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S. HRG. 114–658, PT. 7

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 2017 AND THE FUTURE YEARS DEFENSE PROGRAM

HEARINGS

BEFORE THE

COMMITTEE ON ARMED SERVICES
UNITED STATES SENATE

ONE HUNDRED FOURTEENTH CONGRESS

SECOND SESSION

ON

S. 2943

TO AUTHORIZE APPROPRIATIONS FOR FISCAL YEAR 2017 FOR MILITARY ACTIVITIES OF THE DEPARTMENT OF DEFENSE, FOR MILITARY CONSTRUCTION, AND FOR DEFENSE ACTIVITIES OF THE DEPARTMENT OF ENERGY, TO PRESCRIBE MILITARY PERSONNEL STRENGTHS FOR SUCH FISCAL YEAR, AND FOR OTHER PURPOSES

PART 7
STRATEGIC FORCES

FEBRUARY 9, 23; APRIL 13, 2016

Printed for the use of the Committee on Armed Services

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DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 2017 AND THE FUTURE YEARS DEFENSE PROGRAM

TUESDAY, FEBRUARY 9, 2016

U.S. SENATE,
SUBCOMMITTEE ON STRATEGIC FORCES,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

NUCLEAR ACQUISITION PROGRAMS AND THE NUCLEAR DOCTRINE

The subcommittee met, pursuant to notice, at 2:37 p.m. in Room SR–232A, Russell Senate Office Building, Senator Jeff Sessions (chairman of the subcommittee) presiding.

Present: Senators Sessions, Fischer, Donnelly, and Heinrich.

OPENING STATEMENT OF SENATOR JEFF SESSIONS

Senator SESSIONS. The Strategic Forces Subcommittee convenes today to receive testimony on the Department of Defense nuclear acquisition programs and nuclear policy in review of the defense authorization request for fiscal year 2017.

We know from Secretary of Defense Carter that our nuclear deterrent is the foundation and the bedrock of our security. "No other capability we have is more important," said his predecessor, Chuck Hagel.

We also recognize that a consistent lack of investment and support for our nuclear forces over many decades has left us with little margin to spare as we recapitalize the force. As Secretary Work told Congress just seven months ago in an important comment, "The choice right now is modernizing or losing deterrent capability in the 2020s and 2030s. That is the stark choice that we face."

The case for nuclear modernization is made more urgent by recent developments in the strategic environment. In previewing the fiscal year 2017 budget request, Secretary Carter warned that we are witnessing a return to great power competition. That is a historic event that we have to recognize.

According to the Secretary, Russian aggression in Europe and the rise of China in the Asia-Pacific region are two primary challenges now driving the focus of the Defense Department planning and budgeting, with North Korea and Iran following closely behind.

These are four nuclear nations, all expanding their capabilities in nuclear programs.

In addition to expanding their conventional military capabilities, both Russia and China are making significant investments in their strategic capabilities, expanding the role of nuclear weapons in their overall security strategy. Russia has gone so far as to make direct nuclear threats against the United States and its allies while President Putin warns, "I'm surprising the West with our new developments in offensive nuclear weapons."

It is not just China and Russia. Admiral Haney, Commander of the Strategic Command, observed in January that, "For the foreseeable future, other nations are placing high priority on developing, sustaining, and modernizing their nuclear forces."

Obviously, the vision that we had and many had that unilateral restraint and even reduction of our nuclear weapons stockpile and capabilities would encourage others to follow on that path has not proved effective.

Congress has provided sustained support for the President's entire nuclear modernization program, and I expect us to continue despite obvious budget pressures. This country can and should be able to afford 5 percent to 6 percent of our national defense spending to maintain and recapitalize our nuclear forces over the next 10 years.

We should acknowledge, however, that the DOD and the Department of Energy nuclear modernization programs over the next 10 to 20 years are fragile, in the words of Under Secretary of Defense Frank Kendall, and that "any funding reductions at this point could pose unacceptable risk to the health of the nuclear enterprise."

I believe we have a bipartisan commitment not to make this mistake. I really do. I am optimistic about our ability to make the right choices. I think the President is proposing reasonable goals, and I think our Congress and Senate will support that.

In recent press reports, if they are correct, Secretary Moniz, the Secretary of Energy, has warned that underfunding in the outyears will put the NNSA [National Nuclear Security Administration] budget in an untenable position by 2018.

But make no mistake, the United States Government will do what is necessary to preserve a strong and effective nuclear deterrent that should be feared and respected by potential adversaries, and welcomed by U.S. allies who depend on the United States for their security.

The venerable principle of peace through strength remains true. There must be no doubt that the greatest military in the world has the capacity and the will to defend itself against any attack, and will not cower or be intimidated.

I will now turn to my able ranking member for any comments that he might have.

Senator Donnelly?

STATEMENT OF SENATOR JOE DONNELLY

Senator DONNELLY. Thank you, Mr. Chairman.

I would like to thank today's witnesses for appearing at this hearing.

Assistant Secretary Scher and General Rand, I understand this is your first appearance. Welcome.

Today's hearing occurs almost two years after the cheating incident at Malmstrom that resulted in Secretary Hagel's nuclear enterprise review. While there is much criticism of this event, it has, I believe, resulted in a positive effort for the DOD [Department of Defense] nuclear enterprise. It resulted in a deep discussion of our Nation's ability to maintain its deterrence posture by concentrating on our airmen and sailors first, and the means to support them.

I hope today's hearing continues to understand the progress in this area.

We had a hearing two weeks ago with a number of former deputy assistant secretaries, going back to 1992, who were responsible for the policy of our deterrence mission. I want to continue that discussion with those of you to understand your views on issues associated with our nuclear posture and with recent changes occurring in Europe and NATO.

I am also looking forward to hearing input from our witnesses on how we can best manage costs to undertake the necessary modernization of our nuclear triad in the years to come. I am particularly interested in hearing your feedback today on how we can best leverage commonality across the services to reduce risk, enhance capabilities, and manage costs, starting with Air Force and Navy ballistic missiles.

Senator Sessions, thank you for arranging this hearing. I look forward to today's discussion.

Senator SESSIONS. Thank you, Senator Donnelly.

This is the order that we will go in: Secretary Scher, Dr. Hopkins, General Rand, and Admiral Benedict. I will introduce Mr. Scher first.

Mr. Robert Scher has been the Assistant Secretary of Defense for Strategy, Plans, and Capabilities since December 2014. He is responsible for advising the Secretary of Defense and the Under Secretary of Defense for Policy on national security and defense strategy forces, contingency plans, and, most relevant for today, nuclear deterrence and missile defense policy.

He is well-positioned to understand the relationship between nuclear weapons and U.S. defense strategy.

Mr. Scher, Secretary, we are pleased to hear from you now.

STATEMENT OF HONORABLE ROBERT M. SCHER, ASSISTANT SECRETARY OF DEFENSE FOR STRATEGY, PLANS AND CAPABILITIES

Secretary SCHER. Chairman Sessions, Ranking Member Donnelly, thank you for the opportunity to testify on U.S. nuclear policy and strategy, and to frame the budget's fiscal year 2017 budget request on these issues within the context of today's security environment. Your continuing support for nuclear sustainment and the modernization plan is essential to ensuring the effectiveness of our nuclear deterrent forces.

As you said, last week, Secretary Carter, in previewing the budget, identified five evolving security challenges that have driven the focus of the Defense Department's planning and budgeting this year. Each, in fact, as you say, does have a nuclear dimension that our policy and strategy must address.

Two of these challenges reflect a return to great power competition in these regions where we face nuclear-armed potential adversaries that can pose an existential threat to the United States and to our allies.

Russia has undertaken aggressive actions in Crimea and elsewhere in Ukraine, adopted a pattern of reckless nuclear posturing and coercive threats, and remains in violation of the Intermediate Nuclear Forces Treaty.

China continues its rise in the Asia-Pacific and is introducing qualitative advances into its nuclear capabilities.

I also must also note that North Korea, a threat both to us and our allies, just conducted a space launch and, recently, its fourth nuclear test.

While the President's ultimate goal is a world without nuclear weapons, he has been consistent and clear in his commitment to maintain a safe, secure, and effective nuclear arsenal for as long as nuclear weapons exist. Effective deterrence requires that our nuclear capabilities and posture provide the ability to implement U.S. defense strategy, preserve that strategy's credibility, and reinforce overall strategic stability.

Our approach is to maintain a deterrent that is an inherently robust and stable rather than one that is simply reactive to every action of a potential adversary. This approach remains best served by sustaining a full nuclear triad and dual-capable aircraft with a diverse range of nuclear explosive yields and delivery methods.

The triad and DCA [Defense Contracting Agency] provide the credibility, flexibility, and survivability to meet and adapt to the challenges of a dynamic 21st Century security environment without the need to mirror every potential adversary system for system or yield for yield.

As the invite letter noted, deterring nuclear use in regional conflicts will be one of the challenges that we face for the foreseeable future. We must be able to deter not only large-scale nuclear attacks, the predominant focus during the Cold War, but also limited nuclear attack and deliberate nuclear escalation by an adversary that might arise out of a conventional regional conflict.

Our strategy for deterrence of a large-scale nuclear attack is well-established, so here I would like to touch on four important elements of a regional deterrence strategy aimed at minimizing the likelihood an adversary will choose nuclear escalation.

First, the United States extends nuclear deterrence to certain allies. These formal security arrangements are both a clear representation of our commitment to defend these allies and serve as a means to strengthen that commitment in the minds of both our allies and potential adversaries.

Second, we are working to ensure an appropriate level of integration between nuclear and conventional planning and operations for regional conflicts. Now, this type of integration does not mean lowering the threshold for United States nuclear use. Rather, integration means conventional operations must be planned and executed with deliberate thought as to how they shape the risk that the adversary will choose nuclear escalation. Similarly, nuclear planning needs to account for the possibility of ongoing U.S. and allied conventional operations.

The integration really means also that we must strengthen the resiliency of conventional operations to a nuclear attack along with being prepared to restore deterrence following any adversary nuclear use.

Third, effective regional deterrence requires a balanced approach to escalation risk that deters escalation, but also prepares for the possibility that deterrence might fail. We accept that plans should not assume that we can control escalation.

There is no doubt that Russia's purported doctrine of nuclear escalation to de-escalate a conventional conflict amounts to a reckless gamble for which the odds are incalculable and the outcome potentially catastrophic. Our plans are developed to try to avoid such an outcome, but we have to be prepared if Russia creates a conflict and drives it across that nuclear threshold.

If deterrence fails and nuclear use occurs, we do not want to simply assume that once the nuclear threshold has been crossed, that escalation cannot be limited. Possessing options for responding to limited use with nuclear and/or conventional means, and making clear we have these options, makes credible our message that escalating to de-escalate will ultimately be unsuccessful.

Finally, and as a result of the three previous points, we must sustain our diverse set of U.S. nuclear capabilities to be credible in ensuring we maintain regional deterrence and assurance, as well as the Cold War-era of deterrence.

The administration's nuclear sustainment and modernization plan sustains this broad set of capabilities and is necessary for sustaining effective deterrence. Our plans are affordable, if prioritized appropriately by the department, the Congress, and the Nation, and we seek your help to continuing this.

To be clear, as you noted from the Deputy Secretary, our choice is not between keeping our current forces or modernizing them. Rather, the choice is between modernizing these forces or watching a slow and unacceptable degradation in our capabilities, bringing on degradation in our ability to deter.

We in the department look forward to your continuing support in our collective efforts to ensure the United States is able to meet the security challenges we face today and those ahead. Thank you again for the opportunity to testify, and I look forward to your questions.

[The prepared statement of Secretary Robert Scher follows:]

PREPARED STATEMENT BY SECRETARY ROBERT SCHER

Chairman Sessions, Ranking Member Donnelly, and distinguished Members of the Subcommittee, thank you for the opportunity to testify on U.S. nuclear policy and strategy, and to frame the President's fiscal year (FY) 2017 budget request within the context of today's dynamic security environment. Your support for the nuclear sustainment and modernization plan it funds is essential to ensuring the effectiveness of our nuclear deterrent forces.

SECURITY ENVIRONMENT

Last week Secretary Carter identified five evolving security challenges that have driven the focus of the Defense Department's planning and budgeting this year. Each has a nuclear dimension that our policy and strategy must address.

Two of these challenges reflect a return to great power competition, in regions where we face nuclear-armed potential adversaries that can pose an existential threat to the United States and our allies. Russia has undertaken aggressive actions

in Crimea and elsewhere in Ukraine, and adopted a pattern of reckless nuclear posturing and coercive threats. Russia remains in violation of the Intermediate Nuclear Forces (INF) Treaty and remains unwilling to join us in discussing further reductions in strategic nuclear weapons below the limits of the New START Treaty.

China continues its rise in the Asia-Pacific, where we continue our rebalance to maintain regional stability. China continues to introduce qualitative advances into its nuclear capabilities. North Korea—a threat to both us and our allies—just conducted its fourth nuclear test and conducted a space launch. As we work to counter Iran's malign influence against our friends and allies in the Middle East, we must also prevent Iran from reversing course on its commitments under the nuclear deal. Finally, denying terrorists access to nuclear weapons and weapon-usable materials is an absolute imperative in the ongoing fight to defeat terrorism.

EFFECTIVE DETERRENCE

While his ultimate goal is a world without nuclear weapons, the President has been consistent and clear in his commitment to maintain a safe, secure, and effective nuclear arsenal for as long as nuclear weapons exist. The Department of Defense and the National Nuclear Security Administration (NNSA) work closely together to maintain the safety and security of our nuclear forces at the lowest levels possible while still retaining a full set of options to respond to and address the potential threats we face. I will focus today on the third of these elements—ensuring the effectiveness of our nuclear deterrent.

Effective deterrence means convincing any potential adversary that attacking the United States or its allies would bring risk that far outweighs any expected benefits of aggression. This requires that our nuclear capabilities and posture provide the ability to implement U.S. deterrence strategy, preserve the strategy's credibility, and reinforce strategic stability. Maintaining the ability to achieve the President's objectives if deterrence fails strengthens the credibility of our strategy.

Our approach to meeting the range of challenges we now face or might face in the future is to maintain a deterrent that is robust and stable, rather than one that is necessarily reactive to every action of potential adversaries. This remains best served by sustaining a full nuclear Triad and Dual-Capable Aircraft (DCA) with a diverse range of nuclear explosive yields and delivery modes. The Triad and DCA provide the credibility, flexibility, and survivability to meet and adapt to the challenges of a dynamic 21st Century security environment, without the need to mirror every potential adversary, system-for-system and yield-for-yield. Further, we believe we can meet current military requirements without developing new nuclear warheads or new military capabilities and we continue to manage our nuclear modernization consistent with those policy directives.

DETERRING NUCLEAR USE IN REGIONAL CONFLICTS

Deterring nuclear use in regional conflicts will remain one of those challenges for the foreseeable future. We must be able to deter not only large-scale nuclear attack, but also limited nuclear attack and deliberate nuclear escalation arising out of conventional regional conflict. I would like to touch on four important elements of a regional deterrence strategy aimed at minimizing the likelihood that an adversary will choose nuclear escalation. Together, these elements help convey that we won't let an adversary escalate its way to victory, split our alliances, achieve a favorable military situation, or coerce us out of protecting our vital interests.

First, we extend nuclear deterrence to certain allies. These formal security arrangements are both a representation of our commitment and, by explicitly putting U.S. credibility on the line, they are a means of strengthening that commitment in the minds of allies and potential adversaries.

Second, we are working to ensure an appropriate level of integration between nuclear and conventional planning and operations. This type of integration does not mean lowering the threshold for U.S. nuclear use, turning to nuclear weapons to further a conventional campaign, or increasing our reliance on nuclear weapons. Rather, integration means conventional operations must be planned and executed with deliberate thought as to how they shape the risk that the adversary will choose nuclear escalation. Similarly, nuclear planning needs to account for the possibility of ongoing U.S. and allied conventional operations. Integration also means strengthening the resiliency of conventional operations to nuclear attack. Conventional resiliency preserves Presidential flexibility in the face of limited nuclear use by providing the option of continuing the conventional fight even after the adversary chooses to escalate. We should not be in the position of forcing the President to choose between a nuclear-only response and a conventional-only response, allowing the adversary, not us, to dictate the means of the conflict. Finally, integration

means being prepared to restore deterrence following adversary nuclear use, so that failure to deter first use does not translate into failure to deter subsequent nuclear use.

Third, effective regional deterrence requires a balanced approach to escalation risk that deters escalation but also prepares for the possibility that deterrence might fail. We accept and convey the reality that no one can count on controlling escalation. Russia's purported doctrine of nuclear escalation to deescalate a conventional conflict amounts to reckless gamble for which the odds are incalculable and the outcome could prove catastrophic. Any resort to nuclear weapons would be the ultimate form of escalation. However, we have to be prepared if Russia creates a conflict and drives it across the nuclear threshold; we do not want to simply assume that once the nuclear threshold has been crossed that escalation cannot be limited. We are tasked with providing the President with credible options for responding to nuclear threats and nuclear aggression, including responding to limited nuclear use as noted, with nuclear and/or conventional means. Both aspects of this balanced approach are mutually reinforcing. Possessing a range of options for responding to limited use makes credible our message that escalating to deescalate is dangerous and will ultimately be unsuccessful.

Fourth, sustaining a diverse set of U.S. nuclear capabilities is essential for the role they play in regional deterrence and assurance. A strategy of relying on large-scale nuclear response is credible and effective for deterring large-scale nuclear attack, particularly against one's homeland, but it is far less credible in the context of limited adversary use, particularly against an ally or U.S. forces operating abroad. Retaining more diverse nuclear options gives us the ability to minimize collateral damage in the event the President determines that a nuclear response is required. This, however, does not mean a lower nuclear threshold or higher likelihood of U.S. nuclear use. Indeed, the United States has long maintained a high threshold for nuclear use together with a diverse range of nuclear forces and response options.

SUSTAINMENT AND MODERNIZATION PROGRAM

The Administration's nuclear sustainment and modernization plan is necessary for sustaining effective deterrence, and it is affordable if prioritized appropriately by the Department, the Congress, and the Nation. It is essential that Congress support the President's fiscal year 2017 budget request and Future Years Defense Program (FYDP) for nuclear weapon-related activities. Further delays to the program would put the safety, security, and effectiveness of our nuclear forces at significant and unacceptable risk.

To be clear, our choice is not between keeping or modernizing the current forces. Rather, the choice is between modernizing those forces or watching a slow and unacceptable degradation in our ability to deter.

Our systems have already been in use decades past their intended service lives. Delaying modernization and warhead life-extension would diminish the size and degrade the capabilities of our nuclear forces until they age out of service entirely. National security decisions and arms control agreements, rather than a failure to sustain and modernize, should determine the size and shape of our deterrent capabilities.

The fiscal year 2017 budget request funds warhead life extension and sustainment and recapitalization within the strategic submarine (SSBN) force, the intercontinental ballistic missile (ICBM) force, the strategic bomber force, and our DCA. This includes the B61–12 bomb Life-Extension Program (LEP), and development of a Long-Range Standoff missile (LRSO) to replace the aging Air-Launched Cruise Missile (ALCM). The B61–12 and LRSO are necessary to sustain existing military capabilities, not to provide new ones.

The President's approach to nuclear sustainment and modernization is consistent with his nonproliferation and disarmament objectives. The fiscal year 2017 budget request and FYDP support a program that sustains a safe, secure, and effective nuclear deterrent; reduces the numbers and types of weapons; retains leverage for future arms control agreements; and assures allies they don't need their own nuclear arsenals. The current nuclear stockpile is a dramatic departure from the Cold War, in terms of both numbers and types of weapons. The B61–12 LEP will go further by consolidating four existing bomb variants and allowing eventual retirement of the B83 strategic bomb, the last megaton-class weapon in the stockpile. We are retaining only those capabilities we need to sustain stable and effective deterrence.

We look forward to your continuing support in our collective efforts to ensure the U.S. is able to meet the security challenges we face today, and those ahead. Thank you again for the opportunity to testify. I look forward to your questions.

Senator SESSIONS. Thank you, Secretary Scher.

Dr. Arthur Hopkins is the Principal Deputy Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense Programs. He advises Under Secretary of Defense for Acquisition, Technology and Logistics in all manners across the nuclear, chemical, and biological defense portfolio.

He supports Under Secretary Kendall in his role as chairman of the Nuclear Weapons Council, which we hope continues to provide good leadership, and is, therefore, knowledgeable about the acquisition schedules for nuclear modernization programs in the Department of Defense.

Dr. Hopkins, thank you.

STATEMENT OF ARTHUR T. HOPKINS, Ph.D., ACTING PRINCIPAL DEPUTY ASSISTANT SECRETARY OF DEFENSE FOR NUCLEAR, CHEMICAL AND BIOLOGICAL DEFENSE PROGRAMS

Dr. HOPKINS. Chairman Sessions, Ranking Member Donnelly, and distinguished members of the subcommittee, thank you for this opportunity to discuss the department's 2017 budget request for nuclear deterrence systems.

In addition to serving as Principal Deputy Assistant for Nuclear, Chemical, and Biological Defense Programs, I am the acting staff director for the Nuclear Weapons Council. The council provides an overarching, coordinated vision and strategy for the nuclear enterprise, and it synchronizes the Departments of Defense and Energy efforts to ensure a safe, secure, reliable, and effective stockpile.

The Nation's nuclear forces are the department's highest priority. The nuclear mission continues to be fundamental to our Nation's security strategy, and it ensures that we maintain our extended deterrence commitments to our allies.

The council has developed a strategic plan to integrate all three components of the nuclear enterprise—warheads, platforms, and infrastructure. Portions of the plan are well underway, including production of the W76–1 refurbished warhead and the design engineering for the W88 warhead modernization—both of those are for the Navy's submarine launched ballistic missiles—as well as the B61–12 bomb life-extension for strategic missions and extended deterrence.

In fiscal year 2017, the National Nuclear Security Administration, NNSA, will continue to deliver W76–1 warheads for the Navy's Trident D5 missiles and will complete production in fiscal year 2019.

The W88 warhead alteration effort, also for the D5 missile, is on schedule to deliver the first production unit in December 2019.

The B61 bomb life-extension program is also on schedule to deliver a first production unit in March 2020. The B61–12 will enable a reduction in the total number and types of nuclear weapons in the stockpile.

Modernizing our nuclear delivery platforms is also essential to nuclear deterrence. In fiscal year 2017, the Defense Department plans to continue funding for several delivery systems: first, the *Ohio*-class submarine replacement and its Trident D5 life-extended missile; second, sustainment of the Minuteman III intercontinental ballistic missile and its follow-on capabilities, the ground-based

strategic deterrent; third, upgrades to the B–2 and B–52H heavy bombers; fourth, the development of a long-range strike bomber; and finally, the development of a long-range standoff cruise missile to replace the aging air-launched cruise missile.

The department will ensure alignment of cruise missile development with the associated nuclear warhead life-extension program, the W80–4, that is being executed by the Department of Energy.

With respect to the Nation's nuclear enterprise, the reviews conducted in 2014 identified a number of longstanding systemic issues that continue to be addressed. The department's fiscal year 2017 budget request includes significant resources for enterprise improvements.

The strategy also requires investment in the Department of Energy nuclear infrastructure. The department supports National Nuclear Security Administration efforts to achieve a responsive infrastructure for the future stockpile.

Our fiscal year 2017 budget request is critically important for sustaining and revitalizing the Nation's nuclear deterrent. We ask that you support both the Departments of Defense and Energy budget requests in this area.

My written testimony has more detail, and I ask that it be included in the record of this meeting. Thank you.

[The prepared statement of Dr. Hopkins follows:]

PREPARED STATEMENT BY DR. ARTHUR T. HOPKINS

Chairman Sessions, Ranking Member Donnelly, and distinguished members of the Subcommittee, thank you for the opportunity to testify before you today on the fiscal year (FY) 2017 budget request for nuclear forces. I am pleased to join Assistant Secretary Scher, Vice Admiral Benedict, and General Rand to discuss the Department of Defense's (DOD) number one mission: maintaining a safe, secure, and effective nuclear deterrent for as long as nuclear weapons exist.

As the Principal Deputy Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense Programs and the Nuclear Weapons Council (NWC) Staff Director, I work directly for the Under Secretary of Defense for Acquisition, Technology and Logistics (AT&L), and advise the Department's senior leadership on nuclear matters. The Under Secretary has a dual role in overseeing systems acquisition in the nuclear enterprise: leading the Department's efforts to acquire the strategic nuclear weapons delivery and command and control systems required to meet the operational needs of our Armed Forces, and leading the NWC to address life extension programs (LEPs) related to nuclear warhead sustainment and the aging nuclear infrastructure required for component and material production. The NWC is a joint DOD and Department of Energy (DOE)/National Nuclear Security Administration (NNSA) council established to facilitate cooperation and coordination, reach consensus, and institute priorities between the two departments as they fulfill their responsibilities for U.S. nuclear weapons stockpile management.

To ensure the continued credibility and reliability of our nuclear deterrent in an increasingly complicated and challenging world, it is essential that Congress support the President's fiscal year 2017 budget request for nuclear weapons-related activities. This budget request demonstrates the Department's commitment to strengthening and modernizing the nuclear Triad. Today, I will summarize the DOD and NWC perspectives on, and priorities for, warhead life extension, nuclear weapon delivery systems modernization and replacement, nuclear enterprise infrastructure modernization, stockpile sustainment, and the challenges we face today and tomorrow to ensure a safe, secure, effective, and reliable nuclear stockpile.

NUCLEAR ENTERPRISE CHALLENGES

The NWC convenes to ensure synchronization of the Departments' vision, strategies, and schedules of the nuclear enterprise programs. Specifically, the Council focuses its attention on nuclear enterprise challenges in four vital areas. First, we must maintain and strengthen our ability to extend the lives of aging warheads, as

the majority of today's nuclear weapons and delivery systems have surpassed their initial design life. This is accomplished through comprehensive component reuse, refurbishment, and replacement, while we ensure alignment with existing and future delivery systems (Table 1 summarizes the current and future nuclear weapons stockpile). Second, we must safeguard our ability to provide the rigorous science and engineering expertise required to assess the aging nuclear weapons stockpile, and certify the safety and effectiveness of that stockpile without underground nuclear testing. Third, we must remain steadfast in our commitment to sustain and modernize our aging infrastructure that provides materials, components, and testing facilities essential to our nuclear deterrent enterprise. Fourth, the DOD must address the challenges of sustaining and modernizing all parts of our nuclear force structure, and we must ensure that the Nation's nuclear weapons sustainment programs and delivery system modernization programs are funded and aligned.

Table 1.—The Current and Future Triad Composition

	ICBM	SLBM	Air-Leg
	Current		
Weapon System	W87 Warhead W78 Warhead	W76 Warhead W88 Warhead	B61 Bomb B83 Bomb W80–1 Warhead
Delivery System	Minuteman III	Trident II D5	B–2A B–52H F15/F16 ALCM [1]
	Future		
Weapon System	IW–1[2] IW–2 IW–3	IW–1 IW–2 IW–3	B61–12 Bomb W80–4 Warhead
Delivery System	GBSD[3]	D5 Follow-on	B–2A B–52H F–35 LRSB[4] LRSO[5]

[1] Air-Launched Cruise Missile
[2] Interoperable Warhead
[3] Ground-Based Strategic Deterrent
[4] Long Range Strike Bomber
[5] Long Range Standoff

DOD STOCKPILE REQUIREMENTS

The Administration envisions a future stockpile that is flexible and adaptable to technical and geopolitical changes, and to achieve this end has endorsed the 3+2 stockpile strategy. This strategy includes three interoperable nuclear explosive packages for ballistic missiles and two air-delivered warheads. Interoperability will reduce the number of different nuclear weapons systems that must be maintained and serviced, while providing sufficient diversity among deployed systems to guard against potential technical issues in the stockpile. The 3+2 strategy simultaneously addresses stockpile obsolescence and meets policy objectives of sustaining deterrence through a smaller stockpile with fewer weapon types, and a modernized, responsive nuclear infrastructure capable of addressing technological and geopolitical surprise.

To support the 3+2 strategy and revitalize the enterprise, in 2012 the NWC baselined a 25-year integrated schedule for the nuclear weapons stockpile—known as the NWC Strategic Plan. It aligns warhead life extension plans and infrastructure needs with delivery system modernization and replacement efforts. The NWC Strategic Plan integrates NNSA nuclear security enterprise requirements and plans with military requirements.

Budget realities have forced changes to the Strategic Plan since 2012. Specifically, the NWC endorsed deferrals to key warhead LEPs and infrastructure modernization milestones, delaying overall implementation of the 3+2 strategy. The Council delayed the Interoperable Warhead 1 (IW1) and initially the Long Range Standoff (LRSO) warhead schedules. For the B83–1 bomb, it adjusted the deployment re-

quirement. For the B61–12 bomb LEP, the NWC accepted a schedule delay due to the sequestration-related cuts in the fiscal year 2014 budget.

Plutonium pit production schedules and supporting plutonium infrastructure investments experienced significant delays due to shortfalls in the fiscal year 2013 and fiscal year 2015 congressional appropriations. The current Strategic Plan includes these and other adjustments. Changes include adding high explosive material replacement in the W88 submarine-launched ballistic missile (SLBM) warhead Alteration (ALT) 370; aligning the W80–4 LRSO missile warhead development schedule with the requirement for a fiscal year 2025 First Production Unit (FPU); and adding tritium production capability to the NWC Strategic Plan. The Council remains fully committed to ensuring the viability of each of the three legs of the nuclear Triad and revitalizing the nuclear enterprise.

DOD and NNSA are moving forward with several weapon systems LEPs to support the Nation's long-term deterrent capabilities. The SLBM-based W76–1 warhead and the B61–12 bomb for the air-delivery systems are the most urgent warhead life-extension needs in our stockpile, and the fiscal year 2017 President's budget request fully funds these LEPs. The W76–1 LEP is beyond the halfway mark and is on-schedule to complete production in fiscal year 2019. The B61–12 LEP, which includes the Air Force-provided Tailkit Assembly, is undergoing development engineering and remains on schedule and within budget to meet its March 2020 FPU. The Air Force has funded the tailkit development and production to synchronize with NNSA bomb assembly work. The B61–12 LEP consolidates four variants of the B61 bomb and improves the safety and security of the oldest nuclear weapon system in the U.S. arsenal. The B61–12 LEP will: 1) result in a nearly 50 percent reduction in the number of nuclear gravity bombs in the stockpile, 2) facilitate the removal from the stockpile of the last megaton-class weapon—the B83–1, 3) achieve an 80 percent reduction in the amount of special nuclear material in these bombs, and 4) implement the first step of the 3+2 strategy. These missions support both our deterrent and nonproliferation objectives as outlined in the 2010 Nuclear Posture Review.

The fiscal year 2017 budget also funds expanded work on sustaining our SLBM-based W88 warhead, which is undergoing development engineering to replace the aging arming, fuzing, and firing system, and refresh the conventional high explosive. That program is on schedule to achieve a December 2019 FPU. The IW1 will be the first of three ballistic missile warheads under the 3+2 strategy. A full feasibility study is planned for completion in the early 2020s.

The NWC also evaluated and selected the existing W80–1 warhead as the basis for the follow-on warhead for the Air-Launched Cruise Missile (ALCM) replacement, the LRSO cruise missile. The warhead LEP, designated as the W80–4, is now in the feasibility study and design options development phase. To synchronize the warhead and delivery system schedules, the W80–4 LEP and LRSO cruise missile acquisition communities continue to collaborate and align their concurrent development efforts. To that end, the W80–4 FPU is planned for 2025 with the first LRSO cruise missile to be delivered in 2026.

The greatest challenge for the NWC is to achieve and maintain the necessary resources for three critical areas. To allow continued certification and ensure our nuclear weapons remain safe, secure, and effective, we must be vigilant in sustaining and life-extending our stockpile and delivery systems; sustaining and modernizing our aging nuclear enterprise infrastructure; and preserving stockpile science and engineering. It is imperative that Congress support the full nuclear-related budget requests to ensure national security requirements continue to be met.

