the GMD system? What is the best way to mitigate this risk?

Admiral SYRING. The lack of operational spares is due to significantly increasing the amount of operational Ground-based Interceptors (GBIs). To achieve the SECDEF mandate of fielding 44 GBIs by the end of calendar year 2017, MDA is emplacing all previously planned spares in the operational fleet. The following table illustrates the current program plan and the utilization of GBIs to meet operational and test requirements.

Total Legacy contract (-0001) Deliveries	47	
Total Development and Sustainment Contract (DSC) Deliveries	11	
Total Deliveries	**58**	
Subtract Flight Tests and Stockpile Reliability Program (SRP)	(12)	FTG–06, BVT–01, FTG–06a, CTV–01, CTV–02+, FTG–07, FTG–06b, FTG–11a, FTG–11b, SRP (2), FTG–15
Total Available	**46**	
Emplace 30		**(Original GM Plan)**
IF: 30 are emplaced;	THEN: Subtract 30 from 46 total available; 46 – 30=16	RESULT: 16 GBIs available to support future Flight Tests, Spares and SRP. Provides 10 Flight Test assets for fiscal year 2020 (FY20) through FY28 and 6 for Spares and SRP
Emplace 44		**(March 2013 SECDEF Mandate)**
IF: 44 are emplaced;	THEN: Subtract 44 from 46 total available; 46 – 44=2	RESULT: 2 GBIs are available to support flight tests in FY20 and FY21

Our President's Budget 2017 plan mitigates this risk by providing redesigned kill vehicle spares beginning in FY20 and Configuration 3 spares in FY23.

Mr. ROGERS. Please detail any exercises, table top exercises, or war games you have participated in concerning left-of-launch ballistic missile defeat. In such exercises, were there any areas in which it was observed that policy guidance was required to successfully carry out such capability? If so, please identify and describe such observed areas needing policy guidance from OSD.

Admiral SYRING. The Missile Defense Agency's (MDA's) wargame and exercise support is primarily limited to providing modeling and simulation focusing on right-of-launch ballistic missile defeat for Warfighter-sponsored wargames and exercises.

MDA defers to the respective combatant commands for specific details or questions regarding policy guidance observations or requirements for executing Left-of-Launch activities.

Mr. ROGERS. What kind of intelligence do we need to possess in order for the President to order a preemptive attack on a state possessing nuclear weapons?

Admiral SYRING. This question would be best addressed by the U.S. Strategic Command.

Mr. ROGERS. What do potential adversaries like Russia, China, Iran and other states know about THAAD and PATRIOT? Do they know more than they should? What does that tell us about the security of data about U.S. missile defense? Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Admiral SYRING. The Missile Defense Agency defers to the Department of Defense Intelligence Community.

Mr. ROGERS. How much do the TD–2 and KN–08 have in common, in terms of technology and systems? How much of the KN–08 is it safe to say has been tested? Please reply in detail. Please ensure your response is unclassified to the maximum extent possible

Admiral SYRING. The Missile Defense Agency defers to the Department of Defense Intelligence Community.

Mr. ROGERS. Are we outpacing the threat? How do you evaluate "outpacing" the threat? Based on what criteria? Please provide a detailed list of adversary developments regarding ballistic missile capability that affected our ability to "outpace" the threat. What developments by adversaries, if any, have surprised you? Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Admiral SYRING. [The information referred to is classified and retained in the committee files.]

Mr. ROGERS. How much control do you have over LCMD? How much insight do you have over something that will go into a system for which you are responsible?

Admiral SYRING. Since 2015, the Missile Defense Agency has provided technical support to the Office of the Secretary of Defense/Sandia National Laboratory Low Cost Missile Defeat team, to include systems engineering, Terminal High-Altitude Area Defense system design, sensors, and cost estimating. We have also provided technical deep dives and guidance on the Ballistic Missile Defense System architecture, system requirements, concept of operations, safety and mission assurance, and integration information. We will continue to provide technical support through 2016 in support of a Systems Requirements Review in July and activities leading to a Preliminary Design Review. We participate in all of the major reviews and weekly tag up meetings.

Mr. ROGERS. Are there any other missile defense capabilities you are aware of that are being developed outside of MDA? For example, by the Strategic Capabilities Office? What is your level of insight and technical authority over such capability developments.

Admiral SYRING. The Missile Defense Agency (MDA) is an active team member of the Hypervelocity Gun Weapon System (HGWS) Project sponsored by the Office of Secretary of Defense Strategic Capabilities Office (SCO). MDA supports the HGWS systems engineering efforts and is developing a Prototype Fire Control Radar to support system level demonstrations in the fiscal year 2018–2019 time frame. MDA actively participates in Integrated Air and Missile Defense architecture and requirements development, ballistic missile defense mission performance analysis, and HGWS system-level test planning, as well as 3-Star-level Sensor Steering Committee meetings.