REVITALIZING THE NUCLEAR INFRASTRUCTURE

The 2010 Nuclear Posture Review stressed the importance of an NNSA infrastructure that can respond to technical challenges or geopolitical surprises and enable the consideration of stockpile reductions. The NWC focuses specifically on the plutonium, uranium, and tritium capabilities needed to support the current and future nuclear weapons stockpile as documented in the NWC's Strategic Plan. Our nuclear enterprise infrastructure challenges are two-fold: addressing aged, end-of-life facilities maintenance, recapitalization, and replacement, and working to achieve a more responsive infrastructure. The Department reinforces NNSA's need to develop responsive and productive plutonium and uranium capabilities, as well as the ability to produce tritium to meet planned stockpile needs.

STOCKPILE STEWARDSHIP

Science is paramount to the ability to sustain a safe, secure, reliable, and effective deterrent. The Stockpile Stewardship Program has ensured confidence in the reliability and effectiveness of the nuclear stockpile without nuclear weapons testing.

NNSA's Stockpile Stewardship Program, composed of research, development, testing, and evaluation (RDT&E) facilities and personnel, enables the surveillance and assessment of the stockpile condition by identifying anomalies, evaluating impacts of anomalies on warhead performance, and implementing solutions to anomalies. In general, RDT&E supports broader national security objectives by providing capabilities to avoid technological surprise and to have confidence in system performance. The NWC Strategic Plan relies on continued investments in research, development, design, and production capabilities.

DOD DELIVERY SYSTEM REQUIREMENTS

In accordance with the Nuclear Posture Review's guidance to maintain a Triad within the central limits of the New START Treaty with the Russian Federation, DOD has a robust plan for recapitalizing the ballistic missile submarines, intercontinental ballistic missiles (ICBMs), SLBMs, air-launched cruise missiles, and nuclear-capable heavy bombers that comprise our strategic nuclear deterrent. Our budget request is consistent with our plans to ensure that current nuclear delivery systems will be sustained, and that the modernization and replacement programs are executable and on schedule to avoid capability gaps. The fiscal year 2017 Request continues to fund: the *Ohio*-class replacement submarine and Trident II (D5) missile life extension; a follow-on capability to the Minuteman III ICBM—the Ground-Based Strategic Deterrent (GBSD); upgrades to the B–2A and B–52H heavy bombers as well as development of a new long range, penetrating bomber; and development of an LRSO cruise missile to replace the current ALCM.

The *Ohio* Replacement Program requires adequate resources and a stable, predictable funding profile to ensure on-time construction starts in fiscal year 2021 in order to meet the patrol need date of fiscal year 2031. There is no margin left in the *Ohio* replacement schedule. Delays would put at risk the most survivable leg of the Nation's nuclear Triad. The *Ohio* Replacement Program submarines will have a service life that enables patrols into the 2080s.

The Air Force has completed a GBSD Analysis of Alternatives to study the full range of options to recapitalize the land-based leg of the Triad beyond the extended service life of the Minuteman III ICBM. The fiscal year 2017 budget funds initial development work for the GBSD. The Air Force's fiscal year 2017 budget request also includes funding to continue the development of an affordable, long range, penetrating aircraft that incorporates proven technologies—the Long Range Strike Bomber. Additionally, the fiscal year 2017 budget contains funding for Block 4 of the F–35 program, which provides funds for follow-on capabilities for the F–35, including integration of a nuclear delivery capability for the F–35A. The F–35A Dual Capable Aircraft (DCA) will maintain a critical capability that is needed for nonstrategic nuclear missions in support of the Nation's extended deterrence and assurance commitments.

The Department's budget request is consistent with plans to ensure that current nuclear delivery systems can be sustained and that the modernization and replacement programs are executable and on schedule to avoid capability gaps. The modernization and replacement programs will require increased investment over current levels for much of the next 15 years. The Department is taking steps to control the costs of these efforts. However, even with success in this regard, we face budget decisions entering the 2020s to fund the necessary *Ohio*-class replacement and the Air Force strategic deterrent recapitalization programs. The fiscal year 2014 Secretary of Defense-directed Nuclear Enterprise and Strategic Portfolio Reviews and the Department's fiscal year 2017 budget formulation focused significant attention on recapitalization, sustainment, and modernization of our nuclear deterrent systems and infrastructure. The nuclear enterprise remains the Defense Department's highest priority, and the President's budget request for fiscal year 2017 reflects the Administration's emphasis on the nuclear enterprise.

In the near-term, we are making focused and sustained investments in modernization and manning across the nuclear enterprise. These investments are critical to ensure the continued safety, security, and effectiveness of our nuclear deterrent, as well as the long-term health of the force that supports our nuclear Triad. To help fund improvements across the nuclear enterprise, the DOD has requested an increase of approximately $200 million in fiscal year 2017 from fiscal year 2016 and approximately $10 billion more in the fiscal year 2017 Future Years Defense Program (FYDP) relative to the President's Budget in 2016 to ensure the continued health of this essential enterprise.

CONCLUSION

Budget constraints have forced the DOD to annually adjust its stockpile maintenance and infrastructure plans to fit within appropriated resources, and have caused the NWC to reevaluate priorities. These adjustments cause delays, reduce work scope, and extend development and production periods. We have reached a point where we have removed all flexibility from the nuclear weapons life extension and delivery system modernization programs. We must continue to field a strong nuclear deterrent that is supported by an agile and responsive infrastructure and valued workforce. The President's fiscal year 2017 budget request supports our nuclear posture strategy. It includes funding for sustaining and modernizing our nuclear forces to ensure a safe, secure, and effective deterrent for as long as nuclear weapons exist. The Department of Defense remains committed to maintaining its close and vital partnership with DOE and Congress in meeting the Nation's most fundamental security needs. In closing, I respectfully ask that you support the President's fiscal year 2017 nuclear forces' budget request.

Senator SESSIONS. Thank you, Dr. Hopkins.

Next, we have General Robin Rand. He is the Commander of the Air Force Global Strike Command. He is responsible for organizing, training, and equipping two legs of the triad, the intercontinental ballistic missile and strategic bomber forces.

General Rand, thank you.

STATEMENT OF GENERAL ROBIN RAND, USAF, COMMANDER, AIR FORCE GLOBAL STRIKE COMMAND

General RAND. Chairman Sessions, Ranking Member Donnelly, and distinguished members of the committee, thank you for allowing me to appear before you today to represent the men and women of Air Force Global Strike Command.

As you know, Air Force Global Strike Command was created to provide a focus on the stewardship and operations of two legs of our Nation's nuclear triad, while also accomplishing the conventional global strike mission.

I will tell you freely that our airmen are doing a fantastic job providing effective nuclear and conventional global strike forces for combatant commanders around the globe. The key to our continued success will be our ability to modernize, sustain, and recapitalize our forces.

Our mission set is always evolving and growing in order to ensure we continue to provide effective forces for these combatant commanders. Part of accomplishing this goal is to make sure we are right-sized with manpower and resources, and balancing those efforts with ongoing modernization and recapitalization programs.

Our airmen in the missile fields are accomplishing a critical mission for this Nation. They are operating, maintaining, and securing the most responsive leg of the nuclear triad.

However, we must continue efforts to modernize the Minuteman III weapons systems, where appropriate, until we can bring the ground-based strategic deterrent online. This is an absolutely critical national interest that will provide strategic deterrence and, if needed, global strike for years to come.

Our diverse bomber forces made up of the B–1, the B–2, and the B–52, deter our potential adversaries and ensure our allies across the globe. But when that is not enough, they execute a variety of missions, ranging from long-range global strike to close-air support in-country.

As you are aware, the B–1s have been departing the Central Command area of responsibility to help facilitate needed upgrades. These airmen have done an amazing job for many years, and I am proud of each and every one of them.

Air Force Global Strike Command stands ready to support any combatant commander with our capable platforms to ensure there is no gap in requirements coverage. Therefore, I have directed our B–52 wings to be prepared to backfill the B–1s later this spring, should they be asked to do so.

I am aware that one of the big reasons I am here today is to answer any questions on the command's progress in addressing the nuclear enterprise review findings. We have closed over 300 action items that complement the ongoing nuclear enterprise review efforts. We have reinvigorated the ICBM operations and are effecting positive cultural change throughout the community. We have also overhauled the bomber program, the B–52 training, and streamlined other aircrew programs.

Additionally, Air Force Global Strike Command has been declared the lead command for Nuclear Command and Control Communications, or NC3, systems throughout the Air Force. To recognize the absolute criticality of these systems, NC3 has been declared a weapons system, which means it is tracked, sustained, and modernized just like the rest of our weapons systems in the Air Force.

But let me be clear, we are not done. Cultural change is not something that you can just flip a switch on. We must continue to foster a culture where we are not afraid to question how things are done.

Innovative airmen should have a way to push their ideas to the top, and I will not lose sight of how far we have come, but also that we can never stop working to be better.

Mr. Chairman, I want to thank you again for the opportunity to appear before the committee to highlight the great airmen of Air Force Global Strike Command. I look forward to your questions, and with your permission, I would like to have my written testimony entered into the record.

[The prepared statement of General Rand follows:]

PREPARED STATEMENT BY GENERAL ROBIN RAND, COMMANDER

INTRODUCTION

Chairman Sessions, Ranking Member Donnelly, and distinguished Members of the Committee; thank you for allowing me to represent the over 31,000 Air Force Global Strike Command (AFGSC) Airmen. This is my first opportunity to appear before this committee and I look forward to updating you on what the Command has accomplished and where we are going.

AIR FORCE GLOBAL STRIKE COMMAND MISSION

As you know, the Command was created to provide a focus on the stewardship and operation of two legs of our Nation's nuclear triad while also accomplishing the conventional global strike mission. We live in a world that continues to rapidly change and until we have the peace and security of a world without nuclear weapons we must never forget the stabilizing influence the triad has on our allies, partners, and adversaries. The nuclear mission remains our top priority, however we must not discount the important work our airmen do conventionally. In fact, this past year AFGSC assumed command of the B–1B mission, bringing all Air Force bombers under one command. In order for us to be effective across the spectrum of

conflict from day-to-day deterrence and assurance operations to nuclear engagement, our airmen must be ready and equipped with the right tools to do the job. Continuing in the proud heritage of Strategic Air Command, yet tailored for today's evolving world, AFGSC's mission is: "Airmen providing strategic deterrence, global strike and combat support . . . anytime, anywhere!"

The Command's top priority is to ensure our nuclear arsenal is safe, secure, and effective. This priority underlies every nuclear-related activity in AFGSC whether it is the maintainer turning wrenches or our planners working on future weapon systems. We must never fail in the special trust and confidence the American people have bestowed on our nuclear warriors. It means that leaders must continue to support and advocate for the sustainment and modernization of these weapon systems.

Our conventional bomber forces defend our national interests by deterring or, should deterrence fail, defeating an adversary; they also assure our allies and partners around the globe. Two capabilities are fundamental to the success of our bomber forces: our ability to hold heavily defended targets at risk and our ability to apply persistent combat power across the spectrum of conflict anywhere on the globe at any time. The United States' fleet of heavy bombers provides the Nation a visible global warfighting capability that is essential to the credibility of America's national security strategy. These bombers carry our latest high-tech munitions in quantities to ensure the Air Force can meet our Nation's global responsibilities, and therefore are in high-demand by the regional combatant commanders.

AIR FORCE GLOBAL STRIKE COMMAND FORCES

Intercontinental Ballistic Missile Forces

Twentieth Air Force (20 AF), one of two Numbered Air Forces in AFGSC, is responsible for the Minuteman III (MM III) Intercontinental Ballistic Missile (ICBM) and UH–1N helicopter forces. The 450 dispersed and hardened missile silos maintain strategic stability by presenting potential adversaries a near insurmountable obstacle should they consider a disarming attack on the United States. Currently, no potential adversary can hope to destroy this force without depleting its own arsenal. Every day airmen deploy to our three missile fields, executing strategic deterrence and assurance operations, while standing ready to execute if called upon. They accomplish this mission in a challenging environment and on a massive scale; our missile crews, maintenance teams, security forces personnel, and others who support this mission traveled over 17.9 million miles last year alone. This is a unique and critical mission area that deserves our attention. As part of the Air Force's efforts to improve the nuclear enterprise, 20 AF assumed stewardship of the 377th Air Base Wing at Kirtland AFB. As part of that transfer, the Kirtland Underground Munitions Maintenance and Storage Complex now falls under 20 AF and AFGSC thereby bringing a critical mission set under a nuclear focused command.

Minuteman III

We continue to sustain and modernize the Minuteman III ICBM. This includes upgrading the command, control, and communications systems and support equipment. We continue moving forward on the Transporter Erector (TE) Replacement Program (TERP) and the Payload Transporter (PT) Replacement (PTR) to modernize our existing fleet of large maintenance vehicles utilized to transport missile components to and from the field. We currently expect TERP to reach initial operational capability (IOC) in fiscal year 2018 and PTR to begin production in fiscal year 2017.

We are also equipping ICBM launch control centers (LCC) with modernized communications systems that will upgrade or replace aging and obsolete systems. The LCC Block Upgrade, expected to begin deployment in 2020, is an overall modification effort that replaces multiple LCC components to include a modern data storage replacement for floppy disks and new Voice Control Panels to provide higher fidelity voice communications. We continue to push forward on improving Remote Visual Assessment at our remote LFs, a significant security upgrade, to improve situational awareness and security. We expect this program to be IOC in fiscal year 2019. Another very important program, ICBM Cryptographic Upgrade II, is scheduled to begin production in fiscal year 2017 and will improve our cryptographic security while dramatically streamlining code change operations.

We conducted four successful MM III flight tests in fiscal year 2015 that, along with one Simulated Electronic Launch Minuteman test in the operational environment, demonstrate the operational credibility of the nuclear deterrent force and the AF's commitment to sustaining that capability. Operational flight testing is currently funded and planned for four operational test launches in fiscal year 2016 to satisfy requirements outlined by United States Strategic Command (USSTRATCOM) and the National Nuclear Security Administration (NNSA). In

fact, we have already launched one of those and expect to launch the next two this month.

Ground Based Strategic Deterrent

The Minuteman flight system, currently on its third model, has been on continuous alert since the early 1960s and has proven its value in deterring our adversaries and assuring our allies well beyond the platform's initial 10-year lifespan. ICBM capability gaps were identified and validated by the Joint Requirements Oversight Council, and subsequently approved in August 2012 by the Air Force Chief of Staff, resulting in an Analysis of Alternatives (AoA). The AoA was completed in 2014 and concluded that an integrated replacement to the MM III weapon system was the most cost-effective approach to filling capability gaps. Office of the Secretary of Defense (OSD) Cost Assessment and Program Evaluation (CAPE) reviewed the AoA report and validated it as "sufficient to support a Milestone A decision and initiate a program of record." SAF/AQ approved the Ground Based Strategic Deterrent (GBSD) Acquisition Strategy in December of last year and directed the program to proceed to the Milestone A Defense Acquisition Board. Additionally, we are engaged with our Navy partners to further investigate areas for intelligent commonality between potential GBSD systems and future Navy weapons. We hope to find areas of overlap with the objective of reducing design, development, manufacturing, logistics support, production, and testing costs for the Nation's strategic systems while still acknowledging that the different weapon systems will have some requirements that necessitate unique solutions due to their differing missions. We are also collaborating with the NNSA to develop a life extension program for our aging W78 nuclear warhead, which will operate on both MMIII and GBSD.

Due to system age-out, the first priority is to replace the missile itself. However, command and control (C2) and infrastructure recapitalization is necessary to continue safe, secure, and effective operations. It is no small task to upgrade the command and control systems along with the underlying infrastructure that supports the weapon system. For example, at our largest missile field operated by the 341st Missile Wing, we must connect and support hardened systems across almost 14,000 square miles, an area the size of Maryland. This vital nuclear command and control is currently serviced by buried copper wire and equipment installed in the 1960s. AFGSC is defining approaches to upgrade C2 and modernize necessary facilities. GBSD cannot be viewed as just another life extension to our existing MMIII; it is time to field a replacement ground-based capability that will continue to assure our allies and deter potential adversaries well into the future. Thank you for your continued support of GBSD ensuring it will lead to a viable replacement for the MM III ICBM.

UH–1N

AFGSC is the lead command for the Air Force's fleet of 62 UH–1N helicopters. The majority of these aircraft support two critical national missions: nuclear security in support of the ICBM force and the Continuity of Operations and transport missions in the National Capital Region. They also actively participate in the Defense Support of Civil Authorities program often being called to help with search and rescue activities.

The UH–1N does not meet the missile field needs for range, speed, and capacity as outlined by DOD and USSTRATCOM requirements. We will continue to work to mitigate some of these requirement gaps through various measures such as arming the UH–1N and providing re-fueling stations throughout the missile complex. However, there are certain requirements we are unable to mitigate and I am happy to discuss that further in a classified environment.

UH–1N Follow On

While we can, to some extent, mitigate the UH–1N's deficiencies in range, speed, and payload, no amount of modification to this 1960s platform will close these critical capability gaps entirely. Recognizing that we cannot modify our UH–1Ns to resolve the capability gaps, we are dedicated to replacing the aircraft with a medium lift helicopter capable of meeting mission requirements. The UH–1N Replacement Program was funded in fiscal year 2016 and we are now moving out to deliver this capability and closing this critical gap. This past January, the Air Force conducted a High Power Team which confirmed our most critical capability requirements. Our counterparts in SAF/AQ and Air Force Materiel Command (AFMC) are evaluating acquisition approaches that focus on expediting the fielding of replacement helicopters for the nuclear convoy escort and missile field support missions. While we work to deliver the aircraft, we must also work through support challenges such as infrastructure, maintenance, and aircrew training. I can assure you that Secretary

James, our Chief, General Welsh and I are completely dedicated to delivering the replacement helicopters as soon as possible.

Bomber Forces

Eighth Air Force is responsible for the B–52H Stratofortress (B–52), the B–2A Spirit (B–2), and most recently the B–1B Lancer (B–1) bombers. This includes maintaining the operational readiness of the dual-capable bombers' nuclear and conventional missions. The B–52 is an extremely versatile weapon system providing precision, large payload, and timely global strike capabilities both conventional and nuclear. Complementing the B–52, the B–2 can penetrate an adversary's most advanced Integrated Air Defenses Systems to strike heavily defended and hardened targets. Our flexible dual-capable bomber fleet is the most visible leg of the nuclear triad. They provide decision makers the ability to demonstrate resolve through generation, dispersal, or deployment. Our ability to rapidly place bomber sorties on alert ensures their continued survival in support of the President and to meet combatant command requirements. The B–1 is an incredibly potent weapon system that has been in high demand by combatant commanders due to its wartime capabilities and mission flexibility as steadily demonstrated in conflicts since 2001.

Global Assurance and Deterrence

Continuous Bomber Presence (CBP), initiated in 2003, increases regional stability and assures our allies and partners in the United States Pacific Command (USPACOM) area of responsibility (AOR). We have taken steps to increase continuity of operations and maintenance by establishing a detachment at Andersen Air Force Base, Guam. While CBP is seen as a strong signal to our allies of our commitment to the region, it impacts AFGSC personnel and resources. Sustaining a long-term presence in USPACOM introduces stress in other areas as our bomber force is requested by other combatant commanders. Complementary to CBP, our bombers exercise with every combatant command and every joint partner annually through the Bomber Assurance and Deterrence program. These visible exercises take place all over the globe are a continuous reminder to allies and potential adversaries of our Nation's global reach.

B–1

The B–1 is a highly versatile, multi-mission weapon system that carries the largest payload of both guided and unguided weapons in the Air Force inventory. It can rapidly deliver large quantities of precision and non-precision weapons in support of combatant commanders around the globe.

The B–1's synthetic aperture radar is capable of finding, tracking, and targeting moving vehicles as well as having terrain-following modes and air-to-air situational awareness. The SNIPER–SE pod provides additional capability to engage fixed or moving targets. In addition, an extremely accurate Global Positioning System-aided Inertial Navigation System enables aircrews to navigate without the aid of ground-based navigation aids as well as strike targets with a high level of precision. The Digital Communications Initiative (DCI) modification to the radios provides a secure beyond line of sight satellite connection into the Line of Sight Link-16 network. In a time sensitive targeting environment, the aircrew can use targeting data over DCI, then strike emerging targets rapidly and efficiently. This capability was effectively demonstrated during operations Enduring Freedom, Iraqi Freedom, and Inherent Resolve.

The B–1 will be in demand for many more years and avionics and weapon upgrades are critical for it to remain a viable combatant commander tool. The Integrated Battle Station (IBS)/Software Block-16 (SB–16) upgrade, the largest ever B–1 modification, includes an upgraded Central Integrated Test System (CITS), Fully Integrated Data Link (FIDL), Vertical Situation Display Upgrade (VSDU), and a simulator upgrade. This marks a fantastic capability upgrade and the associated cockpit upgrades providing the crew with a much more flexible, integrated cockpit. In fact, the first 15 IBS-modified aircraft have been delivered, fully equipping an entire bomb squadron with these upgraded capabilities.

Our B–1 aircrews have been heavily engaged in combat operations; since September 11, 2001, they have flown well over 14,000 combat missions. As you may have heard already, the B–1s have begun departing the United States Central Command (USCENTCOM) AOR to help facilitate needed upgrades. This is a much needed respite to ensure the aircrews and aircraft are ready to support combatant commanders. However, AFGSC stands ready to support any combatant commander with our other capable platforms to ensure no gap in combatant command requirements. For instance, the B–52 can very capably step back into a role it has filled in the past in the USCENTCOM AOR; its large payload of precision weapons will meet combatant commander needs in theater, and our crews constantly train to ensure

they are combat ready should they get the call. In the event of a bomber-capable "Request for Forces" by USCENTCOM, I've directed our two B–52 wings to be ready and prepared to backfill the B–1s later this spring.

B–52

The B–52 may be the most universally recognized symbol of American airpower . . . its contributions to our national security through the Cold War, Vietnam, Desert Storm, Allied Force, Iraqi Freedom and Enduring Freedom are well documented. Our airmen have worked tirelessly to keep the venerable B–52 mission capable. The B–52 is able to deliver the widest variety of nuclear and conventional weapons. This past year, we maintained complete coverage of our Nuclear Deterrence Operations requirements while supporting our overseas CBP for Pacific Command.

I anticipate the B–52 will remain a key element of our bomber force beyond 2040; it is paramount that we invest resources into this aircraft now to keep it viable in both conventional and nuclear mission areas for the next 30 years. Our B–52s are still using 1960s radar technology with the last major radar upgrade done in the early 1980s. Currently, the mean time between failure rate on the B–52 radar is 46 hours. The current radar on the B–52 will be even less effective in the future threat environment, and without an improved radar system on the B–52, there will be increased degradation in mission effectiveness. In order to remedy this, the B–52 Radar Modernization Program is approaching the conclusion of a Cost Capability Analysis Study and will be working toward an AoA sufficiency review in early Spring this year. Additionally, we are always looking at cost-effective ways to improve efficiency and performance of this important bomber.

Finally, I want to point out that we are still in work to convert 30 operational B–52 aircraft and 12 in storage to conventional-only configurations. We are on track to meet our New START Treaty requirements.

B–2

For over 25 years, our 20 B–2s have provided the Nation with an assured penetrating bomber capability. In each of our Nation's last four conflicts, the B–2 has led the way. This is a direct result of the outstanding airmen who work to operate, maintain, and secure the aircraft. The B–2 is able to penetrate enemy defenses and deliver a wide variety of nuclear and conventional weapons due to its long-range and stealth capability.

We will preserve and improve the B–2's capability to penetrate hostile airspace and hold any target at risk without subjecting the crew and aircraft to threats. We are striving to maintain the proper balance of fleet sustainment efforts, testing, aircrew training, and combat readiness. The dynamics of a small fleet continue to challenge our sustainment efforts primarily due to vanishing vendors and diminishing sources of supply. AFMC is working to ensure timely parts availability; however, many manufacturers do not see a strong business case in supplying parts for a small aircraft fleet. Problems with a single part can have a significant readiness impact on a small fleet that lacks the flexibility of a large force to absorb parts shortages and logistics delays.

Long Range Strike Bomber

The combat edge of our B–2 is being challenged by next generation air defenses and the proliferation of these advanced systems. The Long Range Strike Bomber (LRS–B) program will extend American air dominance against next generation capabilities and advanced air defense environments. We continue to work closely with partners throughout the Air Force to develop the LRS–B and field a fleet of new dual-capable bombers; scheduled to become operational in the mid-2020s. Make no mistake—the LRS–B will be a nuclear bomber. However, the platform will not be delayed for use in a conventional capacity while it undergoes final nuclear certification. The LRS–B is being designed with an open architecture which will allow us to integrate new technology and respond to future threats for many years into the future. Thank you for your continued support for this critical program as it moves forward.

Air Launched Cruise Missile

The AGM–86B Air Launched Cruise Missile (ALCM) is an air-to-ground, winged, subsonic nuclear missile delivered by the B–52. It was fielded in the 1980s and is well beyond its originally designed 10-year service life. To ensure the USAF maintains its credible stand-off nuclear capability, the ALCM requires Service Life Extension Programs (SLEP). These SLEPs require ongoing support and attention to ensure the ALCM will remain viable through 2030. Despite its age, last year we successfully conducted eight flight test evaluations and have 7 planned during fiscal

year 2016. Additionally, AFGSC continues to maintain the conventional variant (CALCM) to ensure it continues to provide conventional stand-off strike capability.

Long Range Stand-Off Missile

The LRSO is the replacement for the aging ALCM. The ALCM has significant capability gaps that will only worsen through the next decade. The LRSO will be a reliable, flexible, long-ranging, and survivable weapon system to complement the nuclear Triad. The LRSO missile will ensure the bomber force (B–52, B–2 and LRS–B) can continue to hold high value targets at risk in an evolving threat environment, to include targets within an area denial environment. I cannot overemphasize this point: LRS–B without LRSO greatly reduces our ability to hold adversaries at risk and to execute the mission. The LRSO will be compatible with the B–52, B–2, and the LRS–B platforms and we currently expect it to reach Milestone A this fiscal year. Additionally, we are synchronizing our efforts with NNSA to develop the W80–4 warhead to be fully integrated with LRSO.

B61

The B61–12 Life Extension Program (LEP) will result in a smaller stockpile, reduced special nuclear material in the inventory, and improved B61 surety. AFGSC is the lead command for the B61–12 Tail Kit Assembly program, which is needed to meet USSTRATCOM requirements on the B–2. The B61–12 Tail Kit Assembly program is in the Engineering and Manufacturing Development Phase 1 and is synchronized with NNSA efforts. The design and production processes are on schedule and within budget to meet the planned fiscal year 2020 First Production Unit date for the B61–12 Tail Kit Assembly, and support the lead time required for the March 2020 B61–12 all-up round. This joint Department of Defense and Department of Energy endeavor allows for continued attainment of our strategic requirements and regional commitments.

GBU–57

AFGSC assumed responsibility as the lead MAJCOM for the GBU–57 Massive Ordnance Penetrator (MOP) in the Summer of 2015. The MOP is a 30,000-pound guided conventional bomb designed to defeat hardened and deeply buried targets and is exclusively employed from the B–2. The MOP was initially designed as a Quick Reaction Capability following a USCENTCOM Urgent Operational Need. Since then it has received several upgrades and enhancements based on warfighter requirements. AFGSC, USCENTCOM, and AFLCMC (MOP Program Office) are currently conducting two more enhancements to increase weapon effectiveness.

SECURITY

Nuclear security is a key function of the Command's mission. A major AFGSC initiative to ensure security continues to be the new Weapon Storage Facilities (WSF) which will consolidate nuclear maintenance, inspection, and storage. We have put forward a $1.3 billion program ($521 million across the FYDP) to replace all deficient buildings across our aging 1960's-era Weapon Storage Areas with a single modern and secure facility at each of our bases. This initiative eliminates security, design, and safety deficiencies and improves our maintenance processes. We included $95 million in funding for the WSF at F. E. Warren AFB, WY, in the last year's budget and the MILCON for the remaining facilities in future years. These facilities are needed to meet requirements for a safe, secure, and effective nuclear arsenal.

NUCLEAR COMMAND, CONTROL, AND COMMUNICATIONS

The ability to receive Presidential orders and convert those orders into action for the required weapon system is both critical to performing the nuclear mission and foundational to an effective credible strategic deterrent. The Air Force took an important step this year by declaring Nuclear Command, Control, and Communications (NC3) a weapon system which recognizes the absolute importance of these systems that ensure proper nuclear command and control. Declaring NC3 a weapon system is no small matter; it begins a process to manage this new weapon system's training, resources, and sustainment just like all other weapons systems in the AF. AFGSC is the lead command for National Leadership Command Control (NLCC)/NC3 which establishes one focal point for the weapon system. Since these systems are spread across the Government, there are multiple working groups at all levels to ensure open communications. In fact, I chair the Air Force NLCC/NC3 Council where we bring together MAJCOM commanders to prioritize resources and resolve any outstanding issues. I think it is also important to highlight the hard work Air Force Nuclear Weapons Center (AFNWC) and AFMC have put into this effort to

support not only the systems but AFGSC as a whole. As I will discuss later, we are codifying these relationships to establish clear lines of authority and responsibility which will only improve NC3 sustainment and modernization.

AFGSC has made tremendous gains in efforts to modernize our communications and cyberspace infrastructure by leveraging technology to make our forces more capable and effective. In our ICBM missile fields, the copper cabling that transport voice and data between the main base and the Missile Alert Facilities (MAFs) in some cases dates back to 1960s technology and equipment. We have undertaken a major modernization initiative to replace old cabling with modern technology that will realize over a 15-fold increase in data capability and improve missile field command and control with unclassified and classified networking, wireless networking, and secure digital voice to the MAFs. These are important upgrades but they still do not replace the buried copper nuclear command and control lines. We are also addressing mission assurance for our main bases and have begun to look at issues of bandwidth allocation and the routing of long-haul telecommunications circuits into our installations to best guarantee continuity of service.

Ultimately, we have taken seriously our charge with sustaining and modernizing the NC3 weapon system. In fact, through the Nuclear Enterprise Review process we identified multiple areas that have atrophied through decades of low prioritization. To remedy that, we have advocated for funds such as $16 million to improve long-haul communications, $8 million in telephony upgrades, and $2 million in radio upgrades. These are just examples of the things we have been able to accomplish with the support of those inside and outside the DOD. Thank you very much for your continued interest and support in NC3; we are in agreement on what needs to be done in the future and I look forward to continuing our efforts.

NUCLEAR ENTERPRISE REVIEW

As this committee is well aware, the Air Force and this command have undertaken momentous shifts to support our number one priority. Our airmen are beginning to see resourcing balanced against mission requirements. They see mid-career leaders mentoring those below them, educating them on the importance of their missions. They see their most senior leaders in the Administration, in the Department, and here in Congress acting on their behalf.

I will lay out a number of accomplishments that have been possible thanks to the support of leadership in all branches of government, the DOD, and the Air Force. But first I would like to recognize the hard work and leadership of my predecessor, Lieutenant General Stephen Wilson; he embraced the challenge and AFGSC is better for it. I sit before you today as the first 4-star commander of AFGSC and the AF now has a 3-star as the Deputy Chief of Staff for Strategic Deterrence and Nuclear Integration. This recognizes the importance of the nuclear enterprise within the Air Force and elevates our advocacy. Additionally, as part of the Nuclear Enterprise Review (NER) we found we needed to link all the disparate nuclear activities within the AF into a more synchronized and focused structure to provide direction and support for our nuclear forces. The Secretary of the Air Force and Chief of Staff directed the AFGSC Commander be the single face for the AF for "all things nuclear". We are currently in the process of implementing that guidance which will culminate with AFGSC as the lead command for the nuclear deterrent operations mission and the AFNWC restructuring to provide "direct support" to AFGSC for all material elements of the nuclear enterprise.

We are shifting our security forces members from PRP to the Arming and Use of Force (AUoF) standards. This maintains the high standards required in our business while reducing the administrative workload driven by maintaining two overlapping reliability programs. This ensures our security forces members across the Air Force are held to the same standard and improves mobility between bases. Additionally, we have improved the equipment and uniforms of our missile field defenders through our Model Defender program.

Across the maintenance, operations, and security forces career fields we have implemented the Assignment Incentive Pay (AIP) which reflects the incredible responsibility placed on our nuclear airmen's shoulders. For our enlisted members in critical career fields we have implemented the Special Duty Assignment Pay (SDAP). AIP and SDAP are but a small way we recognize the hard work our airmen accomplish in this demanding and ever-important field.

For our ICBM operations, we have implemented a number of changes. Among them is re-imagining the crew construct altogether. We have revamped training to remove the blurring of lines between training and evaluating; implementing reforms to increase the proficiency of our missile crews. We have also changed how the crew tour works. Previously, most crew members would spend four years at their missile

base, progress through the different leadership positions, and then move on to another assignment. Instead we are moving to a "3+3" concept where a crewmember will spend the first three years as a deputy and commander becoming an expert on the weapon system. Most of the crew force will then move to another ICBM base where they will fill instructor, evaluator, and flight commander roles; for those who do not move, they will fill those same roles at their current duty station.

We have been implementing changes for our bomber forces, as well. For instance, we have completely overhauled B–52 initial and mission qualification training and are advancing B–52 simulator upgrade timelines to better support nuclear mission training. Additionally, we have developed up our Striker Vista program to advance integration between bomber platforms through the transfer of personnel between wings. This is not a new concept to the AF but it is something new to our bomber forces.

These are just some of the fundamental changes we have implemented in conjunction with the Nuclear Enterprise Review findings. I could list literally hundreds of individual initiatives, most of which have been completed, that cut across the nuclear mission from standing up an independent helicopter group, to significant manpower plus-ups, to new vehicles and equipment, to organizational changes to address long-standing needs. However, more importantly you should know that we are not done. I truly believe we can never return to the previous way of doing things; instead we must always look to the future and always have open minds. Since the NER reports, we have accomplished bottom-up reviews of our bomber forces, airborne launch operations, and the headquarters itself. Most recently, I tasked a team to conduct a review of our convoy operations to ensure we are accomplishing this absolutely critical mission area the best way possible. We are building a culture that embraces innovation and change.

2016 PRIORITIES

In fiscal year 2015, AFGSC took a deliberate approach with planning and executing its mission. Through the successful execution of new initiatives, AFGSC was able to earn an additional $214 million from initial distribution used to fund NC3, manpower, readiness requirements, and Nuclear Force Improvement Program initiatives. But we have more work to do and we will move forward in the context of my priorities.

My priorities are relatively simple and they inform every decision I make. They are mission, airmen, families all built on heritage and core values. We exist to serve the Nation by providing strategic deterrence and global strike. However, without our great airmen we could never hope to be as successful as we are. In my visits to our units, I am always humbled by the dedication of your Global Strike warriors and their unfailing drive to do their best. I truly believe that while we may recruit airmen, we retain families. To me that means we cannot forget the loved ones who stay behind while our airmen deploy whether it is overseas or to a missile field. It means supporting the families who back up our airmen who work long hours ensuring our bases are secure. It means recognizing that no matter the job an airman is doing, we must never lose sight of the family who makes it all possible.

I mentioned that Heritage and Core Values are the foundation of the priorities I just listed. I think we learn from our history but we are inspired by our Heritage. AFGSC and the Air Force as a whole have a proud heritage. Eighth Air Force has a proud history dating back to the European theater in World War II while Twentieth Air Force did great things in the Pacific theater. Our airmen should understand and embrace this heritage. Lastly, our Core Values of "Integrity First, Service Before Self, and Excellence in All We Do" should underpin every decision we make each and every day. Without these values we sacrifice who we are and then nothing else matters.

CONCLUSION

Thank you for your continued support of Air Force Global Strike Command and our strategic deterrent and global strike missions. The President's 2015 National Security Strategy is clear: "As long as nuclear weapons exist, the United States must invest the resources necessary to maintain—without testing—a safe, secure, and effective nuclear deterrent that preserves strategic stability." Fiscal constraints, while posing planning challenges, do not alter the national security landscape or the intent of competitors and adversaries, nor do they diminish the enduring value of long range, strategic forces to our Nation.

Although we account for less than one percent of the DOD budget, AFGSC forces represent two-thirds of the Nation's nuclear triad and play a critical role in ensuring U.S. national security, while also providing joint commanders rapid global combat

airpower. AFGSC will continue to seek innovative, cost-saving measures to ensure our weapon systems are operating as efficiently as possible. Modernization, however, is mandatory. AFGSC is operating B–52s built in the 1960s with equipment designed in the 1950s; operating ICBMs with 1960s infrastructure; and utilizing 1960s era weapon storage areas. We cannot afford to delay modernization initiatives across the two legs of the Nation's nuclear triad and the NC3 systems which connect our capabilities to the President.

I would like to take this opportunity to thank the Congress for your ongoing support of the nuclear enterprise. Your support does not go unnoticed and is absolutely critical to ensuring AFGSC provides the nuclear and conventional capabilities this Nation deserves. It is my privilege to lead this elite team empowered with special trust and responsibility. It is truly an honor to be a Wingman to the outstanding airmen who make up Air Force Global Strike Command.

Senator SESSIONS. It will be made a part of the record, and thank you.

Vice Admiral Terry Benedict has been the director of the Navy's Strategic Systems Program since 2010. I think that is a good tenure already.

We appreciate your service, and I do think, in these kinds of programs, it is beneficial if you can have a longer tenure.

Would you agree?

Admiral BENEDICT. Yes, sir.

Senator SESSIONS. These are complex systems, and I think a little longer tenure is probably helpful.

In this capacity, you have been responsible for the development, acquisition, and training of the nuclear weapons systems carried aboard our strategic ballistic missile submarines, the underwater leg of our nuclear triad, and perhaps the most secure leg of our triad.

Admiral Benedict, we would be pleased to hear from you.

STATEMENT OF VICE ADMIRAL TERRY J. BENEDICT, USN, DIRECTOR, STRATEGIC SYSTEMS PROGRAMS

Admiral BENEDICT. Chairman Sessions, Ranking Member Donnelly, distinguished members of the committee, thank you for the opportunity to testify before the Subcommittee on Strategic Forces.

Today, I represent the men and women of your Navy's Strategic Systems Programs, or SSP. Your continued support of our deterrence mission is appreciated, and all of us thank you.

My mission as the director of SSP is to design, develop, produce, support, and ensure the safety and security of our Navy's sea-based strategic deterrent capability, the Trident II D5 strategic weapons system.

My written statement, which I respectfully request be submitted for the record, addresses my top priorities. Due to time constraints, I would like to briefly address three priorities today, nuclear weapons safety and security, the Trident II D5 life-extension efforts, and collaboration with the Air Force on weapon system commonality.

First, my top priority is the safety and the security of the Navy's nuclear weapons. Custody and accountability of the nuclear assets entrusted to the Navy are the cornerstone of this program. Our approach to the nuclear weapons mission is to maintain a culture of excellence and self-assessment, one that produces the highest standards of performance and integrity.

Second, the Navy is proactively taking steps to address aging and technology obsolescence. SSP is extending the life of the Tri-

dent II D5 strategic weapons system to match the *Ohio*-class submarine service life and to serve as the initial baseline mission payload for the *Ohio* replacement submarine platform. This is being accomplished through a life-extension program for all of the Trident II D5 strategic weapon systems subsystems to include launcher, navigation, fire control, guidance missile, and reentry.

In November 2015, the USS *Kentucky* conducted her demonstration and shakedown operation, launching two D5 life-extension missiles marking 157 out of 159 successful launches. This milestone continues to ensure a sustainable sea-based strategic deterrence capability.

Finally, I fully support strategic collaboration between our services. The Navy and the Air Force are both addressing challenges in sustaining aging strategic weapons systems. As a result, I remain committed and I believe commonality between the ground-based strategic deterrent at the Trident II D5 systems will improve affordability while reducing risks to ensure a safe, secure, effective, and credible strategic deterrent.

Leadership commitment and focus are required to accomplish this parallel undertaking.

Thank you for the opportunity to testify today, and I am pleased to answer your questions, Mr. Chairman.

[The prepared statement of Admiral Benedict follows:]

PREPARED STATEMENT BY VICE ADMIRAL TERRY BENEDICT, USN

INTRODUCTION

Chairman Sessions, Ranking Member Donnelly, distinguished Members of the subcommittee, thank you for this opportunity to discuss the Navy's strategic programs. It is an honor to testify before you this afternoon representing the Navy's Strategic Systems Programs (SSP).

SSP's mission is to design, develop, produce, support, and ensure the safety of our Navy's sea-based strategic deterrent, the Trident II (D5) Strategic Weapons System (SWS). The men and women of SSP and our industry partners remain dedicated to supporting the mission of our sailors on strategic deterrent patrol and our marines, sailors, and coast guardsmen who stand watch, ensuring the security of the weapons we are entrusted with by this Nation.

The Navy provides the most survivable leg of the U.S. nuclear triad with our ballistic missile submarines (SSBNs) and the Trident II (D5) SWS. The 2010 Nuclear Posture Review reinforced the importance of SSBNs and the Submarine Launched Ballistic Missiles (SLBMs). Critically, SLBMs will comprise a significant majority of the Nation's operationally deployed nuclear warheads. The Chief of Naval Operations (CNO) and Vice Chief of Naval Operations continue to reiterate the Navy's number one priority is to maintain a credible, modern, and survivable sea-based strategic deterrent. Maintaining our Nation's capability in this key mission area includes the proper funding of the *Ohio* Replacement Program—along with the propulsion and the SWS—as the "The Navy's #1 acquisitions programs."

Ensuring sustainment of the sea-based strategic deterrent capability is a vital national requirement today and into the foreseeable future. Our PB–17 budget request provides required funding to support the program of record in fiscal year (FY) 2017 for the Trident II (D5) SWS. To sustain this capability, I am focusing on my top priorities: Nuclear Weapons Safety and Security; the Trident II (D5) SWS Life Extension Program; the *Ohio* Replacement Program; the Solid Rocket Motor (SRM) Industrial Base; the implementation of the Nuclear Enterprise Review recommendations; the newly codified Navy Nuclear Weapons Regulatory responsibility; and collaboration with the Air Force.

NUCLEAR WEAPONS SAFETY AND SECURITY

The first priority, and the most important, is the safety and security of the Navy's nuclear weapons. Accordingly, Navy leadership delegated and defined SSP's role as

the program manager and technical authority for the Navy's nuclear weapons and nuclear weapons security.

At its most basic level, this priority is the physical security of one of our Nation's most valuable assets. Our Marines and Navy Masters at Arms provide an effective and integrated elite security force at our two Strategic Weapons Facilities and Waterfront Restricted Areas in Kings Bay, Georgia and Bangor, Washington. U.S. Coast Guard Maritime Force Protection Units have been commissioned at both facilities to protect our submarines as they transit to and from their dive points. These Coast Guardsmen and the vessels they man provide a security umbrella for our *Ohio*-class submarines. Together, the Navy, Marine Corps, and Coast Guard team form the foundation of our Nuclear Weapons Security Program while headquarters staff ensures that nuclear weapons capable activities continuously meet or exceed security, safety, and compliance standards.

SSP's efforts to sustain the safety and improve the security of national assets continue at all levels of the organization. The Navy's nuclear weapons enterprise maintains a culture of self-assessment in order to sustain safety and security. This is accomplished through biannual assessments by SSP headquarters staff, periodic technical evaluations, formal inspections, and continuous on-site monitoring and reporting at the Strategic Weapons Facilities. Technical evaluations, formal inspections, and on-site monitoring at the Strategic Weapons Facilities provide periodic and day-to-day assessment and oversight. Biannual assessments evaluate the ability of the organization to self-assess the execution of the assigned strategic weapons mission and compliance requirements. The results of these biannual assessments are critically and independently reviewed through the Navy Nuclear Weapons Assessment and provided to the Secretary of the Navy and the CNO.

We also strive to maintain a culture of excellence to achieve the highest standards of performance and integrity for personnel supporting the strategic deterrent mission. We continue to focus on the custody and accountability of the nuclear assets entrusted to the Navy. SSP's number one priority is to maintain a safe, secure, and effective strategic deterrent.

D5 LIFE EXTENSION PROGRAM

The next priority is SSP's life extension effort to ensure the Trident II (D5) SWS remains an effective and reliable sea-based deterrent. The Trident II (D5) SWS continues to demonstrate itself as a credible deterrent and exceeds operational system requirements established over 30 years ago. The submarine leg of the U.S. strategic deterrent is ready, credible, and effective, thereby assuring our allies and partners and deterring potential adversaries. However, we must remain vigilant about age-related issues to ensure a continued high level of reliability.

The Trident II (D5) SWS has been deployed on our *Ohio*-class ballistic missile submarines for 25 years and is planned for a service life of 50 years. This is well beyond its original design life of 25 years and more than double the historical service life of any previous sea-based strategic deterrent system. As a result, effort will be required to sustain a credible SWS from now until the end of the current *Ohio*-class SSBN in the 2040s; as well as the end of the service life of the *Ohio* Replacement SSBN in the 2080s.

The Navy is proactively taking steps to address aging and technology obsolescence. SSP is extending the life of the Trident II (D5) SWS to match the *Ohio*-class submarine service life and to serve as the initial baseline mission payload for the *Ohio* replacement submarine platform. This is being accomplished through an update to all the Trident II (D5) SWS subsystems: launcher, navigation, fire control, guidance, missile, and reentry. Our flight hardware—missile and guidance—life extension efforts are designed to meet the same form, fit, and function of the original system to keep the deployed system as one homogeneous population, control costs, and sustain the demonstrated performance of the system. We will remain in continuous production of large energetic components such as solid rocket motors and Post Boost Control System Gas Generators, while continuing an age management replacement effort for missile small ordnance and control components. We also started initial planning for when a follow-on missile to Trident II (D5) will be needed. These efforts will provide the Navy with the missiles and guidance systems we need to meet operational requirements through the introduction and deployment of the *Ohio* replacement SSBNs through the 2080s.

While budgetary pressures and impacts of sequestration resulted in some deferred or delayed efforts, strategic deterrence remains the Navy's highest priority. As such, the Navy is committed to minimizing, to the maximum extent possible, impacts to this program in order to meet strategic requirements.

One impacted effort is the change to our flight test program in fiscal year 2016. In accordance with Strategic Command (STRATCOM) requirements, the Navy is required to flight test a minimum of four Trident II (D5) missiles per year in a tactically-representative environment. The purpose of flight testing is to detect any change in reliability or accuracy. The enacted fiscal year 2016 budget reflects a reduction of one planned flight test for affordability. The Navy coordinated with STRATCOM to determine that this temporary reduction is manageable in the short-term, contingent upon our plan to ramp back up to four flight tests per year later in the Future Years Defense Program (FYDP). A prolonged reduction beyond what is planned in fiscal year 2016 would impact our ability to detect changes in reliability and accuracy of an aging system with the required degree of statistical confidence to meet STRATCOM requirements. The fiscal year 2017 budget request reflects the return to four flight tests per year.

Despite budgetary pressures, the Navy's D5 life extension program remains on track. In November 2015, the USS *Kentucky* (SSBN 737) successfully conducted her Demonstration and Shakedown Operation (DASO 26) by launching two missiles. These missiles successfully integrated the D5 Life Extension (D5 LE) Flight Controls Electronics Assembly and Interlocks Suite with the D5 LE Guidance System. The D5 LE missiles will be available for initial fleet introduction in fiscal year 2017.

Another major step to ensure the continued sustainment of our SWS is the SSP Shipboard Integration (SSI) Programs, which address obsolescence management and modernization of SWS shipboard systems through the use of open architecture design and commercial off-the-shelf hardware and software. The first increment of this update was installed on the final U.S. SSBN in April 2014. This completed installation on all fourteen U.S. SSBNs, all four UK SSBNs and all United States and UK land-based facilities. Installation of subsequent increments began last summer, with four installations completed to date. The SSI Program includes refreshes of shipboard electronics hardware and software upgrades, which will extend service life, enable more efficient and affordable future maintenance of the SWS and ensure we continue to provide the highest level of nuclear weapons safety and security for our deployed SSBNs while meeting STRATCOM requirements.

To sustain the Trident II (D5) SWS, SSP is extending the life of the W76 reentry system through a refurbishment program known as the W76–1. The W76–1 refurbishment maintains the military capability of the original W76 for an additional 30 years. This program, which is being executed in partnership with the Department of Energy, National Nuclear Security Administration (NNSA), has completed over 60 percent of the planned warhead production. The Navy will continue to work with NNSA to closely monitor production and deliveries to ensure there are no operational impacts.

In addition, the Navy continues the design work to refurbish the aging electronics in the W88 reentry system. The Navy is collaborating with the Air Force to reduce costs through shared subsystems suitable for the W88/Mk5 and the W87/Mk21. Additionally, the Nuclear Weapons Council (NWC) directed the replacement of the conventional high explosive, which will support deployment of the W88/Mk5 for an additional 25 years. As directed by the NWC, we have submitted funding requests to support the initial feasibility and cost studies (Phase 6.2/6.2A) for an Interoperable Warhead (IW) to begin in 2020. The Navy believes that the NWC continues to effectively balance near-term nuclear weapons sustainment and refurbishment priorities and the long-term stockpile strategy.

OHIO REPLACEMENT PROGRAM

The Navy's highest priority acquisition program is the *Ohio* Replacement Program, which replaces the existing *Ohio*-class submarines. The continued assurance of our sea-based strategic deterrent requires a credible SWS, as well as the development of the next class of ballistic missile submarines. The Navy is taking the necessary steps to ensure the *Ohio* replacement SSBN is designed, built, delivered, and tested on time with the right capabilities at an affordable cost.

To lower development costs and leverage the proven reliability of the Trident II (D5) SWS, the *Ohio* Replacement SSBN will enter service with the Trident II (D5) SWS and D5 LE missiles onboard. These D5 LE missiles will be shared with the *Ohio*-class submarines until their retirement. Maintaining one SWS during the transition to the *Ohio*-class replacement is beneficial from a cost, performance, and risk reduction standpoint. A program to support long-term SWS requirements is planned for the future to support the *Ohio*-class replacement SSBN through its entire service life.

The Navy continues to leverage the *Virginia*-class program to implement lessons-learned and ensure the *Ohio* Replacement Program pursues affordability initiatives

across design, construction, and life cycle operations and support. The SSBN design team recently achieved several critical decisions and milestones. In December 2015, the Navy released the Request for Proposals for the final detailed design contract. Maintaining the pace of design and submarine industrial capability is critical to the continued success of our sea-based strategic deterrent now and well into the 2080s.

A critical component of the *Ohio* Replacement Program is the development of a Common Missile Compartment (CMC) that will support Trident II (D5) deployment on both the *Ohio*-class replacement and the successor to the *UK Vanguard*-class. In 2015 the Program began construction of missile tubes to support building the U.S. prototype Quad-pack module, the Strategic Weapons System—Ashore (SWS Ashore) test site, and the UK's first SSBN. The joint CMC effort is shifting from design to construction, supporting production in both United States and UK build yards. Any delay to the common missile compartment effort has the potential to impact the UK's ability to maintain a continuous at sea deterrent posture.

To manage and mitigate technical risk to both the United States and UK programs, SSP is leading the development of SWS Ashore integration test site at Cape Canaveral, Florida. This is a joint effort with the Navy and the state of Florida investing in the re-development of a POLARIS site to conduct integration testing and verification for *Ohio* replacement and UK Successor programs. Refurbishment of the POLARIS site and construction of the infrastructure is proceeding at a rapid pace, including installation of test bay 1 missile tubes and superstructure and several major support systems. Trident II (D5), *Ohio*-class, and *Ohio* replacement new design hardware will be co-located and integrated to prove the successful re-host and redeployment of the Trident II (D5) SWS on the new submarines. To mitigate the risk in the restart of launch system production, SSP constructed a surface launch facility at the Naval Air Station, China Lake, California. This facility will prove that the launcher industrial base can replicate the performance of the *Ohio*-class Trident II (D5) launch system. We will be launching the refurbished Trident II (D5) test shapes used in the 1980s starting in fiscal year 2017. Launch performance is a critical factor we must understand at the systems level to ensure we maintain high reliability as we transition the weapon system to the next class of SSBNs.

The United States and the UK have maintained a shared commitment to nuclear deterrence through the Polaris Sales Agreement since April 1963. As the Director of SSP, I am the U.S. Project Officer for the Polaris Sales Agreement. Our programs are tightly coupled both programmatically and technically to ensure we are providing the most cost effective, technically capable nuclear strategic deterrent for both Nations. Last year marked the 52nd anniversary of this agreement, and I am pleased to report that our longstanding partnership with the UK remains strong. The United States will continue to maintain its strong strategic relationship with the UK as we execute our Trident II (D5) LE Program and develop the common missile compartment. Our continued stewardship of the Trident II (D5) SWS is necessary to ensure a credible and reliable SWS is deployed today on our *Ohio*-class submarines, the *UK Vanguard*-class, as well as in the future on respective follow-on platforms. This is of particular importance given the proportion of our nuclear forces that will be deployed on the sea-based leg of the Triad under the New START Treaty. The *Ohio* replacement will be a strategic, national asset whose endurance and stealth will enable the Navy to provide continuous, uninterrupted strategic deterrence well into the 2080s.

SOLID ROCKET MOTOR (SRM) INDUSTRIAL BASE

The defense and aerospace industrial base—in particular the solid rocket motor industry—is another important priority. I remain concerned with the decline in demand for solid rocket motors. While the Navy is maintaining a continuous production capability at a minimum sustaining rate of twelve rocket motor sets per year, the demand from both NASA and Air Force has precipitously declined. Not only did this decline result in higher costs for the Navy, as practically a sole customer, it also put an entire specialized industry at risk of extinction. To allow this puts our national security at risk. The Navy cannot afford to singularly carry this cost, nor can our Nation afford to lose this capability. While the efforts of our industry partners and others have created short-term cost relief, the long-term support of the solid rocket motor industry and maintenance of critical skills remains an issue that must be addressed at the National level. At SSP, we will continue to work with our industry partners, DOD, senior NASA leadership, Air Force, and Congress to do everything we can to ensure this vital national security industry asset is preserved.

NUCLEAR ENTERPRISE REVIEW

The Navy remains committed to addressing and implementing recommendations of the 2014 Nuclear Enterprise Review (NER). The Program and Budget Review for the fiscal year 2017 budget formulation preserves all current enhancements to the Nuclear Enterprise, focusing significantly on the recapitalization, sustainment, and modernization of our nuclear deterrence systems and infrastructure. The NER provided the Navy a thorough and unbiased look at our nuclear forces. Overall, the report found that the nuclear enterprise is safe, secure, and effective today but it also found evidence of systemic problems that, if not addressed, could undermine the safety, security, and effectiveness of elements of the force in the future. Fortunately, the Navy's internal Nuclear Weapons Assessment and the SSP Comprehensive Self-Assessment identified most of the issues underscored during the NER. In fact, the report validated numerous efforts already underway.

The Navy continues to address the more than 68 recommendations with Navy equity contained in the report. Significant action has been taken to implement each recommendation, focusing on the following areas: oversight, investment, and personnel and training improvements. With respect to oversight, the Navy is clarifying the nuclear deterrent enterprise leadership structure and reducing administrative burdens imposed on the forces. The Nuclear Deterrent Enterprise Review Group (NDERG), formed and led by the Secretary of Defense will continue to provide regular oversight of the nuclear enterprise. The Navy Nuclear Deterrent Mission Oversight Council is the Navy's mechanism to ensure the NDERG recommendations and guidance are properly implemented and that investments achieve the intended effect.

Regarding training and personnel, the Navy is planning a significant investment to build a margin in the deterrence force and clear the SSBN maintenance backlog. The Navy is matching the right responsibilities with the right leaders in order to address the recommendations involving long-term cultural and organizational challenges. There will be an emphasis on the importance of the deterrence mission through updated vision statements, revised campaign plans, and methods to eliminate obstacles to enhance moral conduct and relieve the pressures on sailors, training, and work-life balance.

The Navy is developing a 20 year investment plan to ensure the continued reliability of critical infrastructure at these facilities to support nuclear weapons movement and operations. While the Navy makes significant progress through actions taken to date, we recognize much work remains to be accomplished. The Navy is confident we have the right emphasis, oversight and processes in place to maintain a credible, modern, and safe sea-based deterrent.

NAVY NUCLEAR WEAPONS REGULATORY RESPONSIBILITY

As a result of the Nuclear Enterprise Review, the Navy implemented a centralized regulatory authority for nuclear force readiness. As the Director of Strategic Systems Programs (DIRSSP), I have accountability, responsibility and authority to serve as the single Flag Officer to monitor performance and conduct end-to-end assessment of the Navy Nuclear Deterrence Mission (NNDM) elements. These responsibilities are defined in SECNAVINST 8120.1B and OPNAVINSTs 8120.1 and 8120.2. Nine Echelon 2 level commands directly contribute to the NNDM: U.S. Fleet Forces Command (USFLTFORCOM), U.S. Pacific Fleet (PACFLT), Fleet Cyber Command (USFLTCYBERCOM), Navy Supply Systems Command (NAVSUPSYSCOM), Naval Sea Systems Command (NAVSEASYSCOM), Chief of Naval Personnel (CNP), Bureau of Medicine and Surgery (BUMED), commander, Navy Installations Command (CNIC), and SSP.

In my role as DIRSSP, I am the the Navy Nuclear Deterrence Mission (NNDM) regulatory authority responsible for assessing and reporting issues to the Navy Nuclear Deterrence Mission Council and the CNO. SSP is tasked with developing, coordinating, and implementing policies approved by the CNO; conducting end-to-end assessments of the Navy's nuclear weapons and nuclear weapons systems and personnel, including Nuclear Command, Control, and Communications (NC3), for safe, reliable, and effective execution of the NNDM.

SSP is engaged with the Echelon 2 commands defined above to understand current reporting and assessment processes and to define the NNDM regulatory assessment policy. The next in-progress review with CNO, in February 2016, will provide an update on the significant progress made to date by the participating commands, to include: reporting and engagement strategies with the NNDM component commands, development of archival and analytical tools to assist in performing end-to-end assessments, and presenting the initial component self-assessments and an independent assessment of the Echelon 2 reporting. Further, the upcoming 2016 Bi-

ennial Navy Nuclear Weapons Assessment will review the implementation and execution of the NNDM Regulator processes to date to ensure we are providing the necessary rigor and discipline to this endeavor.

COLLABORATION WITH THE AIR FORCE

The final priority is strategic collaboration between the Services. The Navy and the Air Force are both addressing the challenges of sustaining aging strategic weapon systems and are collaboratively working to ensure these capabilities are retained in the long-term to meet mission requirements. In accordance with a July 2015 tasking letter from the Air Force and Navy Service Acquisition Executives (SAEs), and the commander, U.S. Strategic Command, the Navy and Air Force conducted an assessment of the options for commonality for the two ballistic missile legs of the Triad. The direction to SSP and PEO/SS was to determine whether increasing the commonality between the Ground Based Strategic Deterrent (GBSD) and Trident II life extension (D5LE) could improve affordability while ensuring a safe, secure, effective, and credible nuclear deterrent. The assessment is considering commonality across a wide spectrum, from full system level commonality to technology sharing for independent programs.

Although initial results of the assessment ruled out the possible use of a standard common weapons system by both the Air Force and Navy, a number of common components and technologies remain. The use of these candidates offer significant potential benefits in terms of reducing costs and technical and schedule risks to the GBSD and SLBM programs. Commonality will provide the Navy and Air Force opportunities to eliminate redundant efforts, leverage economies of scale, and sustain shared critical skills and capabilities needed by securing the industrial base.

Each leg of the Triad provides unique attributes. Furthermore, a sustained and ready Triad provides an effective hedge, allowing the Nation to shift to another leg, if necessary, due to unforeseen technical problems or vulnerabilities. For this reason, the Department is focused on cooperative efforts that maintain affordability and reduces risk to both services while retaining essential diversity where needed to ensure a credible and reliable deterrent. Many of the industries and required engineering skills sets are unique to strategic systems. Key to SSP's historical success has been our technical applications programs, which in the past provided a research and development foundation. We will need to resume these critical efforts as we evaluate maintaining this strategic capability until the 2080s to match the full service life of the *Ohio* replacement submarine.

CONCLUSION

SSP continues to maintain a safe, secure, and effective strategic deterrent and focus on the custody and accountability of the nuclear assets entrusted to the Navy. Our PB–17 budget request ensures that we will sustain this capability in fiscal year 2017. However, we must remain vigilant about unforeseen age-related issues to ensure the high reliability required of our SWS. SSP must maintain the engineering support and critical skills of our industry and government team to address any future challenges with the current system as well as prepare for the future of the program. Our Nation's sea-based deterrent has been a critical component of our national security since the 1950s and must continue to assure our allies and deter potential adversaries well into the future. I am privileged to represent this unique organization as we work to serve the best interests of our great Nation.

Senator SESSIONS. Thank you.

Thank you, all. Those are important opening statements, and our subcommittee has some important work to do. I feel that we are not coming in to an entirely new situation, but that we have been observing developments for some time. We know where the danger areas are, and we know we have to avoid those danger areas and make the right decisions.

Dr. Hopkins, last year, you testified before the House that, "We have reached a point where we have removed all flexibility for nuclear weapons life-extension programs, and we are losing flexibility in our platform modernization programs."

I assume by that you mean that, financially, we do not have any room for error at this point. Would you comment on that comment you made previously?

Dr. HOPKINS. Yes, thank you, Senator.

It is a matter both of financially as well as schedule. The modernization schedule is really tied closely to our estimated timeout of the systems that are existing today. After several years of delaying the modernization—I am sure partially for financial reasons, partially for other programmatic reasons—we have reached a point where virtually every leg of the triad is nearing the end of its anticipated service life. We have extended as many as we possibly can, as long as we can.

What we are seeing now is the requirement for the department to modernize the delivery systems and to extend the lives of the various nuclear weapon components.

Senator SESSIONS. Do you have confidence or can you guarantee that at the funding level we are talking about now, if we maintain it, we will be able to replace our current platforms before they reach the end of their service life?

Dr. HOPKINS. Well, I would say that our budget request is designed to support the program to replace the triad, as described. I do not think I could guarantee too much at this point, just because we are so relatively early in the programs. As you know, things tend to change over time.

However, we are giving careful thought to the timing and to the cost estimation, the estimation of the costs of these various legs.

Senator SESSIONS. Now, is it the view of the Nuclear Weapons Council, which you are the staff director for, that our out-year funding for the life-extension programs for nuclear warheads and bombs, and the new facilities, is inadequate, as suggested by Secretary Moniz?

Dr. HOPKINS. I think that the funding for the warhead modernization is adequate, but I believe Secretary Moniz was referring to infrastructure.

Senator SESSIONS. That means?

Dr. HOPKINS. Plutonium, uranium, high-performance computing, that sort of thing.

Senator SESSIONS. Okay.

Dr. HOPKINS. Those will need additional resources in the out-years, in order to keep pace and provide the support that is needed.

Senator SESSIONS. Well, we did challenge some of the structures, building of new structures. I think there was a good response to that, and I think it saved us some money.

Admiral Benedict, one of the things that is talked about, sometimes openly, sometimes just around the table, is that we are going to reach a crisis with regard to the *Ohio*-class replacement financially, because it is going to pop the Navy's budget, and we have to have a plan in place so we can proceed at the right pace with that replacement of that critical part of the triad.

Do you have concerns there? Are we reaching a point that could be a crisis? What, if anything, do we need to do to deal with it?

Admiral BENEDICT. Yes, sir. Thank you.

We have worked closely within the Navy. As we discussed yesterday, there are three major components to deliver the *Ohio* replacement platform. One is, certainly, the propulsion reactor, which is under the auspices of Admiral Caldwell in naval reactors. The other one is the platform itself, which is the responsibility of PEO

submarines, Admiral Jabaley. Then the third piece is the mission package, which I, as the director of SSP, am responsible to deliver.