In addition, MDA is partnering with SCO on other projects at higher classification levels.

Mr. ROGERS. I would like to give you an opportunity to clarify a response to a question during the 14 April hearing, are you funded to develop and deploy defense against boost-glide missiles like those being developed by Russia and China? How much would such development cost?

Admiral SYRING. [The information referred to is classified and retained in the committee files.]

Mr. ROGERS. Am I correct that, if we assume a 2028 initial fielding of a new Patriot radar, we will have a radar system with components, in some cases, that are 58 years old?

Mr. PIKE. The average age of all Patriot ground equipment including the radars and their components across the U.S. Army fleet is 7.5 years. This average age is achieved through the Patriot recapitalization program and the Patriot modification efforts and is cost-effectively enabled by new radar production for foreign partners and continuous obsolescence management. The Patriot recapitalization program is a complete depot overhaul effort that returns one battalion set of Patriot ground system equipment per year (including radars) to like-new (zero miles/zero hours) condition. The recapitalization program is conducted at the Letterkenny Army Depot in Pennsylvania and is funded with Operations and Maintenance Army funding. While the original design heritage of Patriot goes back to the 1970s, the Army has implemented a continuous and robust hardware and software modification effort over the years to address performance, readiness, and obsolescence. These modification efforts not only replace older components, but also leverage the substantial investment of our foreign partners and most recently included the new Radar Digital Processor, new Modern Adjunct Processor, and the new Modern Man Station. These

components also enable adaptation to the Army's Integrated Air and Missile Defense Battle Command System (IBCS).

The materiel solution for the Lower Tier Air and Missile Defense Sensor (LTAMDS) has not been determined nor has a program baseline (cost, schedule, performance) been established. The LTAMDS effort could result in an upgrade to the current Patriot radar or a new radar to replace the Patriot radar. The Army's plan is to conduct a full and open competition to allow industry to propose and demonstrate materiel solutions that address the approved LTAMDS requirements. While LTAMDS is being developed and fielded, Patriot readiness and performance will be maintained through the recapitalization, modification, and obsolescence management efforts described above.

Mr. ROGERS. How many requirements or objectives can Patriot not meet today due to obsolescence or adversary threat developments? Please provide me the complete list. Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Mr. PIKE. [The information referred to is classified and retained in the committee files.]

Mr. ROGERS. When you testified, you stated the Army Requirements Oversight Council was meeting that week to establish an actual operational requirement for the LTAMD radar. Did it? Please provide such AROC-approved requirement if so.

Mr. PIKE. [The information referred to is classified and retained in the committee files.]

Mr. ROGERS. Please provide the operational availability information for each Patriot battery for the most recent year for which it is available. Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Mr. PIKE. Over the last twelve months, Operational Readiness was the driver of availability of Patriot units. Operational Readiness is reported monthly for the worldwide U.S. Army Patriot fleet and is also broken out by the following regions: Korea, Pacific Command (PACOM), Continental United States (CONUS), Europe (USAREUR), and Southwest Asia (SWA).

The Army's Operational Readiness goal for Patriot is 90 percent. The most current Operational Readiness data available for the last twelve months is provided below ending May 2016:

Worldwide 92.67%
Korea 97.75%
PACOM 79.83%†
CONUS 93.42%
USAREUR 91.17%
SWA 93.25%

Mr. ROGERS. What is the risk that, due to obsolescence, the Army will not be able to keep the Patriot radar fully functional to your planned 2028 initial fielding plan? Please explain your answer in detail and cite Army analysis/analyses that has been conducted to inform your answer. Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Mr. PIKE. Due to the recapitalization program, the modification efforts, and continuous monitoring as well as the extensive new production for our foreign partners, the Army categorizes the risk to Patriot radar functionality (performance and operational readiness) as low.

The Army continuously monitors component obsolescence in all Patriot end items. Commercially-available databases are utilized to assess the availability of electronic components used in the manufacture, modification, and recapitalization of the radar. The modification efforts to maintain performance and readiness against the evolving threat (functionality) produce the latest configuration of the Patriot ground system (including radars) for the U.S. Army fleet called Configuration 3+ (C3+). The C3+ modification effort results in a 49.3 percent reduction in obsolete parts associated with the Patriot radar compared to the previous radar configuration. The overall obsolescence percentage of the C3+ radar is assessed at 4.3 percent of the total radar parts. The Army also monitors field failure data to ensure that spare and repair programs are not affected by obsolescence issues.

Although the U.S. Army does not currently plan to procure any new Patriot radars, there is an extensive C3+ production program for our foreign partners. The

†PACOM failures were in radar, heavy and medium wheeled vehicles, and trailers. There were three separate months that affected the PACOM Operational Readiness rate. Radar faults occurred in August 2015 and were corrected by the end of the month. Issues with vehicles occurred in October 2015 and were corrected by the end of that month. Radar faults and trailer issues occurred in APR 2016 and were corrected later that same month. The most recent month's (May 2016) Operational Readiness rate for PACOM was reported as 96 percent.

new production enables a cost-effective supply chain to support performance, readiness, and sustainment of the U.S. Army capability, resolves certain obsolescence issues, and provides opportunity to reduce obsolescence even further.

Mr. ROGERS. Can you please tell me, if you begin fielding the new radar in 2028, when will it be fully deployed to our Army air defenders?

Mr. PIKE. The Lower Tier Air and Missile Defense Sensor effort has not yet been established/approved as an acquisition program. Therefore, the program baseline (cost, schedule, performance) has not yet been established. The program baseline will be informed by results of the full and open competition using the Army's approved operational requirements.

Mr. ROGERS. As the acquisition lead for the Army for Patriot, can you please assure us that at the end of the Lower Tier Army Missile Defense radar modernization program that all, all, capability and objective requirements gaps will be closed so that they are covered for our soldiers and joint warfighters who depend upon this system? If not, what capability and requirement gaps will not be met? Please reply in detail. Please ensure your response is unclassified to the maximum extent possible.

Mr. PIKE. The Army's approved operational requirement for the Lower Tier Air and Missile Defense Sensor (LTAMDS) addresses all of the known capability gaps based on current threat projections for future years. The LTAMDS program will be structured to achieve the Army's operational requirements which will close the gaps. However, threat projections are simply that—today's predictions of the future threat which may or may not accurately reflect the threat in the future. Threat projections and capability gaps are updated on a recurring basis. As the threat evolves, additional capability gaps and objective requirements may be identified during development, production, fielding, and/or sustainment of LTAMDS. Any necessary improvements to address the updated threat projections/emergent gaps will likely be implemented through evolutionary software development and hardware modifications (or product improvement programs) if required based on operational risk assessments. This is the same process that has been successfully accomplished in Patriot for decades.

Mr. ROGERS. In a response to a request for information, MDA indicated that planned Patriot-THAAD integration will consist of being able to pass planning data between units via compact disc. It is understandable that the document describes this as "very limited THAAD integration with IBCS". Is that correct? Is that acceptable? Does this demonstrate the Chairman of the Joint Chief's vision of integrated air and missile defense?

Mr. PIKE. Planned Patriot-THAAD integration does not consist of passing planning data between units via compact disc. Missile Defense Agency's (MDA) response was accurate in that THAAD battle plans are currently passed via compact discs to Army units for non-real time planning purposes. Near real-time target data and engagement status is currently shared between THAAD and Army mission command elements automatically via tactical data links. Additionally, the Army and MDA are building capabilities for future increments of non-real time battle planning that eliminates the need for compact discs. The Army and the MDA have jointly developed an initial integration plan to provide shared defense design/battle planning and situational awareness improvements by 2020. The work includes modification of THAAD software; adding the Common IAMD Extensible Markup Language Schema 3.6 interface to the THAAD Portable Planner; modification of the IBCS Integrated Defense Design algorithms and user interface; and remoting of THAAD workstations into a collocated IBCS Engagement Operations Center functioning as the THAAD battery command post. Subsequent integration steps will be defined as part of the requirements analysis in conjunction with the development of the Army IAMD System of Systems Increment 3 Capabilities Production Document in 2018. This plan supports the Chairman of the Joint Chief's vision of integrated air and missile defense.

QUESTIONS SUBMITTED BY MR. COOPER

Mr. COOPER. Please give us your views on the efforts to change the decades-long missile defense policy of defending against a limited missile defense attack. Would expanding this policy to defense against all missile defense attacks, including large-scale attacks from China or Russia, be possible and cost-effective? What would the strategic stability implications be of such a change in policy? Is there an operational requirement for this? How do we deter Russian and Chinese attacks?

Mr. MCKEON. It has been long-standing U.S. policy not to seek to build missile defense capabilities that could threaten China's or Russia's strategic deterrent.

Every U.S. Administration has instead relied on our nuclear Triad to ensure credible deterrence against Chinese and Russian Intercontinental Ballistic Missile (ICBM) attack against our homeland. Changing this policy would raise profound questions about whether the United States is now pursuing the development and deployment of large-scale, advanced missile defense capabilities to negate either Russia's or China's strategic deterrent. This development could undermine strategic stability with regard to both countries, and could lead them to respond by accelerating and expanding their strategic nuclear forces, or by developing a more advanced asymmetrical response capability.