As we have looked at that *Ohio* replacement program under the direction of Mr. Stackley, who is our acquisition executive in the Navy, I think we have presented a platform that delivers the requirements necessary to meet our leg of the triad at the most cost-efficient price point that we can come up with.

You are well-aware that we took a two-year slip at the beginning of the program, which basically removed our float. We have done a number of things within the Navy, trying to ensure that is the most cost-effective solution that we are presenting to the Congress. Our design maturity is higher than any other platform that has ever or ever will enter production. We will make some requests of other opportunities to reduce the costs—economic order quantities, advanced construction authorities, things like those, which I am certain that Mr. Stackley will address when he comes up here and testifies.

If we are to replace the *Ohio* without reducing the number of platforms necessary to support Admiral Haney's requirements at STRATCOM [Strategic Command], then we must stay the current program of record for the *Ohio* replacement.

Yes, sir.

Senator SESSIONS. You agree with that, Secretary Scher?

Secretary SCHER. Absolutely.

Senator SESSIONS. Senator Donnelly?

Senator DONNELLY. Thank you, Mr. Chairman.

Thanks to all the witnesses.

Admiral Benedict, thanks again for having me aboard on the tests on the USS *Kentucky*. It was a privilege.

Is the Navy committed to commonality as a means to modernize and maintain the triad? If so, what elements do you see as most applicable for commonality with ICBM modernization program?

Admiral BENEDICT. Yes, sir. The Navy is absolutely committed to commonality. I think we have worked very closely with our sister service, the Air Force.

At the direction of Mr. Stackley and Mr. LaPlante, both the acquisition executives for the Navy and the Air Force, as well as Admiral Haney, we have been working since this summer to identify opportunities for commonality with the Air Force.

We have five teams that we have stood up. They have done detailed analysis of opportunities in areas where we could focus with commonality. That report is completed, and we will shortly brief out the secretaries, as well as Admiral Haney.

But commonality is simply a tool. It is a tool to identify risks. When you are doing a program as complicated as the Air Force is right now with the GBSD [Ground Based Strategic Deterrent], or we will do—and we have just come through with the life-extension programs—I believe that, in today's environment, and the fragile industrial bases that we face in some of our niche areas that only we do, the Navy and Air Force, that it is a means to address schedule, cost, technical, and the industrial base appropriately. It is a risk-reduction tool.

We have been meeting now with Mr. Kendall, the OSD acquisition executive, on how we will implement the opportunities that

these five teams that have been working under the direction of the service secretaries, how we will implement those opportunities.

Yes, sir, we are fully committed.

Senator DONNELLY. General Rand?

General RAND. Sir, I will just echo what Admiral Benedict said. We are committed to pursuing commonality in the GBSD and the SLBM [submarine launched-ballistic missile].

I think we are going to brief. Again, I will not be part of that briefing, but I think Secretary Kendall will give a brief later in March.

Senator DONNELLY. Where are we with commonality on guidance systems?

General RAND. I am going to defer a little bit to the Admiral on that question.

Senator DONNELLY. Admiral?

Admiral BENEDICT. Yes, sir. Thank you.

As part of the Trident II D5 life extension, we completely rebuilt our guidance system. We modernized it in terms of instruments, our accelerometers, our gyros, our radiation-hardened memory, our radiation-hardened processors, our architecture. As we have gone through that effort over the last 10 years as part of life extension, significant investments have been made.

We have shared that information with the Air Force. The Air Force is working with Mr. Kendall on how they would incorporate that into their acquisition strategy. Certainly, competition is a major player as they move forward in GBSD.

I think we are collaboratively working with the Secretary to find a way to both achieve competition and yet ensure that we take advantage of the investments that the Navy has made as part of commonality. That is a trade-off right now. As the General said, we have had three meetings with Mr. Kendall, and there are more to happen.

Senator DONNELLY. Dr. Hopkins, how are you working to ensure commonality with the SLBM fleet as you modernize the ICBM fleet by 2030?

Dr. HOPKINS. Thank you, Senator.

As already mentioned, on the acquisitions side, the Under Secretary for Acquisition is leading the charge for commonality. I think a lot of that is driven by the perceived benefit, the anticipated benefit, that commonality will support affordability.

In addition, as the chairman of the Nuclear Weapons Council, the Under Secretary will also help to integrate the opinions and the guidance and the oversight of all the senior leadership within the enterprise.

Senator DONNELLY. Thank you.

Thank you, Mr. Chairman.

Senator SESSIONS. Senator Fischer?

Senator FISCHER. Thank you, Mr. Chairman.

General Rand, there has been really a number of calls recently for the abandonment of the LRSO [Long Range Standoff]. We have heard that it is redundant; it is unnecessary; it is a destabilizing weapon. That runs directly counter to the efforts of this committee and also of the department. We have been focused on trying to move that up.

I realize we are not in a classified forum here, but could you comment on the need for the LRSO, and whether there is any basis in fact that it is unnecessary?

General RAND. Certainly, Senator. I am glad to talk on that.

I think it is absolutely critical to our bomber fleet. With the advent of the LRSB [Long Range Strike Bomber], that will be a primary weapon. The B–52s ALCM needs to be replaced, and it needs to go on the B–52 and we need to put on the B–2. Three of the bombers need LRSO.

A major reason why is because the ALCM has outlived its usefulness. It was intended to be a 10-year missile. It has now been in existence for almost 36 years.

Unfortunately, the enemy gets a vote, and I think that it will not have the capabilities as we get into 2025, 2030, to do exactly what it is intended to do.

In this increasingly contested environment that we will be operating in, we need LRSO. The Air Force is committed to this. It is in our 2017 budget, and it is funded fairly strongly for the FYDP [Future Years Defense Program]. We hope to be able to start production in 2026 with an IOC [initial operating capability] in 2030.

Senator FISCHER. Thank you.

Mr. Secretary, would you like to comment on that?

Secretary SCHER. Yes, thank you, Senator.

I second all the points of General Rand. I think the arguments that it is a destabilizing weapon I think are ones that—I am glad we have this robust discussion in the United States, but I think the LRSO is a continuation of an existing weapon. I would argue that it is not inherently destabilizing, as it is a weapon that already has existed.

I also think that it is important to recognize that having——

[Audio Disruption.]

Secretary SCHER. It is something that will be important today and into the future.

Senator FISCHER. You believe the flexibility of the LRSO is very important?

Secretary SCHER. Absolutely. The goal is to make sure that we have, as I said, this full range of capabilities, yields, and the flexibility to employ them in multiple ranges and options to give the most choices to the President. That gives the most credibility deterrent, and, frankly, I think then is the most stabilizing.

Senator FISCHER. I would agree.

Dr. Hopkins, do you have any comments on that?

Dr. HOPKINS. Yes. Thank you.

I would just reinforce the comment about strategic stability, and that is that the United States has had nuclear cruise missiles since 1982, so I think it is a difficult argument to make that a cruise missile is destabilizing.

Senator FISCHER. Thank you.

General, you mentioned the funding that is proposed in the budget of 2017. Do you think that is on target, online? Will the Air Force make that a priority?

General RAND. Yes, ma'am, I do.

Senator FISCHER. Thank you.

Gentlemen, I would ask if you all agree with the statement that further reductions in our nuclear forces should only be made as a result of a negotiated bilateral agreement and also one that is verifiable. Would you all agree with that?

Admiral BENEDICT. Yes, ma'am.

Senator FISCHER. All are nodding yes.

Mr. Secretary, has Russia taken any steps to come back into compliance with the INF [Intermediate-Range Nuclear Forces Treaty] treaty?

Secretary SCHER. We have seen no steps that Russia has taken to come back into compliance. In fact, we still hear the discussions that Russia has not yet said that they believe they are out of compliance.

Senator FISCHER. I assume that you are aware of the report requirement in section 1243 of the most recent NDAA, and it requires the department to provide this committee a plan to develop the counterforce capabilities, the strike capabilities, active defenses, in response to Russia's violations of that treaty?

Secretary SCHER. Yes.

Senator FISCHER. That report, is it on track to be submitted by March?

Secretary SCHER. My understanding is that it is, but I can assure you that I will go back and make sure that that continues to be the case.

Senator FISCHER. I would hope so. As we continue to look at the past actions of Russia, dating back to 2008, and their current belligerence, I think this report is very valuable, and this committee needs to see it. I would encourage you to make sure that we receive that.

The President himself said rules must be binding.

Thank you.

Thank you, Mr. Chairman.

Senator SESSIONS. Thank you.

Well, we know that Russia is modernizing, as is really every other nuclear power in the world, working on new systems. We understand that there are threats to NATO [North Atlantic Treaty Organization] from this new Russian nuclear strategy.

Secretary Scher, what is the administration's assessment about the threat posed to NATO by Russia's nuclear strategy and new nuclear capabilities, some of which are in violation of existing arms-control treaties?

Secretary SCHER. Senator, obviously, the IMF violation is a very serious violation to begin with, a treaty that the Soviet Union and the United States came to realize, and both countries realized that they were better off with this treaty in place. The fact that that has broken down and that Russia no longer believes that is the case is a serious challenge to the environment of arms control and a serious threat to Europe.

We are, however, looking at it not just as a standalone issue but really as part of a broad range of aggressive and assertive actions that Russia is taking in Europe and elsewhere. We believe that our response needs to be one that looks at this holistically as well.

Clearly, we want to make sure that Russia does not obtain a military advantage because of the violation that they have pursued

in violation of the treaty. But we also want to make sure that we look broadly.

We are looking at operations in conjunction with our allies, very closely in conjunction with our allies, on how we can strengthen deterrence in Europe; how we can ensure that we can protect our forces and our allies in Europe, no matter what capabilities Russia brings to bear; and that we can ensure that we have the ability both through conventional means, primarily, but also nuclear means, if necessary, to address the capabilities that Russia has that threaten us, our allies, and our friends in the region.

Senator SESSIONS. Our committee last week hosted experts and thinkers on this subject and went through all the difficulties of anticipating what Russia might do, what we might do in response.

Do you feel like those possible responses to Russia's actions, some of its niche-type weapons, are adequate now? Or do we have much more to do to think through what our response would be?

Secretary SCHER. I believe both of those are true. I believe they are adequate now, but I do not want to stop and rest on that. I want to make sure that we continue to look at all the capabilities, understanding Russian doctrine even more, and continuing to play out the responses that we could have.

I do feel comfortable with our responses now. I feel confident in the work that has been ongoing in EUCOM [European Command] over in Stuttgart, as well as in STRATCOM [Strategic Command], to deal with the full range of Russian aggression and potential actions they could take.

I am also comfortable with what we have looked at within the Department of Defense and within the administration, in terms of games and responses and tabletop exercises to kind of understand this issue.

But I assure you, we are not stopping now. That is something that we need to continue to look at as the security situation evolves, and as we work closer with our friends and allies to see what they can bring to the table on this.

Senator SESSIONS. There are a lot of reasons to not sit idly by. One of them is, if we are apparently unable to respond to these kinds of new challenges, I think our allies and our adversaries may get the wrong impression about the willingness and capability of the United States to respond.

Right now, we are not on a path to say we are going to develop a new weapon. But I think if it becomes clear that that is needed, I hope that you will ask for it. If we do it in the right way, perhaps we can have congressional support for that.

One more point, the President is requesting $3.4 billion in fiscal year 2017 for the European Reassurance Initiative to reinforce our defense posture in Europe. Is there a nuclear component to this initiative? If not, why not?

Secretary SCHER. There is not a specific nuclear component to the European Reassurance Initiative. What I would say is that there are things ongoing and in the budget as part of the nuclear mission for what we are doing in Europe, specifically one of the most important ones to point to is the B61 life-extension program that is directly related to our nuclear DCA mission in Europe that we share with the NATO allies.

ERI, for lack of a better—we have used to focus on both pre-positioning infrastructure and keeping forces rotating through, and increasing exercises with our allies. But by no means should the budget line for ERI be seen as the full spectrum of what we are doing to address Russian activities and to ensure the deterrence of Russia or the reassurance and assurance of our NATO allies.

Senator SESSIONS. I will just wrap up, but I would say a couple things.

First, we need to keep the pressure on Europe to do more financially. We are now at 75 percent paying the costs of NATO.

I mentioned that to a German delegation of parliamentarians here six months or so ago, and the leader said it is unacceptable that the United States has to pay 75 percent of the cost. He did not offer to put up any money.

[Laughter.]

Senator SESSIONS. But it is an acknowledgment of what Secretary Gates said in his last remarks about leaving the Defense Department.

I am at a point where they have to step up. Every time the Russian bear growls, we provide more to reassure Europe. They must not be so afraid if they are not willing to put up any of their money for this.

I feel pretty strongly about that, and we will be looking at it further. As we go through this initiative, I think some of it ought to be contingent on more work from our allies, including such things as them deploying some brigade toward the east, not just us.

Secretary Donnelly—Senator Donnelly?

Senator DONNELLY. I already have one job. I do not need another.

[Laughter.]

Senator DONNELLY. Secretary Scher, we have seen North Korea take a number of actions in recent weeks. There have been discussions as to what is the best way to have a deterrent effect against North Korea. I would like to hear your opinions on what you think are the best deterrent steps in regards to North Korea.

Secretary SCHER. This is a problem that has faced multiple administrations for a long time, but I do think that, first of all, we are not willing to accept that North Korea is a nuclear weapons state. That does not mean that we do not believe that they have nuclear weapons. But the goal here is for a complete and verifiable denuclearization of North Korea, and we believe that the international community, in general, supports that principle.

The first effort is really to make sure that we can pull everyone together to really put pressure on North Korea to denuclearize.

Separately, we have and will maintain capabilities and plans to address the nuclear threat that exists in North Korea, so that we have options for the President, should he so choose to use them.

We also want to focus on defense and defense of our allies, especially the Republic of Korea and Japan, and making sure that we can effectively defend them from North Korea, both conventionally and nuclear, if it comes to that.

It is going to be a long, hard process that we really need the international community behind. I know that my colleagues in the Department of State are working very hard to try to bring everyone

together to bring the kind of pressure on North Korea that will make it clear to them that they are worse off having nuclear weapons than they are now.

Senator DONNELLY. I guess the question I am asking you is, what do you think that pressure is that sends that message?

Secretary SCHER. I think, certainly, building up capabilities on the peninsula and in Japan are part of it. Certainly, we have to bring economic pressure and continue to bring it. It has to be from the entire international community.

I think you have seen a lot of talk about the entire international community decrying the latest tests. I think we need to see that put into action. I know they are working on that at the U.N. [United Nations] and elsewhere, and hopefully revival of the six-party talks will get us closer. But clearly, that has, up to this point, not worked.

Senator DONNELLY. Without categorizing it specifically this way, but it seems that China seems to pull their punches in regard to North Korea. Why do you think that is? What do you think an active Chinese role to help start moving North Korea back to denuclearization would be?

Secretary SCHER. Honestly, sir, I do not know the intricacies of our approach to them. I, certainly, do not want to characterize what China is thinking.

But I do believe that a more prominent role and effective role from China to live up to the commitments that they have made and that the international community has made will put pressure on North Korea.

If you want to pursue this, I am happy to do it in closed session, along with some other colleagues from the Asia side.

But I think there are ways that we can pursue this, but we are not there yet.

Senator DONNELLY. We asked this question last week in regard to Putin and the Russian leadership, when they talk about offensive use of nuclear weapons. Do you think they believe that NATO and/or the United States would let that occur without response?

Secretary SCHER. Senator, I do not think so, but I also know that we need to continue to make that clear, both in our declaratory policy and in the credibility of the capabilities that we bring to bear on that.

I cannot imagine that Russia does not fully understand the implications of the article 5 commitments of the NATO treaty. But again, that is something that we need to both make sure is credible from both a policy perspective and a capabilities perspective, and that is really our role here.

Senator DONNELLY. What you are saying is that we have to, when those things are said, just make it extraordinarily clear that nothing will be let to stand without a response and a strong and active response in return?

Secretary SCHER. I would never want to prejudge responses, but I do think it is fair that, as we see increasing nuclear saber-rattling from Russia, we make it clear that we will maintain our commitments to the NATO alliance, and that we will respond effectively, and that, most importantly, and sort of the fundamental piece of deterrence is that the risks to Russia from them taking action will

be far outweighed because of our response. They cannot believe that any advantage will accrue to them. They need to understand that we will impose costs that will far outweigh anything they might even think that they will gain by taking that action. That is the core of deterrence, and that is something we must maintain the credibility of.

Senator DONNELLY. One more question. Vice Admiral Benedict, you have recently assumed expanded responsibility as the regulator for the Navy's nuclear deterrence mission as well. How do you see that mission?

Admiral BENEDICT. Thank you, sir.

I see that mission as it is really beginning to pay dividends. I have the opportunity to brief the CNO [Chief of Naval Operations] on a quarterly basis. Of course, the regulator role is one in which I oversee the other Echelon II commands within the Navy who have a purpose of ensuring that an SSBN can go to sea and basically support Admiral Haney's requirements. Fleet Forces Command, Pacific Fleet, the submarine force, BUMED who does the personal reliability program, our shipyards, all of those entities that have a piece in deploying a submarine now all report to me.

They report four times a year. Two reports are readiness reports. Two reports are sustainment reports. We have access to all the information that is flowing around the community as it relates to the ability to execute.

I think it is coming together nicely. We have never done this before. It is maturing rapidly. I have a meeting with the CNO in two weeks to give him the next update. I think it will be a very positive report.

I believe that we are finding niche pieces of the community where things could potentially drop between the cracks of nine different commands, and we are pointing those out and addressing those proactively. I am very pleased with where we are.

Senator DONNELLY. Thank you, Admiral.

Thank you, Chairman.

Senator SESSIONS. I want to follow up on that, Admiral. If you find a defect or a problem, what would be your role?

Admiral BENEDICT. First and foremost, my role is to ensure that the individual commanders within those nine commands see the same problem that I have identified, as the regulator. First and foremost, in the areas of——

Senator SESSIONS. "Regulator" is an unusual word.

Admiral BENEDICT. Yes, sir.

Senator SESSIONS. What does it mean?

Admiral BENEDICT. I guess in the broad terms, I look for problems in the seams. Every command has authority, accountability, responsibility. As Admiral Greenert, when he was CNO, was pretty clear with me, identified my job as not to go in and fix problems. My job is simply to identify the problems, most importantly in the interfaces between the various commands.

To your point, to your question, what would I do, and what I have done, is, when I see those, I identify those to the commander. I have never had one yet that they have not readily identified and gone off and fixed.

If we had a disagreement that it was an issue, then there is an escalation plan within the regulator role where we would both go address that with the CNO. Obviously, the CNO would have the final authority of what would be fixed and how. But I do not ever foresee that happening. It is really a constructive tension backup regulator role, in which we are trying to ensure that we provide to this Nation the most credible sea-based deterrent.

Senator SESSIONS. The history of all government agencies and even the Defense Department, which, in general, does better than most government agencies, is that sometimes it has to be kicked upstairs. You be sure to do it, if it is necessary.

Secretary Scher, Center for Strategic and International Studies, a good group, says, as the nuclear shadow has grown over the Asia-Pacific region, the credibility of the United States security assurances has come under strain for both Japan and South Korea. It goes on to say, "Today, the United States lacks a sufficient range of response options to signal, compel, and defeat nuclear adversaries facing our allies and, by extension, to inspire confidence in the U.S. nuclear guarantees."

Does the administration share that concern? What, if anything, would we do or are we doing to fix it?

Secretary SCHER. As you say, CSIS is an excellent organization. I am not sure I would agree quite with that entire characterization. I think we are in a good place now. I think we bring a full range of conventional and nuclear assets that are in the region, or can be deployed to the region, or can be operated in the region.

I also know that we keep very close discussions with the Republic of Korea and Japan specifically on deterrence policy and on these issue areas.

Senator SESSIONS. Would you agree that additional response options are needed?

Secretary SCHER. I think we actually have a full range of response options now, but I accept that, as our potential adversaries develop more, we need to constantly review that. We may need to take a look and have additional options.

But I do believe that the variety of systems, weapons, yields that we have in the arsenal now should cover, and I believe our allies believe they do cover where we need to today.

Senator SESSIONS. Well, that is a January 2016 report, this year's report. I think it is something you should examine and look at.

Briefly, I think, Secretary Scher, maybe you should be the one to answer, but if any of the others would like to answer, the United States and certain NATO allies have operating dual-capable aircraft. According to unclassified NATO information, these aircraft are available for nuclear roles at various levels of readiness. The highest level of readiness is measured in weeks.

Is this alert level adequate, given that we now see Russia has new nuclear capabilities and is flexing its muscles?

Secretary SCHER. I think, right now, honestly, we are looking at that as an alliance. That is one of the key issues we are examining together. Dr. Hopkins and I are the chair and vice chair of a high-level group in NATO that is charged with examining this. We, as

an alliance, are trying to determine if those readiness levels are what they should be.

It does place a large premium on indications and warning. We do not assume that things will happen out of the blue, so there is some ability and time to get to that level of readiness, so that these DCA can operate.

But as I said, I think this is something that the alliance is looking at now, and we may have some indications of where the alliance wants to go, certainly by the June ministerial.

Senator SESSIONS. Well, the alliance is not overly impressing me about how it operates. The United States has always had to push, and I think maybe more so now in recent years than in the past, push to make sure that we do the things necessary for real defense capability. For the Russians to assume they have weeks before they have a threat, then I think that sends a bad signal in itself.

Secretary SCHER. Senator, I am sorry. I apologize. I agree with you, Senator. One of the ways that we address that as well is that there independent nuclear capabilities of the United States, the U.K. [United Kingdom], and France, that can be brought to bear immediately. All are ready today, currently. The full extent of our nuclear deterrent capability of the alliance does not rest solely on DCA. There are other elements that back that up as well.

General RAND. Senator, if I may?

Senator SESSIONS. Yes, General Rand?

General RAND. I cannot resist the opportunity, being one of the last people in the Air Force to ever serve alert on a dual-capable aircraft, when I did that in the 1980s in the F–16 at Incirlik.

I would agree with Secretary Scher's comment about our ability to respond to Russia in many forms, particularly our B–2 and our B–52. If I may, in the last two years, we have increased the number of what we call BAAD, bomber assurance and deterrence missions, that we provided General Breedlove and General Gorenc in the region.

In fact, three B–52s will be going to Moron, Spain, later this month for a two-week exercise. The beauty is we can have planes take off from Barksdale or Minot or Whiteman and be over and spend considerable time on station and even return where they do not even need to land in Europe.

But the effect that that has is it is easy to judge the assurance value. The intel community is always scratching their head of the deterrent value it has, but we believe it does have a deterrent value or we would not do it.

If I may, when you talked about China and Korea, for the last 10 years, we have not taken a single airplane off the Republic of Korea. We have put continuously six B–52s operating out of Guam, doing a continuous bomber presence.

Are we doing more today than when I left the Republic of Korea in 2004. We have increased our presence in what we are doing. I think that has a very calming effect both on the Republic of Korea and Japan.

Senator SESSIONS. Thank you.

Senator Donnelly?

Senator DONNELLY. Thank you, Mr. Chairman.

Senator Heinrich, do you want to go now? It is up to you.

Senator HEINRICH. Have you had a chance?

Senator DONNELLY. I have.

Senator HEINRICH. Secretary Scher and General Rand, thanks for being here today.

The CBO [Congressional Budget Office] noted that DOD will spend about $15.4 billion on nuclear weapons modernization in 2015, which is about three percent of DOD's entire budget. When you look at that together with NNSA's investment, which was about $19 billion last year in total, that is around $35 million, or roughly about 6 percent of the base defense budget.

In other words, we spend about six cents out of every defense dollar on our nuclear deterrent, which, in my view, has effectively prevented another world war for over 70 years now.

What is your current assessment of other nations' efforts to modernize their nuclear infrastructure? Do we have a good sense of what kinds of investments they are specifically making?

Secretary SCHER. Certainly, the full details of this we could provide to you in a closed session or an intel briefing. But as I mentioned a little bit, certainly, we see modernization across Russia and China. To some extent, the Russian modernization, they reached a point earlier than we did, where they were aging out of their systems and needed to modernize. That is not to say that these are not modern and fully up equipment. They are. They have modernized across the full range, I think we seen.

China, we have seen that they have made qualitative investments in their nuclear forces.

Those are the main ones we track. Obviously, we talked a lot about North Korea and see that they are continuing to test both their nuclear weapons as well as potential delivery systems.

Senator HEINRICH. How important is the B61 LEP to DOD's nuclear policy and the deterrence strategy that you talked about?

Secretary SCHER. The B61 as the remaining gravity bomb for the nuclear forces is very important to us, from a strategic perspective. We want to make sure that we have a full range of options, a range of yields and delivery systems. As a result, that is a critical piece of the air leg of the triad.

In terms of the technical advantages of consolidating a life-extension program, Dr. Hopkins would know more about that. But from a strategy perspective, it is very important.

Senator HEINRICH. Doctor?

Dr. HOPKINS. One of the most significant advantages of the B61 modernization, which is going to produce the B61–12, is it is going to enable the Nation to eliminate the need for—it will take the place of four different variants of the existing B61. There is a certain degree of efficiency and a certain degree of safety associated with reducing the numbers and types of weapons in the inventory.

Senator HEINRICH. Is that largely related to your ability to address yield?

Dr. HOPKINS. Yes, it is. In fact, the expected damage from a bomb, the utility of a bomb, is primarily a function of its yield and its accuracy. They are inversely related, so the more accurate a system is, the lower the yield that can be used to achieve the desired effect.

Senator HEINRICH. General Rand, do you want to add anything to that observation?

General RAND. No, sir. I think that summarizes it well. I think the pragmatics of it is that it is going to be very helpful for us. I was at Whiteman earlier in January, and they had the different B61s. That just becomes much more difficult to manage and to secure.

This will be viewed, from that very pragmatic point of view, as a helpful thing.

Senator HEINRICH. One last question, and then I will turn it back over.

What are the steps that the services are taking broadly to improve the morale of the nuclear mission force? How is each measuring the effectiveness of those actions?

Secretary SCHER. Obviously, the services will comment on this, but I do want to note, first of all, the great job that I know each of the services are doing and the fact that we in OSD [Office of the Secretary of Defense] are not forgetting that we also have a requirement to track this and to make sure that that happens. Now, each of the services is doing it, and we can track that as well. But it has to be a system- and enterprise-wide focus on this, as well as a service-specific one.

Admiral BENEDICT. As Secretary Scher said, leadership starts from the top on this issue. Certainly, the Secretary of Defense and Secretary Work, as a Deputy Secretary of Defense, have been leading this effort.

Within the Navy, we have focused primarily on our shipyards, our manning of the shipyards, to ensure that we can do the throughput, as well as our strategic weapons facilities, which is where we support the SSBNs.

We are, as I stated in my opening statement, about 79 percent complete with the tasks that we were assigned and accepted under the Secretary of Defense reviews. All the remaining ones are really long-term perspectives, which we will not be able to complete physically this year.

It is the number-one priority of the CNO. He tracks it personally. We are very committed to stay on course with what the cape reports to the Secretary.

Senator HEINRICH. General?

General RAND. Yes, sir. I can spend the entire session on this topic, as you well realize. Senator Donnelly had brought it up, of how we were doing to implement the changes that were very much needed.

But if I may, briefly, as we took all the reviews that were done in our force improvement program, came up with over 300 recommendations. We put those into six buckets.

Those buckets are leadership and organization as number one; culture is two; resources and materiel is three; surety is the fourth one; and the fifth and sixth are personnel and training. We are just mowing through it, sir. We are going through each one of these. We are tracking them. Some of these we will never be able to say we are done with, because they will be just repeating.

That is how we are doing it. It is, certainly, my number-one focus. I would tell you that Secretary James and the Chief of Staff

of the Air Force, General Welsh, have given me very strong guidance on their expectations of the emphasis. We have a superb proponent in our chief and secretary.

Senator HEINRICH. Thank you, all.

Senator SESSIONS. Senator Donnelly?

Senator DONNELLY. Thank you, Mr. Chairman.

Secretary Scher, when you look at North Korea, how important of a role do think missile defense systems in South Korea can play?

Secretary SCHER. I think when you look at the range of capabilities that North Korea has, I think there is no question that we need to figure out how we can deploy, and we do deploy, missile defense to the peninsula. As you saw after the potential test of ballistic missile components, but the satellite launch, the alliance together decided that it was time to look at placing THAAD [Terminal High Altitude Area Defense] on the peninsula. I think that is an important step for the alliance, and one that I hope we can look to figure out how we can conclude quickly.

Missile defense, of course, is never going to be the system that protects every place from every kind of missile ever coming in. But it needs to be able to be in place to protect key assets, to protect critical infrastructure, and to sow doubt in the mind of an adversary that they will be successful in a quick launch and a decapitation or a strike of getting out capabilities.

We have to balance missile defense with the capabilities to ensure that we continue effective deterrence, and continue to make the case that, in this case, North Korea will not achieve its objectives, that it will not be able to see any benefit from taking aggressive action against our ally, the Republic of Korea. I believe strongly that we have in place forces now to do that, missile defense and offensive forces, but we are going to continue to do this as the situation changes.

Senator DONNELLY. Do you think the Chinese pass on the message to Kim Jong-un and he just does not listen? What I mean by that is, the message of, look, whatever you do will be met with significantly more coming back into you. That message has been given to the Chinese.

Does Kim Jong-un not even listen to this? Is this all internally related more than externally related?

Secretary SCHER. I think I can give you the——

Senator DONNELLY. We are trying to gain your wisdom here.

Secretary SCHER. I understand. To be very honest, Senator, I used to spend a lot of time trying to figure out the ins and outs of people's motivation. Right now, I spend a lot of time trying to figure out—I do not care. I am looking at their capabilities, and I am going to make sure that we can address the threats posed by their capabilities and make sure that we have effective systems to ensure deterrence.

I have never made a lot of money being a good predictor of what people are actually thinking or doing.

Senator DONNELLY. Is your regular rule basically just, when you show them significantly more firepower, significantly more deterrence, at some point, all you can do is show them the very best that you have, that you would overwhelm them in return?

Secretary SCHER. I personally believe that Kim Jong-un does does have a rational side and does think about regime and his own survival. Hence, us demonstrating exactly what you said goes a long way to ensuring the deterrence on the peninsula and overall stability. We still need to do more, as does everybody in the international community.

Senator DONNELLY. Let me just close with this, and this is like a lightning round, almost. Do the very best you can.

What keeps you up the most at night in your present responsibility? This would be to everyone on the panel.

Secretary SCHER. Miscalculation. The broad answer is miscalculation. But it is either miscalculation from North Korea, from Russia, from Pakistan and India, the number of countries that have at their disposal some of the most destructive weapons known to mankind. That keeps me up at night, miscalculations about that.

There are a lot of other problems and a lot of my colleagues and I spend a lot of time on those, but none of them pose that same existential danger, I think, to the United States, to the Western system, to our allies and friends, as miscalculation amongst the nuclear powers.

Senator DONNELLY. Dr. Hopkins?

Dr. HOPKINS. In addition to miscalculation, what I would be most concerned about is making sure that we have thought of everything with respect to potential threats against our system. We have an active program to try to stay ahead of threats, and we want to make sure that we are staying ahead of both terrorist and state threats.

Senator DONNELLY. General Rand?

General RAND. Yes, Senator, I agree with those concerns expressed, but the practicality for me is that we are doing operations every day. The movement of nuclear weapons, B–1s and B–52s flying combat, those are the reality of doing the mission, and the risks associated with that would be what keep me up at night.

Senator DONNELLY. Admiral Benedict?

Admiral BENEDICT. Sir, I would say it is people. We just celebrated our 60th anniversary as a program with an outstanding record, and I love to make that statement. Then I follow it up with, but we are not halfway done. We have 68 more years to go, because we are building a class of submarines that will be in the water through 2084.

We develop hardware, software, I can do all that, and I think we have demonstrated that we can do that. It is maintaining, training, and putting that fundamental philosophical discipline that got us here in those folks for the next 68 years. That is what keeps me up.

Senator DONNELLY. Thank you.

Senator SESSIONS. Thank you.

I think North Korea needs to know that we may not be the best of all times in creating a new government, but we are pretty good at taking one down. They need to know that there are things we will not accept, and their existence is at stake.

Sometimes I think, in our desire to try to have a rapprochement and work with our adversaries, they may get the wrong message. Ultimately, we have to use these powerful weapons—hopefully not

these—but powerful military force to defend the interests of the United States and the world.

Anything else that you would like to add to the discussion?

Well, we thank you very much. Our subcommittee will be working on this. We have a very good subcommittee that has made itself very knowledgeable about the challenges that we face. We will try to treat respectfully your requests for funding and authority, and do our best to respond as a good Congress should. We are adjourned.

[Whereupon, at 3:57 p.m., the hearing was adjourned.]

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 2017 AND THE FUTURE YEARS DEFENSE PROGRAM

TUESDAY, FEBRUARY 23, 2016

U.S. SENATE,
SUBCOMMITTEE ON STRATEGIC FORCES,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

ATOMIC ENERGY DEFENSE ACTIVITIES AND PROGRAMS

The subcommittee met, pursuant to notice, at 2:33 a.m. in Room SR–232A, Russell Senate Office Building, Senator Jeff Sessions (chairman of the subcommittee) presiding.

Subcommittee members present: Senators Sessions, Fischer, Graham, Donnelly, King, and Heinrich.

OPENING STATEMENT OF SENATOR JEFF SESSIONS

Senator SESSIONS. Our meeting will come to order.

We expect Senator Donnelly to arrive any moment, but I would go on and share a few opening remarks.

This Strategic Forces Subcommittee convenes to hear testimony on the Department of Energy Atomic Defense Activities and Programs in Review for the Defense Authorization Request for Fiscal Year 2017 and the Future Years Defense Program.

Leading the panel of witnesses is retired General Frank Klotz, Under Secretary of Energy and Administrator for the National Nuclear Security Administration.

We thank you, General Klotz. We admire your leadership.

He is joined by Brigadier General Stephen Davis, Acting Deputy Administrator for Defense Programs; Ms. Anne Harrington, Deputy Administrator for Defense Nuclear Nonproliferation; and Admiral James Caldwell, the Deputy Administrator for Naval Reactors. They are joined by Mrs. Monica Regalbuto, Assistant Secretary of Energy for Environmental Management; and Mr. David Trimble, Director of United States/International Nuclear Security and Cleanup in the Government Accountability Office, GAO.

We are pleased to learn that the budget request for NNSA [the National Nuclear Security Administration] Weapons Activities in fiscal year 2017, some 9.2 billion, is consistent with the President's commitment made in 2010 to secure support for the New START Treaty. We will examine carefully the particulars of this request, but I would agree with our colleague, Senator Jim—Congressman

Jim Cooper, the ranking Democrat on the House Armed Services Committee, who observed, when you were before his subcommittee two weeks ago, these programs are the Department's top priority and are going to be fully funded on a bipartisan basis.

Nevertheless, there is reason for some concern. According to the January 12th, 2016, report in the Wall Street Journal, Secretary of Energy, Secretary Moniz, expressed concern to the Office of Management and Budget that, quote, "Without an additional 5.2 billion for out years 2018 through 2021, the budget will," quote, "lack credibility with Congress and stakeholders." That's us. Secretary says this budget isn't—may not have credibility with us—and that, quote, "Failure to address these requirements in the near term "now—" will put NNSA budget in an untenable position by fiscal year 2018," which isn't far away—2018. The subcommittee will want to examine this and see where we stand.

Constrained national defense budgets will like—will be likely toward the future. There will be a lot of tough choices having to be made. But, we must ensure that the critical warhead life extensions remain on schedule and within cost, that facility construction is reasonable and can be justified, and that these programs benefit from stable, sufficient funding over the years—we don't want to be up and down, causing you more cost than you need; you need to be able to know what you've got—which is why Congress needs to look carefully at the Administration's recent decision to pursue development of a repository for high-level defense waste, separate of the development of a repository for civil commercial spent fuel. By altering the longstanding policy of maintaining a common nuclear waste repository, we are concerned that billions of dollars could be added to the defense cost, potentially squeezing out modernization and new weapon systems. Some have—I've heard the figure $15 to $40 billion is possible for this. That's a stunning number.

With that, I'd like to turn to my able Ranking Member, Senator Donnelly, for his opening comments.

STATEMENT OF SENATOR JOE DONNELLY

Senator DONNELLY. Thank you, Mr. Chairman.

I want to thank our witnesses for appearing today.

I understand Assistant Secretary Regalbuto and Brigadier General Davis are new before our subcommittee. I welcome you.

This hearing touches on some of the most complex problems in our government. We will hear testimony from Administrator Klotz on rebuilding our nuclear weapon stockpile to ensure we can deter existential threats to our Nation. Meanwhile, Assistant Secretary Regalbuto will describe how we will treat and dispose of some 55 million gallons of radioactive waste that borders the Columbia River in Washington, with a similar amount at the Savannah River site in South Carolina. I want to understand whether you're meeting the milestones and cost estimates that you have outlined to us in prior hearings and budgets. The Department has, for a number of years, been on the GAO's Major Program High-Risk List, and it is imperative that progress be made in getting off of this list. It won't happen overnight, but I hope that hearings such as these maintain the proper focus on the ability to do so.

As always, let me thank Senator Sessions and his staff for holding this hearing. They've been great partners, and we look forward to today's discussion.

Senator SESSIONS. Thank you.

I will just introduce you all here at once:

Lieutenant General Klotz has been the Department of Energy's Under Secretary of Nuclear Security and NNSA Administrator since April of 2014. He's responsible for the management and operation of NNSA, as well as policy matters across the Department of Energy and NNSA enterprise in support of the President's nuclear security agenda.

Dr. Regalbuto has been Assistant Secretary for Environmental Management at the Department of Energy since August of 2015. She provides the leadership necessary to continue the safe cleanup of the environmental legacy brought about from five decades of nuclear weapons development and government-sponsored nuclear energy research. That's a big deal, and it's expensive, and we need to see where we stand.

Mr. Trimble is the Director of U.S. and International Nuclear Security and Cleanup at the GAO, and provides oversight and leadership on international nuclear security and cleanup issues.

Admiral Caldwell is the Director of Naval Nuclear Propulsion Program, dual-hatted with the Department of Energy and the Department of Navy. Have you melted down over having——

[Laughter.]

Senator DONNELLY. If so, let us know, so we can——

[Laughter.]

Senator SESSIONS. It doesn't look like it. You look fine.

He's responsible for the command and safe, reliable operation of the Navy's Nuclear Propulsion Program and for all the current U.S. naval reactors deployed for usage, as well as all facilities needed to ensure safe operations.

Ms. Harrington has been the Deputy Administrator for Defense Nuclear Nonproliferation since October 2010.

We welcome you back.

She manages NNSA's billion-dollar Nuclear Nonproliferation Program to secure vulnerable nuclear material around the world, stop nuclear smuggling, and prevent the proliferation of weapons of mass destruction, which I'm—we're all nervous about.

Brigadier General Davis is Acting Deputy Administrator for Defense Programs at the NNSA. He's also Principal Assistant Deputy Administrator for Military Applications for the NNSA, ensuring the Nation sustains safe, secure, and effective nuclear weapons.

General Klotz, you want to lead off?

STATEMENT OF HONORABLE FRANK G. KLOTZ, UNDER SECRETARY FOR NUCLEAR SECURITY, DEPARTMENT OF ENERGY

General KLOTZ. Yes, sir, I'd be delighted to.

Chairman Sessions, Ranking Member Donnelly, Senator Fischer, Senator Heinrich, thank you for the opportunity to present the President's fiscal year 2017 budget request for the Department of Energy's National Nuclear Security Administration.

We provided the subcommittee a written statement, and respectfully request it be submitted for the record.

Senator SESSIONS. We will make it part of the record.

General KLOTZ. We value this committee's leadership in national security as well as its robust and abiding support for the missions and the people of NNSA.

Our budget request, which comprises more than 40 percent of the Department of Energy's total budget, is $12.9 billion, an increase of nearly 357 million, or 2.9 percent, over the fiscal year 2016 enacted level. The budget request continues the Administration's unwavering commitment to NNSA's important and enduring missions. These missions are defined in the NNSA Strategic Vision, which we released just last year. These include to maintain a safe, secure, and effective nuclear weapon stockpile; to prevent, counter, and respond to the threat of nuclear proliferation and nuclear terrorism; and to support the capability of our nuclear-powered Navy to project power and to protect American and allied interests around the world.

To succeed, NNSA must maintain crosscutting capabilities that enable each of these core missions, again, as defined in our Strategic Vision. These crosscuts focus on advancing science, technology, and engineering, supporting our people and modernizing our infrastructure, and developing a management culture focused on safety, security, and efficiency, adopting the best practices and use across the Government and in the commercial world.

If you'd like, I'd be pleased to offer a copy of this document, the Strategic Vision document, for the record, as well.

Senator SESSIONS. Thank you. We will make that a part of the record.

General KLOTZ. The budget materials and briefings we have provided describe NNSA's major accomplishments last year, 2015, as well as the underlying rationale for our budget proposal for fiscal year 2017. Let me briefly highlight just a few of the points.

First and foremost, the United States has maintained a safe, secure, and effective nuclear weapon stockpile without nuclear explosive testing for over 20 years. NNSA's fiscal year 2017 budget request continues the steady increase of the Weapons Activities appropriation. In fact, this account has increased more than 40 percent since the fiscal year 2010 budget request. As a result of the funding provided by this Congress and supported by this subcommittee and the significant improvements NNSA has made over the last couple of years in program management, all of our life extension programs are on schedule and within budget.

NNSA's science and technology base continues to yield critical modeling and simulation data and deploy increasingly capable high-performance computing in support of the stockpile. Last year, for example, the National Ignition Facility [NIF] at Lawrence Livermore National Laboratory increased its shot rate—that is, the number of experiments it does—from 191 in 2014 to 356 in 2015, almost doubling, including the first-ever experiments at NIF using plutonium.

Our budget request also supports recapitalization of NNSA's aging research and production infrastructure, most notably the facilities where we perform our major uranium, plutonium, tritium,

and other commodity operations. Of significance, NNSA completed the first subproject of the Uranium Processing Facility, called Site Readiness, on time and $20 million under budget.

This year's request for the Defense Nuclear Nonproliferation account, Anne's account, is 6.8 percent lower than the fiscal 2016 enacted level, for two reasons. First, prior-year carryover balances are available to execute several programs in this mission space. Second, we propose terminating the Mixed Oxide Fuel Fabrication Facility Project [MOX] and pursuing a dilute-and-dispose approach as the fastest, less expensive path to meeting our National commitment and international agreement to dispose of 34 metric tons of excess weapons-grade plutonium.

The request for our third appropriations, the Naval Reactors Program, keeps pace with mission needs and continues NNSA's commitment to the three major initiatives: the *Ohio*-class reactor plant system development, the land-based S8G prototype refueling overhaul in upstate New York, and the Spent Fuel Handling Recapitalization Project in Idaho. For each of these missions, NNSA is driving improvements in management and governance.

For all of our programs, we have instituted rigorous analysis of alternatives, defined clear lines of authority and accountability, and ensured that Federal project directors and contracting officers have the appropriate skill mix and professional certifications to effectively manage NNSA's work.

Our budget request for Federal salaries and expenses reflects an increasing emphasis on improving program and project management across all of our mission pillars.

In closing, Mr. Chairman, the nuclear security enterprise continues to make significant progress. Through discipline, careful planning, and your continued and strong support, we believe we can make smart investments to build on that progress and meet new challenges in the future.

Again, sir, thank you for the opportunity to appear before this subcommittee.

[The prepared statement of General Klotz follows:]

PREPARED STATEMENT BY LT. GEN. FRANK G. KLOTZ, USAF (RET)

Chairman Sessions, Ranking Member Donnelly, and Members of the Subcommittee, thank you for the opportunity to present the President's fiscal year (FY) 2017 budget request for the Department of Energy's (DOE) National Nuclear Security Administration (NNSA). It is a pleasure to be here this afternoon. We value this Committee's strong support for the nuclear security mission, and for the people and institutions that are responsible for executing it.

The President's fiscal year 2017 budget request for NNSA is $12.9 billion, this is an increase of $357.5 million or 2.9 percent over the fiscal year 2016 enacted level. The request is approximately 43 percent of the DOE's total budget, and 67 percent of DOE's total 050 budget.

The NNSA has a unique and special responsibility to maintain a safe, secure, and effective nuclear weapons stockpile for as long as nuclear weapons exist; to prevent, counter, and respond to evolving and emerging nuclear proliferation and terrorism threats; to provide nuclear propulsion to our Navy as it protects American and Allied interests around the world; and to support our outstanding NNSA federal workforce. By supporting overall growth, this budget request represents a strong endorsement of NNSA's vital and enduring missions, and is indicative of the Administration's unwavering commitment to a strong national defense.

NNSA's missions are accomplished through the hard work and innovative spirit of a highly talented federal and Management and Operating (M&O) workforce committed to public service. To provide this team the tools they need to carry out their

complex and challenging task, both now and in the future, we must continue to modernize our scientific, technical, and engineering capabilities and infrastructure. In doing so, we are mindful of our obligation to continually improve our business practices, and to be responsible stewards of the resources that Congress and the American people have entrusted to us.

The fiscal year 2017 budget request also reflects the close working partnership between NNSA and the Department of Defense (DOD). NNSA works closely with DOD to meet military requirements, support our Nation's nuclear deterrence capabilities and modernize the nuclear security enterprise. I would also note, that as in previous years, DOD is carrying in its fiscal year 2017 budget request separate funding in fiscal year 2018 and beyond that will be reallocated annually to NNSA's Weapons Activities and Naval Reactors.

I want to thank the committee for its support of the fiscal year 2016 budget request and look forward to your continuing support in fiscal year 2017. We have made some tough decisions and tradeoffs to meet both military commitments and nuclear security priorities. Without congressional support, modernization of our nuclear enterprise, implementation of our long-term stockpile sustainment strategy, and sustainment of our nonproliferation and prevention and response capabilities could be at risk. The program we have proposed is highly integrated and interdependent across the four accounts.

Details of the fiscal year 2017 budget request for the NNSA follow:

WEAPONS ACTIVITIES APPROPRIATION

For the Weapons Activities account, the fiscal year 2017 budget request is $9.2 billion, an increase of $396.2 million, or 4.5 percent above the fiscal year 2016 enacted levels. This account provides funds for the Defense Programs portfolio, which is responsible for all aspects of the stockpile stewardship, management, and responsiveness programs; the enterprise-wide infrastructure sustainment activities managed by our Office of Safety, Infrastructure, and Operations; NNSA's physical and cybersecurity activities; and the secure transportation of nuclear materials.

Maintaining the Stockpile

Last year, the work of the science-based Stockpile Stewardship Program (SSP) allowed the Secretaries of Energy and Defense to certify to the President for the 20th time that the American nuclear weapons stockpile remains safe, secure, and reliable, without the need for underground explosive nuclear testing. This achievement is made possible each year by essential investments in state-of-the-art diagnostic tools, high performance computing platforms, and modern facilities, which are staffed by NNSA's world-class scientists, engineers, and technicians.

For *Directed Stockpile Work (DSW),* the fiscal year 2017 budget request is $3.3 billion, a decrease of $57.3 million, or 1.7 percent below the fiscal year 2016 enacted levels. These reductions will not restrict NNSA's ability to annually assess system performance and reliability or maintain the schedule for Life Extension Programs (LEP).

The major LEPs are a fundamental part of this account. The $222.9 million requested for the W76–1 warhead LEP directly supports the Navy and will keep the LEP on schedule and on budget to complete production in fiscal year 2019. We continue to make good progress on the B61–12 LEP, which will consolidate four variants of the B61 gravity bomb and will improve the safety and security of the oldest weapon system in the U.S. nuclear arsenal. With the $616.1 million requested, we will remain on schedule to deliver the First Production Unit (FPU) in fiscal year 2020. NNSA is responsible for the refurbishment of the nuclear explosives package and new bomb electronics, while the Air Force will provide the tail kit assembly under a separate acquisition program. When fielded, the B61–12 bomb will support both Air Force strategic long-range nuclear-capable bombers and dual-capable fighter aircraft, providing extended deterrence to our allies and partners, and allow retirement of the last megaton class weapon in the inventory, the B83 gravity bomb.

In July 2015, we began Phase 6.2 (Feasibility Study and Design Options) for the W80–4 cruise missile warhead LEP. The fiscal year 2016 budget request included $195 million to accelerate the FPU by two years to fiscal year 2025, a decision made by the Nuclear Weapons Council (NWC) in late 2014. The fiscal year 2015 budget request included $10 million to start the program. We had initially planned a ramp-up of Phase 6.2 study activities beginning in fiscal year 2016 to support the NWC FPU decision. However, as a result of the fiscal year 2016 continuing resolution, we were unable to begin the planned ramp-up activities until just recently. Furthermore, because of the delay in receiving fiscal year 2016 funding, the program cannot execute the full fiscal year 2016 enacted amount this year. As a result, a significant

amount of the program's fiscal year 2016 funding will carry over into fiscal year 2017. Consequently, the fiscal year 2017 budget request is $25.3 million over the fiscal year 2016 budget request, rather than $117 million over the fiscal year 2016 budget request, as previously projected. While this delayed start will affect planned technology maturation activities in Phase 6.2A (Design Definition and Cost Study), we still fully expect to meet the planned FPU date in fiscal year 2025 to support the Air Force Long Range Stand Off (LRSO) program.

In fiscal year 2015, the NWC approved additional scope for the W88 Alteration (ALT) 370 to meet an emerging requirement. NNSA is now accelerating the new Conventional High Explosive (CHE) refresh work to match the original ALT schedule. As a result, we are synchronizing the full program to transition seamlessly to the Production Engineering phase in February 2017. In preparation for that phase transition, NNSA will publish a baseline cost report by the end of this fiscal year. This budget request reflects these efforts and includes $281.1 million in fiscal year 2017 to support the FPU in fiscal year 2020.

Also within DSW, the fiscal year 2017 budget request includes $1.3 billion for Stockpile Systems and Stockpile Services. These programs sustain the stockpile pursuant to the direction given in the President's Nuclear Weapon Stockpile Plan (NWSP). In doing so, the programs deploy unique skills, equipment, testers, and logistics to enable the daily operations of the nation's nuclear deterrent. Specifically, these programs produce and replace limited life components (LLCs) such as neutron generators and gas transfer systems, conduct maintenance, surveillance, and evaluations to assess weapons reliability, detect and anticipate potential weapons issues such as the recent CHE refresh issue mentioned above, and compile and analyze information during the Annual Assessment process.

The pursuit and application of technological advancements to enhance safety and security while reducing life cycle costs of the stockpile runs through all of these activities. The development of Integrated Surety Architectures enhancing transportation safety and security is an example of these efforts.

Within DSW, the fiscal year 2017 budget request also includes $577.8 million for the Strategic Materials account to maintain NNSA's ability to produce the nuclear and other materials needed to support the enduring stockpile. This program includes Uranium Sustainment, Plutonium Sustainment, Tritium Sustainment, Domestic Uranium Enrichment (DUE), lithium and other strategic materials. Funding for Uranium Sustainment will enable enriched uranium operations in Building 9212, a Manhattan Project-era production facility at the Y–12 National Security Complex in Oak Ridge, Tennessee, to end in fiscal year 2025, and allow the bulk of this obsolete building to shut down. The sustainment and modernization of enriched uranium capabilities and the acceleration of Area 5 de-inventory will reduce safety and mission risks in the near term.

Plutonium Sustainment funds replacement and refurbishment of equipment and the critical skills needed to meet the pit production requirements as outlined in the National Defense Authorization Act (NDAA) for fiscal year 2015.

Tritium Sustainment ensures the Nation's capability and capacity to provide the tritium necessary to meet national security requirements, either through production at Tennessee Valley Authority nuclear power plants or by recovering and recycling tritium from returned gas transfer systems.

The DUE program continues its efforts to ensure that we have the necessary supplies of enriched uranium for a variety of national security needs.

The fiscal year 2017 budget request also includes $69 million for Weapons Dismantlement and Disposition, an increase of $16.9 million, 32.7 percent above the fiscal year 2016 enacted level, which includes funds to support the President's goal to accelerate the dismantlement rate of previously retired weapons by 20 percent. This will enable NNSA to dismantle the weapons retired prior to fiscal year 2009 by 2021, rather than the original goal of 2022. It will also result in increased Management and Operating staff at both the Pantex Plant in Amarillo, Texas and the Y–12 National Security Complex.

For *Research, Development, Test, and Evaluation (RDT&E),* the fiscal year 2017 budget request is $1.9 billion, an increase of $36.2 million, two percent above the fiscal year 2016 enacted level. This includes $663.2 million for the Advanced Simulation and Computing (ASC) Program, an increase of $31 million for the Advanced Technology Development and Mitigation (ATDM) subprogram that supports high performance computing on the path to exascale, and $87.1 million for Advanced Manufacturing Development (AMD), a decrease of $43 million. The decrease reflects a realignment from technology development investments to address higher NNSA priorities. The budget request focuses on continued investment in advanced manufacturing opportunities and improving the manufacturing processes for components that support multiple weapons to maximize the benefits of these investments. Ad-

vanced Manufacturing invests in technologies that will reduce the time and cost of current manufacturing methods, replaces obsolete processes, and supports manufacturing developments for future weapon upgrades. Additive Manufacturing, also known as 3–D printing, aids in developing and manufacturing components for stockpile and weapon technology applications. The overall RDT&E request reflects small increases for the Science Program ($442.0 million, an increase of $18.9 million) to achieve two subcritical experiments per year before the end of the FYNSP, and begin alterations to U1a tunnel complex at Nevada to prepare for these experiments: Inertial Confinement Fusion Ignition and High Yield Program ($523.9 million, an increase of $11.9 million) and the Engineering Program ($139.5 million, an increase of $8.1 million).

The Inertial Confinement Fusion Ignition and High Yield program has spearheaded ongoing improvements in management and operational efficiencies at NNSA's major high energy density (HED) facilities, including the National Ignition Facility (NIF) at Lawrence Livermore National Laboratory (LLNL) in California and the OMEGA facility at the University of Rochester in New York. In fiscal year 2015, NIF markedly improved its shot-rate efficiency with over 350 key experiments performed (compared to 191 in fiscal year 2014) in support of the SSP. This level of effort represents an 85 percent increase over the previous year and an 18 percent increase over its goal for 2015.

NNSA has taken major steps in high performance computing to deliver on its missions and play a leading role to support the President's Executive Order on the National Strategic Computing Initiative (NSCI). In 2015, Los Alamos National Laboratory (LANL) and Sandia National Laboratories (SNL) received the first hardware delivery for NNSA's next generation high performance computer, Trinity. This computer will initially have eight times more applications performance than the Cielo machine it is replacing. NNSA also continued its CORAL collaboration with LLNL, the DOE Office of Science national laboratories at Oak Ridge and Argonne, IBM, and other vendors. CORAL will help develop next generation computing platforms to dramatically improve our ability to run increasingly complex codes and will be a significant step on the path to exascale computing.

NNSA collaborates with the DOE Office of Science while making these much needed investments in exascale computing. The fiscal year 2017 budget request includes $95 million from NNSA for the development of capable exascale systems.

Defense Programs also maintains the vitality of the broader National Security Enterprise. An important aspect of this effort is investing in Laboratory-, Site- and Plant-Directed Research and Development (LDRD/PDRD). Independent reviews have consistently affirmed the importance of the program to the long-term vitality of the labs. LDRD/PDRD provides basic research funding to foster innovation and to attract and retain young scientific and technical talent and is critical to the long-term sustainment of our national laboratories. Congressional support is essential to ensuring that we have both the workforce and the new developments necessary to support the nation's security into the future.

Improving Safety, Operations and Infrastructure

NNSA's ability to achieve its mission is dependent upon safe and reliable infrastructure. The age and condition of NNSA's infrastructure will, if not addressed, put the mission, the safety of our workers, the public, and the environment at risk. More than half of NNSA's facilities are over 40 years old while 30 percent of them date back to the Manhattan Project era. The fiscal year 2017 budget request for Infrastructure and Operations is $2.7 billion, an increase of $442.8 million, 19.4 percent above the fiscal year 2016 enacted level. This funding will help NNSA modernize and upgrade aging infrastructure and address safety and programmatic risks through strategic investments in both general purpose infrastructure and program-specific capabilities that directly support our nuclear weapons and nonproliferation programs.

To support critical programmatic activities, we are making important strides in recapitalizing our aging infrastructure and capabilities. In fiscal year 2015, NNSA funded new and continuing projects to enhance or replace programmatic capabilities and address the risks posed by the aging infrastructure. NNSA's investment in these projects is vital to the revitalization of the NNSA enterprise. The fiscal year 2017 budget request provides funding for more than 70 recapitalization projects. The request will also support general purpose infrastructure and program-specific capabilities through Line Item Construction projects. These projects include, for example, the Uranium Processing Facility (UPF), the Chemistry and Metallurgy Research Replacement (CMRR) project, the U1a Complex Enhancements Project (UCEP) in support of the Enhanced Capabilities for Subcritical Experiments (ECSE)

portfolio, the Albuquerque Complex Project to replace the current inadequate facilities, and a project to expand the electrical distribution system at LLNL.

One of the most worrisome of the NNSA infrastructure challenges is the excess facilities that pose risks to our workers, the environment, and the mission. While many of these facilities will ultimately be transferred to the DOE Office of Environmental Management for disposition, NNSA is focusing on reducing the risk where it can. In fiscal year 2015, NNSA successfully demolished our second non-process contaminated building at Y–12 within the past two calendar years. The fiscal year 2017 budget request supports a number of activities to continue to address excess facilities. These activities include the transition of the Kansas City Bannister Federal Complex to the private sector for environmental remediation and redevelopment, risk reduction activities at Alpha-5 and Beta-4 at Y–12—both of which are highly process-contaminated—and disposition of more uncontaminated facilities across the NNSA enterprise.

Our *Secure Transportation Asset (STA)* program provides safe, secure movement of nuclear weapons, special nuclear material, and weapon components to meet projected DOE, DOD, and other customer requirements. The fiscal year 2017 budget request of $282.7 million includes an increase of $45.6 million, 19.2 percent above the fiscal year 2016 enacted levels, to continue asset modernization and workforce capability initiatives. These initiatives include: (1) restoration of federal agent strength levels to meet the goal of 370; (2) the Safeguards Transporter (SGT) Risk Reduction Initiatives to manage the SGT beyond its design life; (3) development and testing of the selected alternative for the SGT replacement, the Mobile Guardian Transporter (MGT); and (4) replacement of vehicles and tractors.

The *Office of Defense Nuclear Security (DNS)* develops and implements sound security programs to protect Special Nuclear Material (SNM), people, information, and facilities throughout the nuclear security enterprise. The fiscal year 2017 budget request is $670.1 million, a decrease of $12.8 million, or 1.9 percent below the fiscal year 2016 the enacted level of $682.9 million due to one-time dedicated increases in fiscal year 2016. After adjusting for an fiscal year 2016 one-time $30 million designated plus up and $13 million dedicated line item construction amounts for each year, the remaining fiscal year 2017 operating request of $657.1 million is an increase of $17.2 million, or 2.7 percent above the fiscal year 2016 enacted operating level of $639.9 million. The request manages risk among important competing demands as NNSA continues to face the challenges associated with an aging physical security infrastructure that must be effectively addressed in the coming years. To this end, DNS is conducting a Site Condition Review (SCR) of the physical security systems at all locations to facilitate the development of an enterprise-wide security systems upgrade and refresh strategy. This effort will identify and manage current and future security improvements and upgrades on a 10-year planning cycle and includes determining the condition of critical security equipment and infrastructure. A final report of this effort will provide DOE/NNSA leadership and Congressional stakeholders with consolidated and up-to-date information to enable informed decisions for fiscal planning and programming.

The SCR is being conducted within the context of important organizational improvements and management strategies published in the June 2015 Security Roadmap. The document establishes a clear vision and path forward to correcting identified security issues and promoting sustained performance within the NNSA security program. The Security Roadmap is a multi-year effort that implements key recommendations for improvement identified in past assessments; it includes a total of 57 strategic initiatives covering culture, process, infrastructure, and workforce challenges. As of the end of 2015, DNS has completed six of the initiatives and is currently working on another 20 initiatives. The remaining 31 initiatives are pending formal initiation.

For *Information Technology and Cybersecurity,* the fiscal year 2017 budget request is $176.6 million, an increase of $19 million, or 12.1 percent above fiscal year 2016 enacted levels. This increase will fund much needed improvement to the Information Technology and Cybersecurity program, including Continuous Diagnostic and Mitigation (CDM), Telecommunications Security, infrastructure upgrades for the Enterprise Secure Computing Network (ESN), Public Key Infrastructure (PKI), Energy Sciences Network (ESnet) program, and an increased Information Technology budget. This cybersecurity program continuously monitors enterprise wireless and security technologies (e.g., identity, credential, and access management) to meet a wide range of security challenges. In fiscal year 2017, NNSA plans to continue the recapitalization of the Enterprise Secure Network, modernize the cybersecurity infrastructure, implement the Identity Control and Access Management project at NNSA Headquarters and site elements, and implement all Committee on National Security Systems and PKI capabilities.

DEFENSE NUCLEAR NONPROLIFERATION APPROPRIATION

The Defense Nuclear Nonproliferation (DNN), fiscal year 2017 budget request is $1.8 billion, a decrease of $132.4 million, 6.8 percent below the fiscal year 2016 enacted levels. This appropriation covers NNSA's nuclear threat reduction mission. DNN addresses the entire nuclear threat spectrum by helping to prevent the acquisition of nuclear weapons or weapon-usable materials, technologies, and expertise, countering efforts to acquire such weapons, materials, and technologies, and responding to nuclear and radiological incidents. The fiscal year 2017 budget request funds two mission areas under the DNN appropriation: the Defense Nuclear Nonproliferation Program and the Nuclear Counterterrorism and Incident Response (NCTIR) Program.

Nonproliferation Efforts

NNSA made significant progress in nuclear threat reduction in 2015. Working with foreign partners, the Office of Defense Nuclear Nonproliferation removed approximately 170 kilograms of highly enriched uranium (HEU) and plutonium from several civilian sites; successfully down-blended additional HEU to achieve a cumulative total of 150 metric tons of U.S. excess, weapons-usable HEU (approximately 6,000 nuclear weapons worth of material); recovered more than 100,000 curies of disused or orphaned radioactive material; ensured the United States remains on track to fulfill the commitments made at the 2014 Nuclear Security Summit; and supported the Secretary of Energy's efforts to develop the Joint Comprehensive Plan of Action (JCPOA) by providing scientific expertise and technical options to the United States negotiating team.

The *Material Management and Minimization (M/3/)* program provides an integrated approach to addressing the threat posed by nuclear materials through a full cycle of materials management and minimization. The primary objective of the program is to achieve permanent threat reduction by minimizing and, when possible, eliminating weapons-usable nuclear material around the world. The fiscal year 2017 budget request is $341.1 million, an increase of $24.5 million, 7.7 percent above the fiscal year 2016 enacted levels. This funding increase will accelerate reactor conversions in Kazakhstan and in the United States, as well as initiate the critical decision process to support the dilute-and-dispose program for domestic plutonium disposition.

The *Global Material Security (GMS)* program works with partner nations to increase the security of vulnerable nuclear and radiological materials and improve their ability to detect, interdict, and investigate illicit trafficking of these materials. The fiscal year 2017 budget request for this program is $337.1 million, a decrease of $89.6 million, 21 percent below the fiscal year 2016 enacted level. This decrease is possible because GMS is completing its work to protect the remaining International Atomic Energy Agency (IAEA) Category I radiological sources in the United States to meet our 2014 Nuclear Security Summit commitment, and because GMS is committed to reducing its prior year carryover balances.