Furthermore, the technical challenges and interceptor inventories associated with building missile defenses to cope with a large-scale, sophisticated Russian or Chinese missile attack would make the project cost-prohibitive.

DOD continues to believe that the most effective and reliable means to deter an attack on the United States by a major nuclear power is to sustain and modernize our strategic nuclear Triad.

Mr. COOPER. Admiral Syring, you noted that Space Based Interceptors are neither technically nor financially feasible. Please explain these feasibility concerns.

Admiral SYRING. At a conceptual level, Space Based Interceptors (SBI) could provide on-demand boost and early post-boost access against certain classes of threats even in places where terrestrial weapons would be geographically constrained or politically precluded. However, the basic feasibility of an SBI layer with operational utility has not yet been shown in the relevant environment of space and on the compressed engagement timelines required.[1] Essential SBI technologies have been worked only sporadically over the years and consequently are not feasible to procure, deploy, or operate in the near- to mid-term.

Cost has traditionally been a barrier to space based defenses. Feasible solutions would depend upon aggressive incorporation of light-weight technologies, low-cost access to orbit, and selection of a mission that is bounded enough to be affordable and at the same time militarily useful. The 2011 IDA report showed costs ranging from $26B for a limited mission, to greater than $60B for a "medium" capability system that could perform against near-term threats, to over $200B for a full global defense.

Mr. COOPER. Please give us your views on the efforts to change the decades-long missile defense policy of defending against a limited missile defense attack. Would expanding this policy to defense against all missile defense attacks, including large-scale attacks from China or Russia, be possible and cost-effective? Is it technologically feasible? What would the cost be?

Admiral SYRING. The Office of the Secretary of Defense for Policy is the most appropriate organization to respond to questions concerning a change in missile defense policy.

QUESTIONS SUBMITTED BY MR. FORBES

Mr. FORBES. We understand that the Department of Defense is considering deploying JLENS in the Mid-Atlantic region. Would Wallops Island, Virginia, be a suitable location to deploy JLENS in support of NORTHCOM/NORAD missions?

Admiral GORTNEY. A number of sites were considered when planning for the three-year JLENS Operational Exercise (OPEX) from FY15 through FY17. Wallops Island was one of the sites considered; however, due to a number of variables, including current availability of restricted airspace and the timeframe required to develop new restricted airspace, Wallops Island was not deemed suitable to support the OPEX in the given timeframe. The objective of the JLENS OPEX was to assess JLENS contribution to cruise missile defense within the National Capital Region and inform an enduring mission decision. If the OPEX results had supported an enduring mission requirement, an assessment of optimal JLENS locations, including additional site surveys if necessary, would be part of the JLENS enduring mission decision.

QUESTIONS SUBMITTED BY MR. BISHOP

Mr. BISHOP. It is my understanding that you are on schedule to ensure that 44 Ground Based Interceptors (GBI) are fielded by the end of 2017. Can you describe

[1] Note: Delta 180 (Vector Sum) did demonstrate in 1986 the principle of intercepting in space a target during powered flight

for the committee how many back-up boosters and kill vehicles MDA plans to acquire to support the 44 GBI fleet?

Admiral SYRING. The Missile Defense Agency is on track to field 44 GBIs by the end of 2017. The Agency plans to acquire three spare redesigned kill vehicles and two spare Configuration 3 boosters from calendar years 2020–2025 to support the 44 GBI fleet.

Mr. BISHOP. Do you believe that you are on schedule to ensure that the upgraded booster, known as C3, will be able to support the new Redesigned Kill Vehicle (RKV) fielding in the 2020–2022 time frame? How much funding in FY17 is requested to begin C3 development?

Admiral SYRING. No, the Configuration 3 (C3) booster will not be delivered to support RKV fielding from 2020–2022. In order to maximize system reliability as quickly as possible and to meet the 2016 National Defense Authorization Act requirement to replace all Capability Enhancement-1 (CE–I) exoatmospheric kill vehicles (EKV) by 2022, the Missile Defense Agency (MDA) will initially recap C1 boosters with RKVs. Beginning in 2023, MDA will deliver C3 boosters with RKVs and continue until all CE–2 EKVs are replaced. Beginning in 2024, the first 18 RKVs that were placed on C1 boosters will receive their C3 booster. This strategy focuses resources on the highest priority GBI component (replacing all CE–I kill vehicles) while phasing in the C3 booster in an efficient manner. In PB17, the Agency has requested $20.8 million in fiscal year 2017 to begin C3 development.

○