The *Nonproliferation and Arms Control (NPAC)* program supports the nonproliferation and arms control regimes by developing and implementing programs to strengthen international nuclear safeguards; control the spread of nuclear and dual-use material, equipment, technology and expertise; verify nuclear reductions and compliance with nonproliferation and arms control treaties and agreements; and address other nonproliferation and arms control challenges. The fiscal year 2017 budget request will fund safeguards and export control activities, including efforts specifically in support of JCPOA implementation. This funding also supports statutorily mandated activities such as technical reviews of export licenses and interdiction cases, technical support for the negotiation and implementation of civil nuclear cooperation agreements (123 Agreements), and upgrades to the 10 CFR 810 authorization process. The fiscal year 2017 budget request for this program is $124.7 million, a decrease of $5.5 million, 4.2 percent below the fiscal year 2016 enacted level. This decrease primarily reflects a return to baseline funding following the one-time increase of $3.5 million by Congress in the fiscal year 2016 budget for improvements in the export control process, as well as cost-savings in export licensing activities achieved through operational efficiencies.

The *DNN Research and Development (DNN R&D)* program supports innovative unilateral and multi-lateral technical capabilities to detect, identify, and characterize (1) foreign nuclear weapons programs, (2) illicit diversion of special nuclear materials, and (3) nuclear detonations. To meet national and Departmental nuclear security requirements, DNN R&D leverages the unique facilities and scientific skills of DOE, academia, and industry to perform research, including counterterrorism-related R&D. The fiscal year 2017 budget request for this program is $393.9 million,

a $25.4 million or 6.1 percent decrease below fiscal year 2016 enacted levels. The decrease in funding reflects projected savings resulting from a reduction in planned activities for arms control-related R&D and a return to the baseline Nuclear Detonation Detection (NDD) program after development of an initial mitigation path for supply chain interruptions.

Nonproliferation Construction consolidates construction costs for DNN projects. Currently, the MOX Fuel Fabrication Facility (MFFF) is the only project in this program; however, the fiscal year 2017 budget request terminates the MOX project. The Department will complete pre-conceptual design for the dilute-and-dispose approach to establish Critical Decision-0 (CD–0), Approve Mission Need, and begin conceptual design in late fiscal year 2017. The fiscal year 2017 budget request of $270 million will be used to bring an orderly and safe closure of the MFFF. The scope and costs will be refined in subsequent budget submissions when the termination plan for the MFFF project is approved.

Nuclear Counterterrorism and Emergency Operations

DOE has adopted an enterprise-wide approach to strengthen overall preparedness to respond to a broad spectrum of potential emergencies. These emergencies include natural phenomena, such as adverse weather events or earthquakes, and man-made events, such as accidents or acts of terrorism. To better accomplish this mission, in November 2015, NNSA reorganized the Office of Emergency Operations and the Office of Counterterrorism and Counterproliferation.

Both of these organizations are supported under the Nuclear Counterterrorism and Incident Response (NCTIR) Program. In fiscal year 2016, the NCTIR program transitioned to the DNN account in order to align all NNSA funding to prevent, counter, and respond to nuclear proliferation and terrorism. The fiscal year 2017 budget request includes $271.9 million to support the NCTIR program, an increase of $37.5 million, 16 percent above the fiscal year 2016 enacted level. Within NCTIR, NNSA continues to work domestically and around the world to prepare for and improve our ability to respond to radiological or nuclear incidents.

Our counterterrorism and counterproliferation programs are part of broader U.S. Government efforts assessing the threat of nuclear terrorism and to develop technical countermeasures. The scientific knowledge generated under this program ensures that NNSA's technical expertise on nuclear threat devices, including improvised nuclear devices (INDs), supports and informs broader U.S. Government nuclear security policy and guides nuclear counterterrorism and counterproliferation efforts, including interagency nuclear forensics and DOD contingency planning.

NNSA's emergency response teams must deploy and respond with the most up to date equipment. The current equipment is aging, increasing maintenance expenses, and has started to impact NNSA's ability to perform its emergency response mission. The Radiological Assistance Program (RAP) remains the nation's premier first-response resource to assess a radiological incident and advise decision-makers on necessary steps to minimize hazards, but its effectiveness is beginning to be compromised by obsolete equipment. To ensure that NNSA is able to execute its radiological emergency response mission, RAP's equipment must be recapitalized regularly. Additionally, NNSA is acquiring state-of-the-art, secure, deployable communications systems that are interoperable with our Federal Bureau of Investigation and DOD mission partners, ensuring decision makers receive real-time technical recommendations to mitigate nuclear terrorist threats.

The Office of Emergency Operations is now aligned to focus on its core Department-wide all-hazards and complex-wide emergency management mission. The fiscal year 2017 budget request for this office is $34.7 million, an increase of $9.6 million, or 38 percent above the fiscal year 2016 enacted level. This will improve the emergency management system through an enterprise-wide approach that effectively increases the Department's all-hazards emergency preparedness and response capability during complex, cascading, or enduring incidents, and more effectively calls upon and leverages the assets, resources, and skills across the DOE complex. The Emergency Operations Center (EOC) will continue to be the 24/7/365 single-point-of-contact for Departmental and interagency notifications regarding situations requiring centralized management such as, national emergencies, heightened international tension, Departmental emergencies, natural disasters, or acts of terrorism. The program also manages the Emergency Communications Network, and Continuity Programs for all of DOE, including NNSA. The Office of Emergency Operations will continue to work within the DOE to develop plans to replace the existing EOC and to improve the Department's capabilities to respond to emergencies.

NAVAL REACTORS APPROPRIATION

Advancing Naval Nuclear Propulsion

NNSA supports the U.S. Navy's ability to protect and defend American interests across the globe. The Naval Reactors Program remains at the forefront of technological developments in naval nuclear propulsion and ensures a commanding edge in war.ghting capabilities by advancing new technologies and improvements in naval reactor performance and reliability.

In 2015, Naval Reactors enabled U.S. nuclear powered warships to operate for another year safely and effectively, steaming more than two million miles in support of national security missions. Initial reactor start-up was achieved in the lead reactor plant of pre-commissioning unit (PCU) *Gerald R. Ford* (CVN 78), the first new design aircraft carrier propulsion plant in 40 years. This historic milestone represents the culmination of almost 20 years of dedicated and sustained effort by Naval Reactors and its field activities, our Department of Energy laboratories, nuclear industrial base suppliers, the Navy design team and the nuclear shipbuilders. This is the first step in fully testing the integrated operations of the propulsion plant, culminating in sea trials this spring. Finally, we continued our reactor plant design and reactor core manufacturing development efforts in support of the new design *Ohio*-class replacement reactor plant, including the life-of-ship core.

The *Naval Reactors* fiscal year 2017 budget request is $1.42 billion, an increase of $45 million, 3.2 percent above the fiscal year 2016 enacted level. In addition to supporting today's operational fleet, the requested funding will enable Naval Reactors to deliver tomorrow's fleet by funding three national priority projects, and recruiting and retaining a highly skilled work force committed to the Navy and the nation. The projects include (1) continuing design of the new reactor plant for the replacement of the *Ohio*-class SSBN, which will feature a life-of-ship core and electric drive; (2) refueling a Research and Training Reactor in New York to facilitate *Ohio*-class replacement reactor development efforts and provide 20 more years of live reactor based training for fleet operators; and (3) building a new spent fuel handling facility in Idaho that will facilitate long term, reliable processing and packaging of spent nuclear fuel from aircraft carriers and submarines.

Naval Reactors has requested funding in fiscal year 2017 to support these projects, and to fund necessary reactor technology development, equipment, construction, maintenance, and modernization of critical infrastructure and facilities. By employing a small but high-performing technical base, the teams at our four Program sites—the Bettis Atomic Power Laboratory in Pittsburgh, the Knolls Atomic Power Laboratory and Kesselring Site in greater Albany, and our spent nuclear fuel facilities in Idaho—we can perform the research and development, analysis, engineering and testing needed to support today's fleet at sea and develop future nuclear-powered warships. Importantly, our labs perform the technical evaluations that enable Naval Reactors to thoroughly assess emergent issues and deliver timely responses that ensure nuclear safety and maximize operational flexibility. This technical base supports more than 15,000 nuclear-trained Navy sailors, who safely maintain and operate the 98 nuclear propulsion plants in the fleet 24 hours per day, 365 days per year around the globe. It will also facilitate delivery, as directed by Congress, of our conceptual plan for potential naval application of low enriched uranium.

NNSA FEDERAL SALARIES AND EXPENSES APPROPRIATION

The NNSA *Federal Salaries and Expenses (FSE)* fiscal year 2017 budget request is $412.8 million, an increase of $49.1 million, 13.5 percent above the fiscal year 2016 enacted level. The fiscal year 2017 budget request provides funding for 1,715 full-time equivalents (FTE) and support expenses needed to meet mission requirements. We are actively engaged in hiring to that number in a thoughtful and strategic manner. The fiscal year 2017 budget request will support 1,715 FTEs, an increase of 60 FTEs (25 above the authorized 1,690) above the anticipated number of FTEs in fiscal year 2016, and request an additional 25 for a total of 1,740 FTEs in fiscal year 2018 and the outyears. The exact number of FTEs will be determined following a detailed staffing review. It also provides for a 1.3 percent cost of living increase and a 5.5 percent increase for benefit escalation. In addition, the request provides funding for additional Federal Background Investigations for security clearances and provides additional funding to the Department's Working Capital Fund, primarily for Office of Personnel Management (OPM) credit monitoring and the Department's accounting systems (iMANAGE).

In fiscal year 2017, NNSA will continue its efforts to meet current and future workforce needs by analyzing how evolving missions are affecting job requirements. Reshaping of the workforce over the next several years will be essential, including

identifying the right staffing size and skill sets and implementing professional development plans now and in the future. NNSA will also continue to streamline its operations, particularly in travel and support services, to provide a lean and efficient organization.

MANAGEMENT & PERFORMANCE

To enhance our ability to carry out our mission and execute this budget request, we will continue to focus on improving our project management and cost estimating capabilities. In keeping with the Secretary of Energy's increased focus on Management and Performance, NNSA is committed to managing its operations, contracts and costs in an effective and efficient manner. The NNSA's Office of Acquisition and Project Management (APM) is driving continued improvement in contract and project management practices. APM is leading NNSA's effort to institute rigorous analyses of alternatives, provide clear lines of authority and accountability for federal and contractor program and project management, improve cost and schedule performance, and ensure Federal Project Directors and Contracting Officers with the appropriate skill mix and professional certifications are managing NNSA's work. NNSA participates in the Secretary of Energy's Project Management Risk Committee as a means to institutionalize and share best practices across the Department. NNSA established the Office of Project Assessments, reporting directly to the Principal Deputy Administrator, ensuring senior leadership visibility and accountability throughout the Enterprise for project performance. This office generated $33 million in cost avoidances as a result of their independent project peer reviews.

Since 2011, NNSA has delivered approximately $1.4 billion in projects, a portion of NNSAs total project portfolio, $70 million (or 5 percent) under original budget. Significant examples in the last year include the Uranium Processing Facility (UPF) Site Readiness Subproject, which delivered $20 million under budget; Y–12's Nuclear Facility Risk Reduction Project, which delivered $6 million under budget and 11 months ahead of schedule; and LANL's Transuranic Waste Facility Project, which is on track to complete $3 million under budget. Using the Department's best practices, the UPF and Chemistry and Metallurgy Research Replacement Facility Projects were restructured into smaller more manageable subprojects, significantly reducing project delivery risk.

NNSA is committed to encouraging competition and increasing the universe of qualified contractors, by streamlining its major acquisition processes. The most significant example was the competitive award of the Kansas City National Security Campus M&O contract, awarded without protest, saving taxpayers $150 million and increasing the use of small businesses. As an affirmation of the quality of NNSA's acquisition management team, only four out of 103 competitive procurements were protested, with NNSA winning all protests. Finally, NNSA exceeded its small business goal by over 20 percent, awarding $233 million to small business in fiscal year 2015.

NNSA will continue to focus on delivering timely, best-value acquisition solutions for all of our programs and projects. NNSA will use a tailored approach to contract structures and incentives that is appropriate for the unique missions and risks at each site. Our M&O contractors are responsible for disparate activities, ranging from research and development to industrial production. Accordingly, we will work to develop the right incentives for each circumstance and for each of our contracts.

COST ESTIMATING AND PROGRAM EVALUATION

The Office of Cost Estimating and Program Evaluation (CEPE) continues to develop its capabilities to provide trusted independent cost and resource analysis of NNSA's programs and projects. As detailed in its implementation plan, the number of CEPE federal staff will grow from a target of 15 in fiscal year 2016 to 18 in fiscal year 2017. CEPE will conduct independent cost estimates on the B61–12 LEP and W88 Alt 370 in fiscal year 2016 and the W80–4 LEP in fiscal year 2017. CEPE is also institutionalizing best practices for analysis of alternatives and leads the corporate process to build the NNSA budget.

CONCLUSION

The NNSA performs vital activities at home and throughout the world in support of the nuclear security mission. Its success in addressing 21st Century challenges hinges upon the technology, capabilities, and infrastructure entrusted to the organization.

Again, thank you for the opportunity to appear before you today.

[The prepared statement of Admiral James F. Caldwell follows:]

PREPARED STATEMENT BY ADMIRAL JAMES F. CALDWELL

A strong Navy is crucial to the security of the United States. Navy warships are deployed around the world every hour of every day to provide a credible "forward presence." With over 45 percent of the Navy's major combatants being nuclear powered, including 10 aircraft carriers, 14 ballistic missile submarines, 55 attack submarines, and 4 guided missile submarines—it is vital that these ships are ready when and where our Nation needs them. In addition to supporting these nuclear powered combatants, Naval Reactors has also safely maintained and operated two nuclear powered land-based prototypes—both over 38 years old—to conduct research and development and two Moored Training Ships—both over 51 years old—the oldest operating pressurized water reactors (PWRs) in the world. These land-based prototypes, Moored Training Ships, and Naval Nuclear Power Training Command train over 3000 sailors per year to operate our naval nuclear propulsion plants.

Our ballistic missile submarine force remains on patrol, marking over 60 years of peacekeeping capability through strategic deterrence. The Navy had 34 submarine deployments and 26 strategic deterrent patrols during 2015. In addition, at any given time, there were always at least 56 of 71 submarines deployed or on stand-by to deploy within a few days. Our carriers, USS *Carl Vinson* (CVN 70) and USS *Theodore Roosevelt* (CVN 71) completed successful deployments to the Central Command area of responsibility, and the USS *Ronald Reagan* (CVN 76) turned over with the USS *George Washington* (CVN 73) to serve as the forward-deployed carrier in Japan.

This past year, we also saw the christening of the attack submarine PCU *Illinois* (SSN 786) and keel laying for the PCU *Colorado* (SSN 788) and PCU *Indiana* (SSN 789), our fifteenth and sixteenth *Virginia*-class submarines. We've also added another attack submarine to our force by commissioning USS *John Warner* (SSN 785), and began a program that delivers two *Virginia*-class submarines annually. In 2015, we laid the keel for the second FORD-class CVN, PCU *John F. Kennedy* (CVN 79). We currently have 12 submarines and one next generation aircraft carrier in various phases of construction at our shipyards. Initial reactor start-up was achieved in the lead reactor plant of PCU *Gerald R. Ford* (CVN 78), the first new design aircraft carrier propulsion plant in 40 years. This historic milestone represents the culmination of almost 20 years of dedicated and sustained effort by Naval Reactors and its field activities, our Department of Energy laboratories, nuclear industrial base suppliers, the Navy design team and the nuclear shipbuilders. This is the first step in fully testing the integrated operations of the propulsion plant, culminating in sea trials this spring. Finally, we continued our reactor plant design and reactor core manufacturing development efforts to support of the new design *Ohio*-class replacement reactor plant, including the life-of-ship core.

The firm support of this subcommittee last year enabled safe operation of the fleet, Naval Reactors mandatory oversight, and continued progress on key projects. Naval Reactors' budget request for fiscal year (FY) 2017 will continue this work. The funding request is for $1.420 billion, an increase of $45 million (3 percent) over the fiscal year 2016 enacted funding level. In addition to supporting today's operational fleet, the requested funding will enable Naval Reactors to deliver tomorrow's fleet by funding three national priority projects and recruiting and retaining a highly skilled work force committed to the Navy and the nation. The projects are:

- Continuing to design the new reactor plant for the replacement of the *Ohio*-class ballistic missile submarine, which will feature a life-of-ship core and electric drive;
- Refueling a Research and Training Reactor in New York, to facilitate *Ohio*-class replacement reactor development efforts and provide 20 more years of live reactor based training for the fleet operators; and
- Building a new spent fuel handling facility in Idaho that will facilitate long term, reliable processing and packaging of spent nuclear fuel from aircraft carriers and submarines.

Naval Reactors has requested funding in fiscal year 2017 to support these projects, and to fund necessary reactor technology development, equipment, construction, maintenance, and modernization of critical infrastructure and facilities. By employing a small but high-performing technical base, the teams at our four Program sites—the Bettis Atomic Power Laboratory in Pittsburgh, the Knolls Atomic Power Laboratory and Kesselring Site in greater Albany, and our spent nuclear fuel facilities in Idaho—we can perform the research and development, analysis, engineering and testing needed to support today's fleet at sea and develop future nuclear-powered warships. Importantly, our labs perform the technical evaluations that enable Naval Reactors to thoroughly assess emergent issues and deliver timely responses that ensure nuclear safety and maximize operational flexibility. This tech-

nical base supports more than 15,000 nuclear-trained Navy sailors, who safely maintain and operate the 97 nuclear propulsion plants in the fleet 24 hours per day, 365 days per year around the globe. It will also facilitate delivery, as directed by Congress, of our conceptual plan for potential naval application of low enriched uranium.

The requested increase in funding is also required to support the planned ramp up of design efforts for the new reactor plant for the *Ohio*-class SSBN replacement—the Navy's number one acquisition priority. Providing unparalleled stealth, endurance, and mobility, our ballistic missile submarine force has delivered more than 60 years of continuous at-sea deterrence, and continues to be the most survivable leg of the nuclear triad. *Ohio*-class Replacement SSBN activity this year includes reactor plant design and component development to support procurement of long lead components starting in fiscal year 2019. Progress in these areas in fiscal year 2017 maintains schedule alignment with the Navy as the program moves forward to construction start in fiscal year 2021 while retiring technical risk and targeting cost reduction.

Related to *Ohio*-class replacement and the Program's training needs, the fiscal year 2017 budget request will support the land-based prototype refueling overhaul at the Kesselring Site in upstate New York. In fiscal year 2017, Naval Reactors will continue the core manufacturing work needed for the refueling overhaul, which will also enable timely construction of the life-of-ship core for *Ohio*-class replacement. Further, plant service-life engineering design will be completed in fiscal year 2017 to ensure that the land-based prototype overhaul, performed concurrently with refueling, supports 20 additional years of research, development and training.

The Naval Reactors fiscal year 2017 budget request also contains funds to continue the Spent Fuel Handling Recapitalization Project. After many years of funding reductions, Naval Reactors greatly appreciates Congressional support for this much needed project in fiscal year 2016, where we received the full request of $86M. Congressional support in 2016 enabled progress, design, and planning for site preparations and long lead material procurements in fiscal year 2017. We will use the $100M requested in fiscal year 2017 to finalize key facility and equipment requirements and advance facility design to support establishing the Performance Baseline in fiscal year 2018 and the start of construction in fiscal year 2019. Continued Congressional support will help ensure that the facility in Idaho is ready to receive spent nuclear fuel from the fleet in fiscal year 2025. Because the new facility's capabilities are required to support aircraft carrier refuelings and defuelings, any delay to the project schedule would require procurement of additional shipping containers to temporarily store naval spent nuclear fuel at a cost of approximately $150M for each year the project is delayed.

At the requested funding level, Naval Reactors can safely maintain and oversee the nuclear-powered fleet. Naval Reactors can also continue to advance the *Ohio*-class replacement and Land-based Prototype Refueling Overhaul, continue progress on the Spent Fuel Handling Recapitalization Project, and meet our environmental responsibilities.

Naval Reactors is committed to executing our projects on time and on budget, and continuing the search for the safest and most cost effective way to support the nuclear fleet. I respectfully urge your support for aligning funding allocations with the fiscal year 2017 budget request.

Senator SESSIONS. Thank you.

I believe next we'll go to Dr. Regalbuto—Secretary Regalbuto.

STATEMENT OF HONORABLE MONICA C. REGALBUTO, ASSISTANT SECRETARY OF ENERGY FOR ENVIRONMENTAL MANAGEMENT, DEPARTMENT OF ENERGY

Dr. REGALBUTO. Thank you.

Good afternoon, Chairman Sessions, Ranking Member Donnelly, and members of the subcommittee. I am pleased to be here today to represent the Department of Energy's Office of Environmental Management and to discuss the work that we have already successfully accomplished and what we plan to accomplish under the President's fiscal year 2017 budget request.

The total budget request for the EM [Environmental Management] program is 6.1 billion, which includes 673 million of pro-

posed mandatory funding and 5.3 billion for defense environmental cleanup activities. The request will allow EM to maintain a safe and secure posture across the complex while maximizing our work on compliance activities.

I would like to take this opportunity to highlight a number of EM's recent accomplishments:

At the Savannah River site, the 4,000-canister radioactive glass was recently poured. Achieving these milestones enables the closure of the seventh high-level waste tank.

At the Moab site, half of the estimated 16 million tons of uranium milling tailings have been removed and shipped to an engineering disposal cell.

At Hanford, we have completed cleanup of the bulk of the river corridor, including more than 500 facilities and 1,000 remediation sites.

The fiscal year 2017 budget request will allow us to continue to make progress in an ongoing cleanup priorities. Among EM top priority is the safe reopening of WIPP [Waste Isolation Pilot Plant]. EM continues to support recovery from the two incidents at the facility that interrupted the nationwide program for the disposition of transuranic waste. The request will support initiating waste emplacement operations by December of 2016.

At Idaho, the request will support the integrated waste treatment unit. This facility is planned to treat approximately 900,000 gallons of sodium-bearing waste.

At the Savannah River site, we will complete construction and ramp up commissioning activities at the Salt Waste Processing Facility, which will significantly increase our ability to treat tank waste. In addition, we will also continue to receive, store, and process spent nuclear fuel.

At the Hanford Office of River Protection, the request supports continued construction of the Low Activity Waste Facility, Balancing Plant, and outfitting of the Analytical Laboratory, which are the centerpiece of the Department's plan to begin the direct feed of low activity waste as soon as 2022.

The request for Richland allow us to continue the important work in the central plateau and to complete the demolition of Hanford's Plutonium Finishing Plant, once one of the most dangerous buildings in the complex.

At Oak Ridge, the request supports continued design of the Outfall 200 Mercury Treatment Facility at the Y–12 National Security Complex and complete the demolition of Building K–27, the last gaseous diffusions enrichment process building. It will mark the first time that a gaseous diffusion enrichment site has been completely decommissioned.

With the most challenging cleanup remaining, we understand the importance of technology development in reducing the lifecycle costs and enhancing our effectiveness. To help address many of the technical challenges involved, the request reflects a total investment in technology development of $33 million. The funding will allow us to continue to integrate robotics technologies into our efforts to help improve overall worker quality of life by easing the performance of physically demanding tasks.

In closing, I am honored to be here representing the Office of Environmental Management. We are committed to achieving our mission and will continue to apply innovative strategies to complete our mission safely.

Thank you. Be happy to answer any questions.

[The prepared statement of Dr. Regalbuto follows:]

PREPARED STATEMENT BY DR. MONICA REGALBUTO

Good afternoon Chairman Sessions, Ranking Member Donnelly, and Members of the Subcommittee. I am pleased to be here today to represent the Department of Energy's (DOE) Office of Environmental Management (EM). I would like to provide you with an overview of the EM program, key accomplishments during the past year and what we plan to accomplish under the President's $6,119,099,000 fiscal year (FY) 2017 budget request, which includes $673,749,000 of proposed mandatory funding.

OVERVIEW OF THE EM MISSION

EM supports the Department's Strategic Plan to position the DOE to meet the challenges of the 21st Century and the Nation's Manhattan Project and Cold War legacy responsibilities. The Department will leverage past experience, applying best practices and lessons learned; identify, develop, and deploy practical technological solutions derived from scientific research; and look for innovative and sustainable practices that make cleanup more efficient.

The EM program was established in 1989 and is responsible for the cleanup of millions of gallons of liquid radioactive waste, thousands of tons of spent nuclear fuel and special nuclear material, disposition of large volumes of transuranic and mixed/low-level waste, huge quantities of contaminated soil and water, and deactivation and decommissioning of thousands of excess facilities. This environmental cleanup responsibility results from five decades of nuclear weapons development and production and Government-sponsored nuclear energy research and development. It involves some of the most dangerous materials known to mankind. EM has completed cleanup activities at 91 sites in 30 states; EM is responsible for the remaining cleanup at 16 sites in 11 states.

Since 1989, the EM footprint has reduced significantly. For example, the Fernald site in Ohio and the Rocky Flats site in Colorado, both of which once housed large industrial complexes, are now wildlife refuges that are also available for recreational use. At the Idaho National Laboratory, we have decommissioned and demolished more than two million square feet of excess facilities, and removed all EM special nuclear material (e.g., highly enriched uranium) from the state.

There is less than 300 square miles remaining to be cleaned up across the EM complex and progress continues. The remaining cleanup work presents some of the greatest challenges.

EM CLEANUP OBJECTIVES AND PRIORITIES

EM's first priority is worker safety and at our sites across the complex we continue to pursue cleanup objectives with that in mind. Taking many variables into account, such as risk reduction and compliance agreements, EM has generally prioritized its cleanup activities as follows:

- Ensuring that activities are performed safely while providing the necessary security framework;
- Radioactive tank waste stabilization, treatment, and disposal;
- Spent nuclear fuel storage, receipt, and disposition;
- Special nuclear material consolidation, stabilization, and disposition;
- Transuranic and mixed/low-level waste disposition;
- Soil and groundwater remediation; and
- Excess facilities deactivation and decommissioning.

In particular, the fiscal year 2017 budget request will allow EM to:

- Complete activities necessary for resumption of waste emplacement operations at the Waste Isolation Pilot Plant;
- Commence startup testing and commissioning activities at the Salt Waste Processing Facility to support initiation of radioactive operations in 2018; and
- Continue construction on the Waste Treatment and Immobilization Plant to support direct feed of low activity waste by end of 2022.

Most importantly, EM will continue to discharge its responsibilities by conducting cleanup within a "Safe Performance of Work" culture that integrates environmental, safety, and health requirements and controls into all work activities. This ensures protection for the workers, public, and the environment

KEY RECENT AND NEAR-TERM ACCOMPLISHMENTS

I would like to take this opportunity to highlight a number of EM's most recent accomplishments. Recently, the 4,000th canister of radioactive glass was poured at the Savannah River Site Defense Waste Processing Facility. Achieving this milestone, along with other processing activities, enabled the closure of the seventh high-level waste storage tank at Savannah River with closure of the eighth tank in progress. At the Moab Site, half of the estimated 16 million tons of uranium mill tailings has been removed and shipped to an engineered disposal cell. At Hanford, we have completed cleanup of the bulk of the River Corridor cleanup, including more than 500 facilities and 1,000 remediation sites. At Oak Ridge, we are continuing design and critical decision reviews for the Outfall 200 Mercury Treatment Facility. The budget request enables EM to continue progress in completing buried waste exhumation at the Idaho site under the Accelerated Retrieval Project.

HIGHLIGHTS OF THE FISCAL YEAR 2017 BUDGET REQUEST

The fiscal year 2017 budget request for EM includes $5,382,050,000 for defense environmental cleanup activities. The request will allow EM to maintain a safe and secure posture across the complex, while maximizing our work on compliance activities. The budget request supports the continued construction of two unique and complex tank waste processing plants at the Savannah River Site, South Carolina, and the Office of River Protection, Washington. We are working to ensure these facilities will operate safely and efficiently. These two facilities are projected to treat tens of millions of gallons of radioactive tank waste for disposal.

Among EM's top priorities is the safe re-opening of the Waste Isolation Pilot Plant (WIPP) outside of Carlsbad, New Mexico. EM continues to support recovery from two 2014 incidents at the facility that interrupted the nationwide program for the disposition of transuranic waste resulting from atomic energy activities. Since opening WIPP, EM has sent more than 11,800 shipments of transuranic waste for permanent disposal, safely emplacing nearly 90,000 cubic meters of waste. The fiscal year 2017 budget request will continue corrective actions and safety activities to support WIPP, regulatory and environmental compliance actions, the Central Characterization Project and transportation activities, and the resumption of waste emplacement operations by December 2016.

In fiscal year 2017, cleanup progress will continue to be made across the rest of the complex. At Idaho, the fiscal year 2017 request will support the Integrated Waste Treatment Unit. This facility is planned to treat approximately 900,000 gallons of sodium bearing tank waste. The request also continues exhumations at the Subsurface Disposal Area, treatment of legacy contact-handled and remote-handled transuranic and mixed low-level waste and safe, secure management of spent nuclear fuel.

At the Savannah River Site, the fiscal year 2017 request supports continued production of canisters of vitrified high-level waste, and the construction of an additional on-site disposal unit for saltstone, the separated and treated low-activity fraction component of tank waste. Complete construction to support the planned commissioning and start-up of the Salt Waste Processing Facility in 2018. In addition, the request supports the safe and secure operation of the H Canyon/ HB–Line for the purpose of processing aluminum-clad spent nuclear fuel and down-blending EM-owned plutonium, ensuring the availability of space in K- and L–Areas for the future receipt of materials returned under national security summit agreements.

At the Office of River Protection, the fiscal year 2017 request supports continuing construction of the Low-Activity Waste (LAW) Facility, Balance of Facilities, and outfitting of the Analytical Laboratory of the Waste Treatment and Immobilization Plant (WTP), facilities which are the centerpiece of the Department's plan to begin the direct feed of low activity to the LAW facility (DFLAW) as soon as end of 2022. It will also simultaneously support ongoing efforts to resolve the technical issues associated with the WTP Pretreatment Facility and the WTP High-Level Waste Facility. The fiscal year 2017 request is designed to achieve the immobilization of low activity waste as soon as practicable while resolution of technical issues continues. In support of DFLAW, the request includes funds for engineering scale testing and final design of the Low Activity Waste Pretreatment System, which will remove cesium and solids from the tank waste and provide feed directly to the Low Activity Waste Facility.

Ongoing cleanup efforts continue at Richland. The fiscal year 2017 request supports the completion of the Plutonium Finishing Plant Facility transition and certain disposition activities in order to achieve slab-on-grade and completion of a cap over the site. The fiscal year 2017 request also supports continued remediation of the 618–10 Vertical Pipe Units and planning and technology maturation for the remediation of the 324 hot cell facility located over the 300–296 waste site.

At Oak Ridge, the fiscal year 2017 request will maintain EM facilities in a safe, compliant, and secure manner; and support continuing design and critical decision reviews for the Outfall 200 Mercury Treatment Facility at the Y–12 National Security Complex. The processing of contact-handled and remote-handled transuranic waste debris will continue at the Transuranic Waste Processing Center while technology maturation and planning continues for the Sludge Processing Facility Buildout project. Additionally, the budget request supports continued direct disposition of Consolidated Edison Uranium Solidification Project material from Building 3019.

With the most challenging cleanup sites before EM, we understand the importance of technology development in reducing life cycle costs and enhancing our effectiveness. To help address many of the technical challenges involved with high-risk cleanup activities, the fiscal year 2017 request reflects a total investment in technology development of $33,000,000. The fiscal year 2017 budget supports testing multiple technologies to solidify/stabilize mercury in soil and building materials to minimize the potential of mercury releases to the environment when decontamination and decommissioning of excess facilities begins at the Oak Ridge site. EM will also invest in characterization of and treatment options for Technetium-99, a key radioactive constituent in tank waste and in soils at sites across the complex; in robotics and semi-autonomous systems required for remote access to nuclear, chemical and other high-hazard facilities that are inaccessible or restricted to human entry; and in the development of test beds for the demonstration of treatment technologies, innovative tooling, and other technical solutions.

BUDGET AUTHORITY AND PLANNED ACCOMPLISHMENTS BY SITE

Office of River Protection, Washington
(dollars in thousands)

FY 2016 Enacted	FY 2017 Request
$1,414,000	$1,499,965

Key Accomplishments Planned for Fiscal Year 2017

- Maintain scheduled construction activities for the Low Activity Waste Facility, Analytical Laboratory, and Balance of Facilities to support the Direct Feed Low Activity Waste approach
- Initiate single-shell tank retrievals in AX Tank Farm
- Complete retrieval of AY–102 double-shell tank
- Complete Low Activity Waste Pretreatment System (LAWPS) preliminary design to a design maturity of 90 percent
- Continue resolution of technical issues of Criticality; Hydrogen Gas Vessels; and Erosion/Corrosion at the Pretreatment Facility

Savannah River Site, South Carolina
(dollars in thousands)

FY 2016 Current	FY 2017 Request
$1,336,566	$1,448,000

Key Accomplishments Planned for Fiscal Year 2017

- Package 100 to 110 canisters of vitrified high-level waste at the Defense Waste Processing Facility
- Operate Actinide Removal Process and Modular Caustic Side Solvent Extraction Unit to process 1.7 million gallons of salt waste
- Support planned construction, commissioning, and start-up activities for the Salt Waste Processing Facility
- Complete construction of Saltstone Disposal Unit #6

- Continue to receive foreign research and domestic research reactor spent nuclear fuel for safe storage and disposition
- Disposition spent nuclear fuel in H–Canyon by processing
- Activities to support implementation plan activities for the Defense Nuclear Facilities Safety Board Recommendation 2012–1 to mitigate and remedy safety issues at 235–F

Carlsbad Field Office, New Mexico
(dollars in thousands)

FY 2016 Enacted	FY 2017 Request
$304,838	$271,000

Key Accomplishments Planned for Fiscal Year 2017

- Complete activities necessary for resumption of waste emplacement operations at the Waste Isolation Pilot Plant by December 2016
- Continue design and permitting actions for new ventilation shaft and on-site storage projects

Los Alamos National Laboratory, New Mexico
(dollars in thousands)

FY 2016 Enacted	FY 2017 Request
$185,000	$189,000

Key Accomplishments Planned for Fiscal Year 2017

- Address the nitrate salt bearing transuranic wastes
- Remediation of town site (TA–43) cleanup of solid waste management units from the 1940s and 1950s production sites
- Complete the investigation of hexavalent chromium contamination of the groundwater beneath Mortandad and Sandia Canyons including field and bench-scale testing and plume control interim measures

Idaho National Laboratory, Idaho
(dollars in thousands)

FY 2016 Enacted	FY 2017 Request
$396,000	$362,088 [1]

[1] The amount reflects Defense Environmental Cleanup portion, the total Idaho fiscal year 2017 Request is $370,088,000.

Key Accomplishments Planned for Fiscal Year 2017

- Continue treatment of sodium bearing waste in the Integrated Waste Treatment Unit
- Characterize, package, certify, and temporarily store exhumed waste on site pending the resumption of operations at and shipments to the Waste Isolation Pilot Plant
- Complete exhumation of targeted buried waste at the Accelerated Retrieval Project VIII facility
- Continue safe storage of spent (used) nuclear fuel

Oak Ridge Site, Tennessee
(dollars in thousands)

FY 2016 Current	FY 2017 Request
$250,878	$213,219 [2]

[2] The amount reflects Defense Environmental Cleanup portion, the total Oak Ridge fiscal year 2017 Request is $391,407,000.

Key Accomplishments Planned for Fiscal Year 2017

- Continue planning design and preparation of regulatory documentation and Critical Decision reviews for the Outfall 200 Mercury Treatment Facility
- Continue processing transuranic waste debris at the Transuranic Waste Processing Center
- Continue offsite disposition of select Oak Ridge waste stream

Richland Operations Office, Washington
(dollars in thousands)

FY 2016 Current	FY 2017 Request
$988,091	$797,760[3]

[3] The amount reflects Defense Environmental Cleanup portion, the total Richland fiscal year 2017 Request is $800,000,000.

Key Accomplishments Planned for Fiscal Year 2017

- Complete Plutonium Finishing Plant Facility transition and selected disposition activities pursuant to achieving slab-on-grade including completion of a cap over the site
- Begin project planning for dry storage options for the cesium and strontium capsules currently stored at the Waste Storage Encapsulation Facility
- Planning and technology maturity for the remediation of the highly radioactive waste site 300–296 located beneath the 324 Building
- Continue remediation of the 618–10 Vertical Pipe Units

Nevada National Security Site, Nevada
(dollars in thousands)

FY 2016 Enacted	FY 2017 Request
$62,385	$62,176

Key Accomplishments Planned for Fiscal Year 2017

- Complete closure activities for 9 soil corrective action sites
- Support safe disposal of approximately 34,000 cubic meters of low-level and mixed low-level radioactive waste

CONCLUSION

Mr. Chairman, Ranking Member Donnelly, and Members of the Subcommittee, I am honored to be here today representing the over 20,000 men and women that carry out our Office of Environmental Management mission. We are committed to achieving our mission and will continue to apply innovative environmental cleanup strategies to complete work safely, and efficiently, thereby demonstrating value to the American taxpayers. All of this work will, first and foremost, be done safely, within a framework of best business practices. I am pleased to answer any questions you may have.

Senator SESSIONS. Thank you very much.

Mr. Trimble, I believe I omitted to introduce you. You are the Director of U.S. International Nuclear Security and Cleanup at the Government Accountability Office, the GAO, and provide oversight and leadership and insight on the United States international nuclear security and cleanup issues to Congress and other institutions.

Thank you.

STATEMENT OF DAVID C. TRIMBLE, DIRECTOR, U.S. AND INTERNATIONAL NUCLEAR SECURITY AND CLEANUP, GOVERNMENT ACCOUNTABILITY OFFICE

Mr. TRIMBLE. Thank you.

Chairman Sessions, Ranking Member Donnelly, and members of the subcommittee, my testimony today is based on past and ongoing work and will address challenges facing DOE's [the Department of Energy's] efforts to modernize the nuclear security enterprise, the growing cost of DOE's environmental liabilities, and accomplishments and planning challenges in the nonproliferation program.

Regarding modernization efforts, let me highlight three challenges facing DOE: management of the LEPs [Life Extension Programs], oversight of contracts and major projects, and budgetary issues.

NNSA estimates that it needs more than $290 billion over the next 25 years to support its modernization plans. These——

Senator SESSIONS. How much?

Mr. TRIMBLE. Two hundred ninety.

These plans include executing seven LEPs and depend on the replacement of key plutonium and uranium infrastructure assets. To carry out this work, effective management of these LEPs will be essential.

In our February report on the B61, we found that NNSA had adopted improved management approaches and has incorporated some of these into its defense programs. These are positive steps. But, some of these tools are yet to be proven, and the B61 program has faced shortages in program staff. These challenges must be navigated while the B61 program is operating on a constrained schedule with little, if any, margin left to deal with program risks.

Modernization plans also depend on DOE's ability to effectively manage its contracts and major construction projects. In 2015, we found that NNSA does not have a comprehensive policy for overseeing its M&O contractors. Notably, its key policy document was incomplete, parts were not being followed, and NNSA did not know if it had the staff needed to carry out its oversight approach.

DOE has taken actions to improve its project management, such as requiring Department offices to develop project cost and schedule estimates according to best practices. However, in our last high-risk report, we noted that DOE is currently on its third round of corrective action since 2008, and many of the same root causes continue to be identified.

DOE also continues to face challenges with some of its major projects. DOE has proposed to terminate MOX after spending nearly $5 billion, and is proposing to downblend the 34 tons of plutonium and potentially dispose of it at WIPP, which is currently closed. We have ongoing work to assess whether WIPP has the capacity for this volume of plutonium.

At Hanford, WTP [Waste Treatment Plan] continues to face longstanding technical and management challenges, and DOE is pursuing two new capital asset projects that will likely cost more than $1 billion. DOE has proposed adding 17 years to WTP's completion date, but does not know what the final cost will be.

Modernization plans are also complicated by questions about the alignment of NNSA's plans with future budgets and future competing demands for funding. In December, we found that NNSA's long-term budget estimates for modernization were $4.2 billion more than what is in the administration's budget figures for fiscal years 2021 through 2025. In addition, we found that low-range estimates for four LEPs exceeded estimated budget amounts in some years, meaning that some LEPs could face budgetary shortfalls.

In addition, funding for modernization activities will take place while its standing and new needs compete for resources. NNSA faces billions in deferred maintenance, and its current spending is below its own benchmarks to keep this problem from getting worse. In addition, DOE is pursuing a new strategy to build a separate repository just for defense waste. DOE's analysis indicates that this approach could cost billions more than using a single repository for commercial and defense waste. DOE's analysis cites some benefits to this approach, but officials have said these benefits cannot be quantified at this time.

Regarding DOE's long-term environmental liabilities which future defense budgets will need to fund, DOE faces many challenges. Over the past two decades, GAO and others have pointed out the need for DOE to take a complex-wide, risk-based approach to its cleanup strategy, finding that such an approach could reduce costs while also maximizing risk reduction. Notably, from fiscal year 2011 to fiscal year 2015, EM spent a total of about $23 billion on cleanup activities. Over the same time period——

Senator SESSIONS. How much?

Mr. TRIMBLE. Twenty-three billion from 2011 to 2015.

Over the same time period, its estimates of its remaining environmental liability rose by 77 billion. In 2015, EM estimated that cleanup of former weapons production sites would take until 2075 and cost 240 billion. Our recent ongoing work indicates that this figure is likely understated.

Lastly, in regards to nonproliferation, we have found that NNSA has made progress securing nuclear materials around the world and met its targets for removing HEU [Highly Enriched Uranium] and downblending LEU [Low Enriched Uranium]. While progress has been made, our work has found some methodological limitations in NNSA's over-the-horizon long-term planning effort to assess threats and trends over the next 5 to 10 years. NNSA agreed with our recommendations in this area and is revising its process.

Thank you. I'd be happy to answer any questions you may have.

[The prepared statement of Mr. Trimble follows:]

United States Government Accountability Office

GAO

Testimony

Before the Subcommittee on Strategic Forces, Committee on Armed Services, U.S. Senate

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DEPARTMENT OF ENERGY

Observations on Efforts by NNSA and the Office of Environmental Management to Manage and Oversee the Nuclear Security Enterprise

Statement of David C. Trimble, Director
Natural Resources and Environment

GAO-16-422T

GAO Highlights

Highlights of GAO-16-422T, a testimony before the Subcommittee on Strategic Forces, Committee on Armed Services, U.S. Senate

February 23, 2016

DEPARTMENT OF ENERGY

Observations on Efforts by NNSA and the Office of Environmental Management to Manage and Oversee the Nuclear Security Enterprise

Why GAO Did This Study

DOE's NNSA is responsible for managing the nuclear weapon stockpile and supporting nuclear nonproliferation efforts. NNSA executes its missions at eight sites that make up the nuclear security enterprise. DOE's EM's mission includes decontaminating and decommissioning facilities that are contaminated from decades of nuclear weapons production and nuclear energy research.

DOE has made progress, but GAO continues to identify challenges across the nuclear security enterprise, including with major projects' cost and schedule delays. With NNSA and EM proposing to spend tens of billions of dollars to modernize the nuclear security enterprise, it is important to ensure that scarce resources are spent in an effective and efficient manner.

This testimony discusses DOE's (1) ongoing challenges in nuclear security modernization, (2) growing cost of environmental liabilities, and (3) nonproliferation accomplishments and long-term planning challenges. GAO's statement is based mainly on information from 11 prior GAO reports issued from February 2015 to February 2016, as well as on ongoing work on (1) DOE's plans to develop a high-level waste repository and (2) environmental liabilities. That work included reviewing agency documents and interviewing agency officials.

GAO is not making any new recommendations. DOE continues to act on the numerous recommendations GAO has made in these areas. GAO will continue to monitor DOE's implementation of these recommendations.

View GAO-16-422T. For more information, contact David C. Trimble at (202) 512-3841 or trimbled@gao.gov

What GAO Found

The Department of Energy's (DOE) National Nuclear Security Administration (NNSA)—a separately organized agency within DOE—continues to face several ongoing challenges in modernizing the nuclear security enterprise, including challenges in managing life extension programs (LEP), contracts and major projects, and the alignment of plans with future budgets. As GAO reported in August 2015, NNSA estimates that it will need more than $290 billion over the next 25 years to support its modernization plans. These plans include the execution of seven LEPs that entail refurbishing or replacing nuclear weapons' aging components. In February 2016, GAO found some improved and positive management approaches were being used on the ongoing B61-12 LEP but also noted that the cost and schedule of the LEP have been subject to significant changes since its inception. Another challenge for DOE's modernization plans is effectively managing contracts and major projects to replace aging nuclear facilities. DOE has taken some actions to improve its contract and project management but continues to face cost and schedule delays, and this remains a high-risk area. Further, in May 2015, GAO found that NNSA did not have a comprehensive policy or procedures for implementing its framework for overseeing its contractors and for evaluating their performance. Moreover, NNSA's ability to execute its modernization plans is also complicated by questions regarding the alignment of its plans with future budgets and by outstanding and new needs for funding, such as supporting a new repository for defense high-level waste.

In 2015, DOE's Office of Environmental Management (EM) estimated that cleanup of former weapons production sites would generally take until 2075 and cost $240 billion. In March 2015, GAO found that that this estimate does not include all costs—for example, the costs for some contaminated facilities that have not yet been transferred to EM, which DOE acknowledges could cost billions to clean up. GAO's preliminary observations from ongoing work also indicate that the estimated cost of the remaining environmental cleanup has been growing, even while EM has been spending billions on cleanup. For example, from fiscal years 2011 to 2015, EM spent a total of about $23 billion, while EM's estimate of its remaining environmental liability rose by $77 billion. Over the past 2 decades, GAO and others have pointed out the need for DOE to take a complex-wide, risk-based approach to its long-term cleanup strategy, which could reduce costs while also maximizing risk-reduction in a more timely way. For example, a 2015 review requested by EM found that DOE needed a more systematic effort to assess and rank risks within and among sites, to remedy the highest priority risks through the most efficient means.

NNSA implements nuclear nonproliferation programs worldwide. GAO found in September 2015 that NNSA had made progress in securing nuclear materials worldwide but that it missed some goals, such as for providing physical protection upgrades at buildings containing nuclear materials. In addition, NNSA began an initiative in 2010 to identify and assess future nuclear and radiological proliferation threats and related trends over the next 5 to 10 years. In an October 2015 report, GAO found limitations in the methods NNSA used in this initiative, such as not conducting its peer review consistent with established standards.

Chairman Sessions, Ranking Member Donnelly, and Members of the Subcommittee:

Thank you for the opportunity to discuss our recent work on some of the pressing ongoing management challenges that the Department of Energy's (DOE) National Nuclear Security Administration (NNSA)—a separately organized agency within DOE—and Office of Environmental Management (EM) continue to face.[1] NNSA is responsible for managing the nation's nuclear security missions: ensuring a safe, secure, and reliable nuclear deterrent; achieving designated reductions in the nuclear weapons stockpile; and supporting the nation's nuclear nonproliferation efforts. These missions are largely executed at eight sites that comprise the nuclear security enterprise. The sites include national laboratories, production plants, and a test site, which are owned by the U.S. government but managed and operated by contractors. According to NNSA documents, NNSA's funding to support its mission and related activities has increased from $9.6 billion in fiscal year 2009 to $11.4 billion in fiscal year 2015[2]—approximately 42 percent of DOE's total fiscal year 2015 budget. EM is responsible for decontaminating and decommissioning facilities and sites that are contaminated from decades of nuclear weapons production and nuclear energy research. EM currently has responsibilities at 16 sites across the United States. Since its inception in 1989, EM has spent over $150 billion on cleanup efforts, including multiple activities to retrieve, characterize, treat, package, store, transport, and dispose of waste.

Since the end of the Cold War, key portions of the nuclear security enterprise's weapons production infrastructure have aged and become outdated, prompting congressional and executive branch decision makers to call on DOE to develop plans to modernize the infrastructure.[3] The

[1]NNSA was created under Title 32 of the National Defense Authorization Act for Fiscal Year 2000, Pub. L. No. 106-65, § 3201 et seq.

[2]NNSA's budget did not increase in fiscal year 2013 compared with the previous year because of sequestration, which decreased NNSA's fiscal year 2013 budget by $917 million.

[3]The end of the Cold War caused a dramatic shift in how the nation maintains nuclear weapons. Instead of designing, testing, and producing new nuclear weapons, the strategy shifted to maintaining the existing nuclear weapons stockpile indefinitely. Life extension programs increase, through refurbishment, the operational lives of weapons in the nuclear stockpile by 20 to 30 years and certify these weapons' military performance requirements without conducting underground nuclear testing.

Department of Defense's (DOD) 2010 Nuclear Posture Review identified long-term modernization goals and requirements, including sustaining a safe, secure, and effective nuclear arsenal through increasing investments to rebuild and modernize the nation's nuclear infrastructure, some of which dates back to the 1940s.[4] In fiscal year 2011, the administration pledged over $88 billion to NNSA over 10 years for operations and modernization, including the refurbishment of weapons in the current stockpile and the construction of facilities to support these refurbishments. In addition, the President's 2015 National Security Strategy states that the United States must invest the resources necessary to maintain a safe, secure, and effective nuclear deterrent as long as nuclear weapons exist.[5]

To meet modernization goals for the nuclear security enterprise, NNSA replaces or renovates research, development, and production facilities; refurbishes weapons in the stockpile to extend their operational lives; and performs simulations and laboratory experiments to ensure existing nuclear weapons remain safe and reliable. NNSA's Stockpile Stewardship and Management Plan, which is updated annually, provides information on modernization and operations plans and budget estimates over the next 25 years. The plan is NNSA's formal means for communicating to Congress the status of certain activities and its long-range plans and budget estimates for sustaining the stockpile and modernizing the nuclear security enterprise. The plan also discusses the current and projected composition and condition of the nuclear weapons stockpile.

NNSA is also involved in efforts to counter the proliferation of nuclear weapons. NNSA implements a range of nonproliferation programs under its Office of Defense Nuclear Nonproliferation (DNN). These programs include efforts to secure, consolidate, and dispose of weapons-usable nuclear materials and radiological sources;[6] reduce the risks of nuclear

[4]Department of Defense, *Nuclear Posture Review Report* (Washington, D.C.: Apr. 6, 2010). The 2010 Nuclear Posture Review establishes the nation's nuclear weapons requirements and policy.

[5]The President is required to submit a national security strategy annually to Congress. 50 U.S.C. § 3043 (2015).

[6]Weapons-usable nuclear materials are highly enriched uranium, uranium-233, and any plutonium containing less than 80 percent of the isotope plutonium-238. Such materials are also often referred to as fissile materials or strategic special nuclear materials.

smuggling; enhance international export controls and International Atomic Energy Agency nuclear safeguards;[7] and support research and development of new nonproliferation technologies.

As NNSA works to modernize the nuclear security enterprise, EM must address the legacy of 70 years of nuclear weapons production and energy research by the department and its predecessor agencies. These activities generated large amounts of radioactive waste, spent nuclear fuel, excess plutonium and uranium, and contaminated soil and groundwater. They also resulted in thousands of contaminated facilities, including land, buildings, and other structures and their systems and equipment.

NNSA and EM are also responsible for managing the design and construction of major projects (those with an estimated cost of $750 million or more). Reports we have issued over the past several years,[8] have highlighted various challenges that NNSA and EM face in carrying out their mission-related responsibilities, including challenges in contract and project management that relate to NNSA's modernization efforts. These challenges contribute to our continuing inclusion of NNSA's and EM's management of major contracts and projects on our list of agencies and program areas that are at high risk due to their vulnerabilities to fraud, waste, abuse, and mismanagement or that are most in need of

[7]The International Atomic Energy Agency is an independent international organization based in Vienna, Austria, that is affiliated with the United Nations and has the dual mission of promoting the peaceful uses of nuclear energy and verifying that nuclear material subject to safeguards is not diverted to weapons development efforts or other proscribed purposes. Safeguards allow the agency to independently verify that nuclear material and other specified items are not diverted by, among other things, inspecting all facilities and locations containing nuclear material declared by countries to verify its peaceful use.

[8]See for example GAO, *National Nuclear Security Administration: Observations on Management Challenges and Steps Taken to Address Them*, GAO-15-532T (Washington, D.C.: Apr. 15, 2015); *Department of Energy: Observations on DOE's Management Challenges and Steps Taken to Address Them*, GAO-13-767T (Washington, D.C.: July 24, 2013); *Modernizing the Nuclear Security Enterprise: Observations on DOE's and NNSA's Efforts to Enhance Oversight of Security, Safety, and Project and Contract Management*, GAO-13-482T (Washington, D.C.: Mar. 13, 2013); and *Modernizing the Nuclear Security Enterprise: Observations on the National Nuclear Security Administration's Oversight of Safety, Security, and Project Management*, GAO-12-912T (Washington, D.C.: Sept. 12, 2012). A list of recent GAO products assessing EM's and NNSA's management challenges is included at the end of this testimony.

transformation.[9] In our 2015 high-risk update, we found that DOE continued to demonstrate a strong commitment and top leadership support to improve contract and project management in EM and NNSA—a key criterion for removing agencies and program areas from our high-risk list.[10] However, we also found that the department had not made progress on the other four criteria for removal: organizational capacity, corrective action planning, monitoring effectiveness, and demonstrating progress. Our high-risk update also noted that NNSA and EM struggled to stay within cost and schedule estimates for most of their major projects.

My testimony today discusses (1) ongoing challenges facing DOE's nuclear security modernization efforts, (2) EM's growing cost of environmental liabilities, and (3) NNSA's nonproliferation accomplishments and long-term planning challenges. My statement is based mainly on information from 11 GAO reports issued from February 2015 to February 2016.[11] Also included are preliminary observations from

[9]In our 2013 high-risk update, to acknowledge progress DOE, including NNSA, has made in managing nonmajor projects (i.e., those costing less than $750 million), we narrowed the focus of DOE's high-risk designation to major contracts and projects (i.e., those costing $750 million or greater) but noted that we would continue to monitor nonmajor projects to ensure that progress in this area continues. See GAO, *High-Risk Series: An Update*, GAO-13-283 (Washington, D.C.: Feb. 14, 2013).

[10]GAO, *High-Risk Series: An Update*, GAO-15-290 (Washington, D.C.: Feb. 11, 2015).

[11]GAO, *Nuclear Weapons: NNSA Has a New Approach to Managing the B61-12 Life Extension, but a Constrained Schedule and Other Risks Remain*, GAO-16-218, (Washington, D.C.: Feb. 4, 2016); *Nuclear Weapons Sustainment: Improvements Made to Budget Estimates Report, but Opportunities Remain to Further Enhance Transparency*, GAO-16-23 (Washington, D.C.: Dec. 10, 2015); *Nuclear Nonproliferation: NNSA's Threat Assessment Process Could Be* Improved, GAO-16-118 (Washington, D.C.: Oct. 30, 2015); *Nuclear Nonproliferation: DOE Made Progress to Secure Vulnerable Nuclear Materials Worldwide, but Opportunities Exist to Improve Its Efforts*, GAO-15-799 (Washington, D.C.: Sept. 23, 2015); *Modernizing the Nuclear Security Enterprise: NNSA Increased Its Budget Estimates, but Estimates for Key Stockpile and Infrastructure Programs Need Improvement*, GAO-15-499 (Washington, D.C.: Aug. 6, 2015); *DOE Project Management: NNSA Should Ensure Equal Consideration of Alternatives for Lithium Production*, GAO-15-525 (Washington, D.C.: July 13, 2015); *National Nuclear Security Administration: Actions Needed to Clarify Use of Contractor Assurance Systems for Oversight and Performance Evaluation*, GAO-15-216 (Washington, D.C.: May 22, 2015); *Hanford Waste Treatment: DOE Needs to Evaluate Alternatives to Recently Proposed Projects and Address Technical and Management Challenges*, GAO-15-354 (Washington, D.C.: May 7, 2015); GAO-15-532T; *DOE Facilities: Better Prioritization and Lifecycle Cost Analysis Would Improve Disposition Planning*, GAO-15-272 (Washington, D.C.: Mar. 19, 2015); and *Nuclear Waste: DOE Needs to Improve Cost Estimates for Transuranic Waste Projects at Los Alamos*, GAO-15-182 (Washington, D.C.: Feb. 18, 2015).

our ongoing work on DOE's plans to develop a defense high-level waste repository and on nuclear waste environmental liabilities. Detailed information about the scope and methodology used to conduct our prior work can be found in each of our issued reports. We also updated information from our prior work when possible. For our ongoing work on DOE's plans to develop a high-level waste repository, we are reviewing agency documents and interviewing officials to describe DOE's analysis, and we are conducting content analyses using previous GAO reports and interviewing officials from DOE, the Nuclear Regulatory Commission, and other organizations about this approach. For our ongoing work on nuclear waste environmental liabilities, we are reviewing agency documents and interviewing agency officials to examine key elements of DOE's environmental liabilities estimate and factors contributing to growth of this estimate. In addition, we are reviewing agency documents, as well as our prior reports and those of others describing DOE's long-term waste cleanup strategy to describe how DOE prioritizes the human health and environmental risks. We are also reviewing DOE's audited financial statements for fiscal years 2011 to 2015. To assess the reliability of the data in those statements, we compared the environmental liability data in the financial statements to other published cost estimates for EM's cleanup program and interviewed officials in DOE's Office of the Chief Financial Officer and officials with the independent audit organization that annually audits DOE's financial statements. The work upon which this testimony is based was conducted or is being performed in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Ongoing Challenges Facing Nuclear Security Modernization Efforts

DOE faces several challenges in modernizing the nuclear security enterprise, including challenges in managing life extension programs (LEP), managing major projects, and budgetary challenges facing modernization efforts. NNSA's modernization plans call for undertaking seven LEPs and alterations[12] to refurbish or replace nuclear weapons' aging components for warheads and bombs over the next 25 years. Essential to the execution of these LEPs will be the timely completion of major projects on which they may depend, such as projects to replace aging facilities supporting their plutonium and uranium needs. These challenges are magnified by budgetary uncertainties related to the alignment of modernization plans with budget estimates and to outstanding and new needs for budgetary resources. Such needs include addressing deferred maintenance in facilities on which mission success depends, recapitalizing security infrastructure, and supporting a new repository for defense high-level waste, which will place additional demands on the defense budget.

Managing LEPs

Effective management of each planned LEP is essential to keep the modernization schedule on track.[13] To ensure the continued safety, reliability, and performance of the aging nuclear stockpile, NNSA and DOD undertake LEPs and other efforts to refurbish or replace nuclear weapons' aging components. As we reported in August 2015, NNSA estimated that it will need more than $290 billion over the next 25 years to support modernization of the nuclear security enterprise.[14] Carrying out these LEPs is complex and difficult, and our past work has found that NNSA and DOD have had difficulty effectively managing these programs.

- In March 2009, we found that, in LEPs for the W76 warhead and legacy B61 bombs, NNSA and DOD established unrealistic schedules, did not establish consistent cost baselines, and did not

[12]A nuclear weapon alteration is a material change regarding assembly, maintenance, or storage that does not alter the weapon's operational capability.

[13]According to the fiscal year 2016 Stockpile Stewardship and Management Plan, NNSA is currently conducting four LEPs or other refurbishments (W76-1, B61-12, W88 alteration 370, W80-4). Over the next 25 years NNSA is planning three additional LEPs (IW-1, -2, -3).

[14]GAO-15-499.

effectively manage technical risks.[15] These problems resulted in delays, additional expenditures, difficulties tracking the cost of the W76 program, and a B61 refurbishment that did not meet all of NNSA's and DOD's technical objectives. NNSA agreed with our recommendation to, among other actions, develop and use consistent budget assumptions and criteria for the baseline to track costs over time, and the agency has taken steps toward improvement in this area, which we continue to monitor.

- In a May 2011 report on the B61 LEP, we found that NNSA and DOD had not prepared a long-term risk management plan to help avoid operational gaps and ensure that the United States would be able to maintain the capability to support its NATO commitments if the LEP were delayed or canceled.[16] DOD and NNSA agreed with our recommendations to develop an operational risk management plan for the LEP, identifying the measures required to ensure that the United States is able to maintain its commitments to NATO with no gaps in operational capability. In September 2011, the Air Force, in coordination with NNSA, issued an initial plan for mitigating the risk of program delay, which the Air Force is currently updating.

More recently, in a February 2016 report, we reviewed the status of the B61-12 LEP.[17] With thousands of individual components, the B61-12 LEP is the most complicated and expensive LEP undertaken since DOE initiated stockpile life extension activities in January 1996. Our report noted some improved and positive management approaches being used in the B61-12 LEP but also noted that the cost and schedule of the LEP have been subject to significant changes since the LEP's inception. Since May 2011, NNSA's and the Air Force's total cost estimate for the LEP increased from an initial estimate of about $4 billion to about $8.9 billion as of September 2015, and the first production date moved from 2017 to 2020. Much of the work under this LEP remains to be executed, with the largest share of program spending yet to come; as of September 2015, about $1.6 billion had been spent on the LEP. We also found that, as the

[15]GAO, *Nuclear Weapons: NNSA and DOD Need to More Effectively Manage the Stockpile Life Extension Program*, GAO-09-385 (Washington, D.C.: Mar. 2, 2009).

[16]GAO, *Nuclear Weapons: DOD and NNSA Need to Better Manage Scope of Future Refurbishments and Risks to Maintaining U.S. Commitments to NATO*, GAO-11-387 (Washington, D.C.: May 2, 2011).

[17]GAO-16-218.

B61-12 LEP moves forward, a significant challenge may be a constrained development and production schedule that the joint DOE and DOD Nuclear Weapons Council characterized as having "little, if any, margin left" to deal with potential program risks. We also found that factors constraining the schedule of the LEP include the aging of components in current versions of the B61, delays in starting the B61-12 LEP because of a lengthy design study, the effects of sequestration, and the need to complete the B61-12 LEP so that NNSA can begin other planned LEPs. We have previously made recommendations in this area and will continue to monitor these issues as we assess the LEP in its later stages.

Managing Contracts and Major Projects

Another significant challenge for DOE's modernization plans for the nuclear security enterprise is effectively managing contracts including those for the design and construction of major projects that are intended to replace large components of the aging nuclear security infrastructure. Regarding contracts, about 90 percent of DOE's budget is spent on contracts, and effective management of these contracts and associated contractors is essential for DOE to achieve its complex and challenging missions. In May 2015, we found that NNSA had not fully established policies or guidance for using information from contractor assurance systems to conduct oversight of management and operations contractors. These systems are designed by contractors to assure their own performance and can be leveraged by NNSA for oversight purposes and thereby improve efficiency.[18] In the absence of a headquarters policy, we found that NNSA field offices had established their own procedures, but these procedures were not always complete and differed among field offices. We also found that NNSA had discontinued a process for validating oversight approaches without replacing it with another approach. In addition, we found that NNSA had not determined if it had sufficient qualified staff to implement its framework for using information from the contractor assurance systems. We recommended, among other things, that NNSA develop guidance on using information from contractor assurance systems to oversee and evaluate management and operations contractors, and study staffing needs. In NNSA's response to our report, the agency agreed with our recommendations and outlined planned actions to address these recommendations, as well as timelines for completion.

[18]GAO-15-216.

Regarding major projects, our past reports have found that NNSA has struggled to manage these projects within their initial cost and schedule estimates.[19] In April 2015, we reported to this subcommittee that DOE had taken a number of actions to address its contract and project management challenges in NNSA and EM.[20] The most recent actions have included the issuance of memorandums from the Secretary of Energy in December 2014 and June 2015. These memorandums put into effect several important recommendations to improve contract and project management made in a report by the Contract and Project Management Working Group that was established by the Secretary in 2013.[21] The December 2014 memorandum directed that several recommendations made by the Working Group be implemented immediately, including that program offices conduct analyses of project alternatives independent of the contractor responsible for the proposed project. The memo also established a project management risk committee to provide department-wide project management risk assessment and expert advice on projects with a cost of $100 million or greater. The June 2015 memorandum implemented several more recommendations from the working group. For example, it directed program offices to develop project cost and schedule estimates consistent with methods and best practices identified in GAO's Cost and Schedule Guides, and to conduct analyses of the root causes underlying project cost overruns, schedule delays, and performance shortcomings.

We support the actions taken by the Secretary, but as reported in our 2015 high-risk update, we remain concerned that the department still may not truly understand the underlying causes of its contract and project management problems. As we testified in April 2015, the recommendations made in the Working Group report and the actions

[19]In addition, although we removed nonmajor projects from our high-risk list in 2013, we continue to monitor these projects to ensure that progress in this area continues and is sustained. We recently evaluated progress with the Lithium Production Facility at NNSA's Y-12 complex and the Transuranic Waste Facility at NNSA's Los Alamos National Laboratories. See GAO-15-525 and GAO-15-182.

[20]GAO-15-532T.

[21]U.S. Department of Energy, *Improving Project Management: Report of the Contract and Project Management Working Group* (Washington, D.C.: November 2014). The working group is chaired by a senior advisor to the Secretary and includes a group of senior project management leaders, including from NNSA and EM. The purpose of the working group is to improve project management execution.

taken by DOE in response to these recommendations represent the third such cycle since 2008, and the recommendations include some issues that the department had declared it previously mitigated, such as difficulties with front-end planning and project funding.[22]

Our recent work indicates that implementation of and adherence to departmental requirements is essential if the department's most recent corrective actions are to succeed, as shown in the examples below:

- In July 2015, we found that NNSA had not followed established departmental policy that requires analyzing a mission need independent of a particular solution.[23] Specifically we found that, when considering how it might replace an aging lithium production facility, NNSA included a description of alternatives for addressing its mission need, such as building a new facility or outsourcing lithium processing, but that it also expressed a preference for a particular solution—specifically, a new facility. We concluded that by having completed a mission need statement that is not fully independent of a particular solution and having prepared cost and schedule estimate ranges for only one of the seven alternatives, NNSA could potentially undermine its ability to choose the best alternative that satisfies the mission need. We recommended that NNSA objectively consider all alternatives, without preference for a particular solution, as it proceeds with its analysis of alternatives process. NNSA neither agreed nor disagreed with our recommendation; however, it disagreed with our conclusion. We continue to believe our conclusion is fair and well supported.

- In February 2015, we found that the cost estimates associated with NNSA's Transuranic Waste Facility only partially followed best practices.[24] Among other things, we found that NNSA did not follow best practices in developing the cost estimate for the facility's operations and maintenance costs because, among other things, the agency did not sufficiently document its approach for developing the

[22]GAO-15-532T.

[23]GAO-15-525.

[24]GAO-15-182. The term transuranic means those elements with an atomic number greater than that of uranium. Transuranic waste generally includes radioactive waste containing more than 100 nanocuries of alpha-emitting transuranic isotopes per gram of waste, with half-lives greater than 20 years.

estimate and did not use an inflation rate in its calculations. We recommended that NNSA update the facility's cost estimate to allow better management of the project's life-cycle costs going forward. DOE generally agreed with our recommendations.

In addition, certain major projects that we have examined in past and ongoing work continue to experience cost and schedule delays. For example:

- NNSA proposed in its fiscal year 2017 congressional budget request to terminate its Mixed Oxide (MOX) Fuel Fabrication Facility,[25] which has been under construction since 2007, and for which NNSA has already spent approximately $4.6 billion on design and construction. NNSA's request stated that its MOX fuel approach to dispose of 34 tons of weapons-grade plutonium will be significantly more expensive than anticipated and will require approximately $800 million to $1 billion annually for decades. Instead, NNSA proposes to focus on a new alternative to dilute and dispose of the surplus plutonium and dispose of the material in a geologic repository. According to DOE officials, they are currently conducting pre-conceptual design work for this dilute and dispose option, evaluating whether a portion or all of this material could be disposed of in DOE's geologic repository, the Waste Isolation Pilot Plant (WIPP), located near Carlsbad, New Mexico; and examining alternative options for disposal. We have ongoing work examining the extent to which WIPP has the capacity to dispose of this quantity of plutonium.

- EM does not have updated information on the cost and schedule delays for key portions of the Waste Treatment and Immobilization Plant (WTP) at Hanford, Washington. This is the largest construction project at DOE, and it continues to face delays and cost increases. In May 2015, we noted that in 2006,[26] EM increased the project cost baseline to $12.3 billion and extended completion to 2019. We also reported that this project will not meet its cost and schedule baselines. In addition, we found that DOE is limited in its ability to measure cost and schedule performance. In January 2016, DOE stated that it would not be able to develop new cost and schedule baselines for at least 3

[25]The facility was to produce MOX fuel (i.e., a mix of plutonium and uranium oxides) for nuclear reactors.

[26]GAO-15-354.

years for key portions of the WTP. In May 2015, we found that DOE's costs for the WTP will likely increase by billions.[27] DOE also proposed adding 17 years to the completion date in its proposal to modify the consent decree in its dispute with the state of Washington.[28]

We have ongoing work to evaluate DOE's contract and project management practices. Specifically, we have ongoing reviews examining major projects including the WTP, as well as the Chemistry and Metallurgy Research Replacement project at NNSA's Los Alamos National Laboratories in New Mexico, and the Uranium Processing Facility at NNSA's Y-12 complex in Oak Ridge, Tennessee. In addition, we have ongoing reviews examining DOE's use of management and operating contracts, and NNSA's qualifications for program managers.

Budgetary Challenges Facing Modernization Efforts

NNSA's ability to execute its modernization plans is also complicated by questions about the alignment of its plans with future budgets and competing demands for budgetary funding. Our work has identified instances where NNSA's long-term budget estimates to support its modernization plans and the President's budget request were not in alignment. We have also identified outstanding and new demands for resources, such as the need to address deferred maintenance in facilities on which mission success depend; to recapitalize security infrastructure; and to support a new repository for defense high-level waste, which may place additional demands on the defense budget.

[27]As we reported in May 2015, on September 30, 2014, the WTP contractor submitted a contract modification proposal to DOE's Office of River Protection that includes revised cost estimates to complete portions of the WTP. According to the proposal, the cost for this work is about $3.7 billion, including the contractor's fee, which is in addition to the $151 million to $2 billion the contractor estimated it may need to address risks facing the Low Activity Waste facility. This proposal does not include the costs for the Pretreatment and High-level Waste facilities, on which construction has been stalled for several years. According to DOE headquarters officials, these costs are estimates developed by the contractor that have not been validated or accepted by DOE.

[28]On October 25, 2010, a federal district court approved a consent decree as part of the settlement of a lawsuit that the state filed against DOE. This consent decree imposed an enforceable schedule for cleaning up waste from Hanford's underground tanks. DOE agreed in this consent decree to achieve "initial plant operations" of the WTP no later than December 31, 2022. Washington v. Chu, Civ. No. 08-05085 (E.D. Wash), entered October 25, 2010. DOE has proposed in court to change that deadline to December 31, 2039.

Budgetary Alignment with Program Plans

In a December 2015 report,[29] we assessed budget estimates for sustaining and modernizing the nuclear stockpile and nuclear security enterprise over the next 10 years that were contained in a joint DOD-DOE report.[30] We found that DOE's overall budget estimates for fiscal years 2021 through 2025—the 5 years beyond the Future-Years Nuclear Security Program (NNSA's 5-year funding plan)—totaled $56.4 billion, $4.2 billion more than the estimates identified in the joint report as the President's budget figures. This apparent nonalignment between these estimates has raised questions about the alignment of NNSA's modernization funding needs based on program plans with potential future budgets.

In our August 2015 and December 2015 reports, we also found some nonalignment over a 10-year period (fiscal years 2016 to 2025) between the program cost estimates and budget estimates for a number of LEPs.[31] We concluded in both reports that this misalignment, if left uncorrected, could result in a potential funding shortfall for those programs in some years. NNSA agreed with our recommendation from August 2015 to be more transparent about differences between program and budget cost estimates and noted that it would include such information in its fiscal year 2017 planning documents. We have ongoing work on this issue.

Outstanding and New Demands for Budgetary Resources

Our work has found that outstanding and new needs for budgetary resources—such as the outstanding needs to address deferred maintenance and recapitalize security infrastructure as well as the new need to support a separate repository for defense high-level waste—may place additional demands on the defense budget. As we found in August 2015, NNSA's infrastructure budget estimates are not adequate to address the agency's reported $3.6 billion deferred maintenance backlog, and the backlog will continue to grow.[32] We found that one reason the

[29]GAO-16-23.

[30]These estimates were included in the fiscal year 2016 DOD-DOE joint report. DOD and DOE are required to submit to certain congressional committees a report—referred to as the "section 1043" report or the "DOD-DOE joint report" —on among other things, the plan for the nuclear weapons stockpile and its delivery systems and 10-year budget estimates for modernization.

[31]GAO-15-499 and GAO-16-23. Our reviews examined the following LEPs: W76-1, the B61-12, the W88 Alteration 370, the W80-4, the Interoperable Warhead-1, and the Interoperable Warhead-2.

[32]GAO-15-499.

backlog will continue to grow is that the 2015 budget estimates to address the problem fell below DOE infrastructure investment benchmarks for maintaining and recapitalizing existing facilities. We reported that NNSA is investing in systems and processes to improve data available for program planning and budget estimating to address deferred maintenance and that NNSA expects improved estimates to contribute to the President's budget request in fiscal year 2017. In addition to a large backlog of deferred maintenance, NNSA faces other infrastructure challenges that are not included in NNSA's long-range plans. For instance, NNSA's fiscal year 2017 budget request notes that more than $2 billion may be needed over a 15-year period to address aging and obsolete security infrastructure.[33] Congress directed the creation of a Security Improvements Program to address the backlog of needed security infrastructure upgrades, and provided $30 million in fiscal year 2016 to begin that process. According to NNSA's fiscal year 2017 budget request, NNSA will use the fiscal year 2016 funding to meet immediate requirements, while developing a funding plan and list of prioritized upgrade projects to address security infrastructure and Perimeter Intrusion Detection and Assessment System upgrades in future years.

Further, a recent policy change may place additional demands on the defense budget. In March 2015, DOE released a report supporting the need for a separate defense high-level radioactive waste repository, which would hold waste from atomic energy defense activities. In addition to this repository, defense spent nuclear fuel along with commercial spent nuclear fuel would be placed in separate comingled repository. Until 2010, DOE had been proceeding with a plan to use a single repository at Yucca Mountain, Nevada, that comingled defense and commercial waste. We have ongoing work examining what is known about the projected cost and schedule of DOE's new plan. According to DOE's analysis, developing two repositories is generally more expensive than one. According to DOE, the upper end of DOE's cost estimate range for the two repository option is $33 billion higher than the upper end of their cost estimate range for a single comingled repository option.[34] Further, DOE

[33]DOE, *Department of Energy: FY 2017 Congressional Budget Request for the National Nuclear Security Administration,* vol. 1 (Washington, D.C.: Feb. 2016).

[34]DOE's analysis from the March 2015 plan shows the cost of a two-repository option as being $38 billion to $129 billion, while the cost of a single comingled repository option is shown as $29 billion to $96 billion.

documents indicate that these estimates do not include the full cost of the program. For example, the estimates do not include the cost of packaging and transporting the waste. DOE's previous cost estimate for packaging and transportation at Yucca Mountain exceeded $20 billion. According to DOE officials, these costs may be offset to some degree by future benefits, such as efficiencies in site selection that could shorten the amount of time it takes the department to choose a site for the comingled repository, but such benefits cannot be quantified at this time. Our preliminary observations show that the additional costs for a two-repository approach could place additional demands on future defense budgets. Under DOE's new plan for two repositories, defense appropriations are to cover the entire cost of the defense high-level radioactive waste repository. In addition, according to DOE documents, the defense appropriation share for a comingled repository could be up to 20 percent of its cost, but according to DOE officials the share will likely be lower than 20 percent.

Growing Costs of Environmental Liabilities

EM is responsible for the large and complex mission of cleaning up the nuclear security complex, and the cost of addressing this environmental liability is significant. Based on our preliminary observations from ongoing work, of the total environmental liability held by the federal government, DOE is responsible for the majority, or $340 billion.[35] Of this amount, EM's cleanup of former weapons production sites is by far the largest piece. In 2015, EM estimated that cleanup of former weapons production and nuclear energy research sites would generally take until 2075 and could cost as much as $240 billion (in current dollars).[36] Some of our recent work indicates that this $240 billion figure is likely understated, in part because there are additional future cleanup costs in other portions of DOE liabilities that will likely shift to EM. For example, we found in March 2015 that EM's portion of the environmental liability estimate does not include the cost to clean up NNSA's excess facilities that have not yet been transferred to EM, which DOE acknowledges could cost billions.[37]

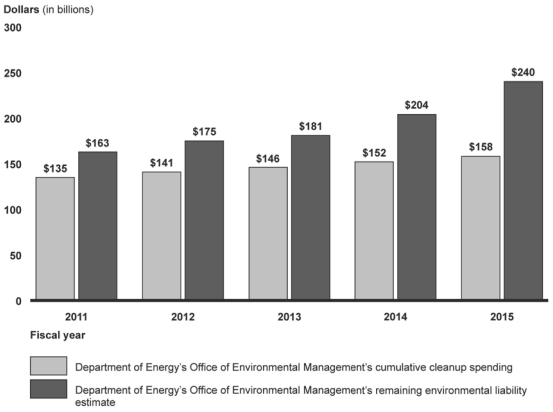
[35]As of this testimony, the most current federal government environmental liability estimate of $370 billion was for 2014.

[36]DOE, *FY 2016 Congressional Budget Request*, DOE/CF-0111 (Washington, D.C.: Feb. 2015). DOE, *Fiscal Year 2015: Agency Financial Report*, DOE/CF-0144 (Washington, D.C.: Nov. 16, 2015).

[37]GAO-15-272.

Our preliminary observations based on our ongoing work indicate that the remaining environmental cleanup estimate has been growing since fiscal year 2011, even as EM has continued to spend money on cleanup work. For example, our preliminary analysis of EM audited financial statements indicates that EM spent $23 billion from fiscal years 2011 through 2015—with the cumulative total spent by EM rising from $135 billion to $158 billion—for environmental cleanup work at its EM sites (see fig. 1). During this same time, EM's estimate to complete the cleanup work (remaining environmental liability estimate) rose by $77 billion—from $163 billion to $240 billion. In its fiscal year 2015 financial statement, DOE attributes recent increases to (1) inflation adjustments to reflect constant dollars for the current year; (2) improved and updated estimates for the same scope of work, including changes resulting from deferral or acceleration of work; (3) revisions in technical approach or scope; and (4) regulatory changes.

Figure 1: DOE's Office of Environmental Management's Cumulative Spending on Cleanup and Remaining Environmental Liability Estimates from Fiscal Years 2011 to 2015



Source: GAO analysis of Department of Energy financial statement data. | GAO-16-422T

Over the past 2 decades, we and others have pointed out the need for DOE to take a complex-wide, risk-based approach to its long-term cleanup strategy, which could reduce costs while also maximizing risk-reduction in a more timely way. For example, in 1995, we reported that DOE's cleanup strategy had been shaped by site-specific environmental agreements whose priorities and requirements had not always been consistent with technical or fiscal realities and that, under budgetary constraints, the use of many separately negotiated agreements was not well suited to setting priorities among sites and may result in the selection of cleanup approaches that are costlier than needed to address risks.[38] Most recently, in 2015, a review by the Omnibus Risk Review Committee found that DOE needed a more systematic effort to assess and rank risks within and among sites, including through headquarters guidance to sites, and to allocate federal taxpayer monies to remedy the highest-priority risks through the most efficient means to help secure more effective use of available resources and greater overall protection.[39] The report noted that DOE has not achieved the best risk-reducing use of available resources. According to the report, inconsistent regulatory approaches across cleanup sites, selection of cleanup remedies that are not tailored to risks, and certain requirements in federal facility agreements and consent decrees cause disproportionate resources to be directed at lower-priority risks.

We have ongoing work looking at (1) DOE's long-term cleanup strategy, (2) what is known about the potential cost and time frames to address DOE's environmental liabilities, (3) what factors DOE considers when prioritizing cleanup activities across its sites, and (4) how DOE's long-term cleanup strategy addresses the various risks that long-term cleanup activities encounter.

[38]GAO, *Department of Energy: National Priorities Needed for Meeting Environmental Agreements*, GAO/RCED-95-1 (Washington, D.C.: Mar. 3, 1995).

[39]Omnibus Risk Review Committee, *A Review of the Use of Risk-Informed Management in the Cleanup Program for Former Defense Nuclear Sites* (Washington, D.C.: August 2015). EM requested the Consortium for Risk Evaluation with Stakeholder Participation, an independent multidisciplinary consortium of universities led by Vanderbilt University, to organize a review in response to congressional direction accompanying the Consolidated Appropriations Act, 2014. To carry out the reviews, the consortium constituted a committee of eight nationally distinguished individuals with diverse experience in risk analysis; public health and safety; nuclear safety; risk management; and environmental law, regulation, and public policy.

Nonproliferation Accomplishments and Long-Term Planning Challenges

We have found that NNSA has made progress securing nuclear materials around the world but that it faces challenges in meeting some future nuclear security goals. In addition, we have found limitations in some of NNSA's long-term planning efforts for DNN programs, particularly in its effort to assess proliferation threats and trends over the next 5 to 10 years and their implications for the future of DNN programs.

In September 2015, we reported that NNSA had made progress in securing nuclear materials around the world, particularly in achieving goals under the President's 2009 initiative to secure all vulnerable nuclear materials within 4 years.[40] Specifically, we found that from April 2009 through December 2013, NNSA exceeded its goal for removing or disposing of highly enriched uranium (HEU) or plutonium, and it exceeded its goal of downblending HEU.[41] However, we found that NNSA missed its goals for other activities under the initiative, including for providing physical protection upgrades at buildings containing nuclear materials and for converting foreign reactors to use more proliferation-resistant low-enriched uranium. In addition, we identified several challenges that may hamper NNSA's ability to meet future nuclear material security goals. For instance, we found that NNSA had neither completed a prioritization list of nuclear materials, including recently identified HEU of U.S.-origin, for return to the United States or disposition, nor established a time frame for doing so. We also found that NNSA and other agencies had not visited key foreign sites to determine whether the U.S.-origin nuclear material on-site was protected according to international physical security guidelines. We recommended that NNSA complete its prioritization of nuclear materials at foreign locations and that NNSA and other agencies visit sites containing key quantities of U.S nuclear materials that have not been visited in at least 5 years. NNSA agreed with our recommendations and reported to us in December 2015 that it had completed a revised list, prioritizing the removal or disposition of civilian nuclear material inventories.

[40]GAO-15-799.

[41]HEU is uranium enriched in the isotope uranium-235 to 20 percent or greater. Downblending is a process that involves mixing HEU with either depleted or natural uranium, or low-enriched uranium, to produce a new product that has a lower concentration of uranium-235.

We have also reported on other limitations related to NNSA's long-term nonproliferation planning. Notably, in response to the changing nonproliferation environment, NNSA began an initiative in 2010, known as the "Over the Horizon" (OTH) initiative, to identify and assess future nuclear and radiological proliferation threats and related trends over the next 5 to 10 years—beyond NNSA's 5-year budget planning horizon—and to consider the implications for the future of DNN programs. The establishment of the OTH initiative was intended to institutionalize long-term DNN planning, and the information produced by the initiative would, among other things, support DNN program planning and organization decisions.

In an October 2015 report, we found that NNSA used a variety of established methods in its OTH initiative to assess potential proliferation threats, but the implementation of these methods had several limitations.[42] For example, NNSA officials used the established method of subjecting OTH results to peer review. However, we found that the peer review was not conducted in a way consistent with established standards, for instance, by documenting the results of the peer review. The limitations we identified raised concerns about the quality of the analyses produced and about the usefulness of the OTH initiative, as it had been implemented so far, as a DNN planning tool. Additionally, it was unclear how information generated by the OTH initiative informed recent organizational changes and planning decisions in the DNN office. For instance, we found that the extent to which the OTH initiative informed the January 2015 DNN reorganization, which consolidated five DNN program offices into four offices, was unclear because NNSA officials could not provide documentation or examples of links between OTH findings and elements of the reorganization. In addition, we found that it was unclear how the OTH initiative informed the development of a March 2015 strategic plan for NNSA's programs—including DNN programs—to prevent, counter, and respond to future nuclear proliferation and terrorism threats because of conflicting information about the role of the initiative in the plan's development. We did not make recommendations on these matters because NNSA officials told us that a new strategic planning function was being created that will oversee the OTH process and manage integration of OTH and other long-range studies into future

[42]GAO-16-118.

versions of the NNSA strategic plan. We will continue to monitor NNSA's actions in this area.

Chairman Sessions, Ranking Member Donnelly, and Members of the Subcommittee, this completes my prepared statement. I would be pleased to respond to any questions you may have at this time.

GAO Contact and Staff Acknowledgments

If you or your staff members have any questions about this testimony, please contact me at (202) 512-3841 or trimbled@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. GAO staff who made key contributions to this testimony are Nathan Anderson, Dan Feehan, Jonathan Gill, and William Hoehn (Assistant Directors); David Bennett; Mark Braza; Antoinette Capaccio; Lee Carroll; Rob Grace; Bridget Grimes; Cristian Ion; Richard Johnson; Nancy Kintner-Meyer, Jeff Larson; Cynthia Norris; Chris Pacheco; Leslie Pollock; Dan Royer; Robert Sanchez; and Kiki Theodoropoulos.

Appendix: Selected GAO Products

The following is a selection of GAO's recent work assessing the National Nuclear Security Administration's and the Office of Environmental Management's management efforts:

Nuclear Weapons: NNSA Has a New Approach to Managing the B61-12 Life Extension, but a Constrained Schedule and Other Risks Remain. GAO-16-218. Washington, D.C.: Feb. 4, 2016.

Nuclear Weapons Sustainment: Improvements Made to Budget Estimates Report, but Opportunities Remain to Further Enhance Transparency. GAO-16-23. Washington, D.C.: Dec. 10, 2015.

Nuclear Nonproliferation: NNSA's Threat Assessment Process Could Be Improved. GAO-16-118. Washington, D.C.: Oct. 30, 2015.

Nuclear Nonproliferation: DOE Made Progress to Secure Vulnerable Nuclear Materials Worldwide, but Opportunities Exist to Improve Its Efforts. GAO-15-799. Washington, D.C.: Sept. 23, 2015.

Modernizing the Nuclear Security Enterprise: NNSA Increased Its Budget Estimates, but Estimates for Key Stockpile and Infrastructure Programs Need Improvement. GAO-15-499. Washington, D.C.: Aug. 6, 2015.

DOE Project Management: NNSA Should Ensure Equal Consideration of Alternatives for Lithium Production. GAO-15-525. Washington, D.C.: July 13, 2015.

National Nuclear Security Administration: Actions Needed to Clarify Use of Contractor Assurance Systems for Oversight and Performance Evaluation. GAO-15-216. Washington, D.C.: May 22, 2015.

Hanford Waste Treatment: DOE Needs to Evaluate Alternatives to Recently Proposed Projects and Address Technical and Management Challenges. GAO-15-354. Washington, D.C.: May 7, 2015.

National Nuclear Security Administration: Observations on Management Challenges and Steps Taken to Address Them. GAO-15-532T. Washington, D.C.: April 15, 2015.

DOE Facilities: Better Prioritization and Lifecycle Cost Analysis Would Improve Disposition Planning. GAO-15-272. Washington, D.C.: Mar. 19, 2015.

Nuclear Waste: DOE Needs to Improve Cost Estimates for Transuranic Waste Projects at Los Alamos. GAO-15-182. Washington, D.C.: Feb. 18, 2015.

High-Risk Series: An Update. GAO-15-290. Washington, D.C.: Feb. 11, 2015.

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Senator SESSIONS. Thank you all.

Mr. Trimble, while you've given us some, I think, grim points, let's just briefly mention them without going into a lot of detail. You're saying we need an overall strategy to contain costs on environmental liabilities, and that, from 2011 to 2015, we spent 23 billion, but now more accurate later estimates are that we expect to spend 77 more billion than we previously expected to complete the project?

Mr. TRIMBLE. Yeas. Over that time period while we've been spending billions, our overall liability has continued to grow. We're sort of not making up ground, if you will.

Senator SESSIONS. Of course, you say, through the final completion, 2075, we're looking at 200-and-

Mr. TRIMBLE. Fourty billion.

Senator SESSIONS.—fourty billion.

Mr. TRIMBLE. Our work indicates that that is—understates the actual liability.

Senator SESSIONS. We're talking about $240 billion for one part of the defense budget. I guess it would be your recommendation that this would require the most intense evaluation to see if we can make it better.

Mr. TRIMBLE. Yeah. We have recommended in the past, and others have as well, to take a risk—overall risk-based approach across the complex to maximize the return on risk reduction and also cost efficiency.

Senator SESSIONS. General Klotz, the Wall Street Journal reported that Secretary Moniz's letter warning us, that I quoted previously, that without additional billions in the years 2018 through 2021—5.2 billion, in fact—the budget will lack credibility with Congress and could put the NNSA budget in, quote, "an untenable position by 2018."

Let's talk about that. That's 5.2 billion more than we included last year. We had—in our FYDP [Future Years Defense Program], we thought that we were on path to modernize our nuclear program and that we'd reached a bipartisan consensus that we would support, basically, the President's request to do that job. Do I understand Secretary Moniz to say now we are going to be 5 billion short, and that shortage is going to hit as early as 2018?

General KLOTZ. Thank you for the question, Chairman.

First of all, as I indicated in my opening statement, we were very satisfied with the budget request for fiscal year 2017, for the next fiscal year. We think it meets all of the needs we have under our three essential and enduring missions. However, as we look out towards the budget projections for 2018 to 2021, we note they still remain subject to the sequester cap set in the Budget Control Acts. Added onto that, one of the things that we have been working very hard on in the Department of Energy and in NNSA is looking across the enterprise and trying to identify those things which we are going to need to sustain, not just in the NNSA area, but in the science area and environmental management. We have a very old infrastructure, many buildings that go back to the early days of the Cold War, even back to the Manhattan Project, that are going to need to be either replaced or significant work done to reduce the deferred maintenance, which are associated with it. Right now, deferred maintenance for NNSA alone is $3.7 billion, just in the buildings that we have now.

Senator SESSIONS. Well, you say that, General Klotz, but, you know, people get a little dubious about these things. I see one of your complaints are that tiles are falling in the ceiling. It reminds me of schools that say they don't have enough money to have toilet paper, when they're spending $100 billion on the school—million dollars—and it's like, "What kind of management do you have if you don't fix the tiles in your ceiling?" I mean, we're at a tight budget time. Are you sure we need $3.7 billion just to refurbish buildings?

General KLOTZ. That's—as we add up the work that needs to be done to prevent things like tiles falling or fix water systems that are rusting out or to bring electrical systems up to code, that's—across the enterprise, that's what it adds up to.

Chairman, this is a perennial problem, not just for us, but for the DOD [Department of Defense], as well. In my nearly 39 years of Active Duty, I observed, as most people do, that the first dollar always goes for mission and for people. In very tightly constrained budgets, typically what—the practice has been to defer those maintenance issues, move them to the right and accept risk. At some point, you know, you just have to stop accepting risk and get on with the business of repairing the facility that you have, because it does create these types of safety or security concerns that falling tiles or other deficiencies in the infrastructure create.

Senator SESSIONS. Well, sometimes it has to be done, and it has to be spent, but—just briefly, again, so the 5.2 billion was not in the last year's FYDP. This is a new request from the Secretary, and he emphasizes infrastructure, which I assume means buildings and that kind of thing.

General KLOTZ. Our emphasis has been on dealing with the—what we see as a coming bow wave in expenses to make sure that the nuclear security enterprise is able to be responsive for the longer term. We've just—DOD has talked a lot about the bow wave that it faces. We have a similar bow wave, although, in absolute terms, it's much smaller than the DOD's. But, relative to our overall budget, it's fairly significant.

That's—you know, I think the Secretary—I can't speak to what was in the Wall Street Journal editorial, and I can't speak to what was supposed to be a private letter between the Secretary and the OMB [Office of Management and Budget] Director, but I can say that——

Senator SESSIONS. This was a private leak letter?

General KLOTZ. It——

Senator SESSIONS. You don't know.

General KLOTZ. I don't know. I have to speak to the budget, as presented——

Senator SESSIONS. Right.

General KLOTZ.—to——

Senator SESSIONS. I understand that.

General KLOTZ.—by the President to——

Senator SESSIONS. So——

General KLOTZ.—to this committee.

Senator SESSIONS. Well, I've expressed my concern. We'll just to look at it, because we're in a tight budget time.

General KLOTZ. But, we certainly want to work with your subcommittee, your committee, and your staff as we—now that we have submitted the fiscal year 2017 budget, we are—these people are already hard at work on building the fiscal year 2018 budget. I commit to work very closely with you and with your staff as we parse out these various requirements, as we see them, from fiscal year 2018 on.

Senator SESSIONS. All right. Thank you.

Senator Donnelly.

Senator DONNELLY. Thank you, Mr. Chairman.

Ms. Harrington, I noted in the budget a significant decrease in the funding for nonproliferation activities. When you look at that—you know, obviously it has to do with the Russians. Could you explain exactly what's driving that and how we got to that point?

Ms. HARRINGTON. The decrease of work with the Russians is certainly part of the decrease overall. But, since March of 2014, when Russia illegally annexed Crimea, and the disturbances they have continued to cause in eastern Ukraine since then, violations of the INF [Intermediate-Range Nuclear Forces] Treaty,—and the list, unfortunately, goes on and on, in terms of Russia's recent behavior—part of that behavior has been to declare that they are no longer in need of cooperative work with us to secure their facilities. We continue to work, where we can, on prior-year money. But, as you know, in 2015 and 2016, we have a prohibition, in our authorization, against using any appropriated funds for projects in Russia.

Senator DONNELLY. Do you think that this slowdown—these actions by the Russians—do you think it increases the risk portfolio that's out there as to us?

Ms. HARRINGTON. We believe, absolutely, that that is the case.

Senator DONNELLY. Okay.

General Klotz, in regard to the plutonium facilities at Los Alamos, what is the status at the present time? Do we have the funding, over the next 5 years, we need for the modules necessary to achieve a sustainable range of 50 to 80 pits per year?

General KLOTZ. The short answer is no, not yet. But, let me say that we are in the process of doing a significant amount of work at Los Alamos in order to get out of the old chemical and metallurgical building where we've been doing a lot of the analytical chemistry and material characterization associated with plutonium operations. There are two buildings there. One's called PF–4, the other one's called the Radiation Laboratory, which we are repurposing the space that's there, moving things around so that we can get out of that building by 2019.

For the longer term, we are convinced that we will need an approach to have additional space and safety basis in the buildings to do—to meet the congressional requirement to do—show a capacity of 50 to 80 pits by 2027. We—I have signed out, this past year, a—what we call a mission need, critical decision zero document, saying that we need to have an—the additional capacity. We are launching an analysis of alternatives, one of which might be the modules.

For that reason, the money that you see in the out years under the plutonium lines within our budget basically show a wedge for what would be necessary to build the modules, of 12 million a year. We will have to come back to OMB, to the Congress, after we have done this analysis of alternatives, and after we have done the independent cost reviews of what it would cost to do what alternative we feel is the best, before we can load in significant numbers that have some credibility.

Senator DONNELLY. Thank you.

Admiral Caldwell, we are in the middle of working on the design and engineering of the reactor and the fuel for the *Ohio*-class replacement submarine, which will have a 40-year life of core fuel

and electric drive. In regards to this program, how are we doing on the timeframe right now, on schedule, and when do you expect completion?

Admiral CALDWELL. Sir, thanks for the question. I would like—just like to say, this is my first opportunity to appear before this subcommittee.

Senator DONNELLY. Oh, we have a bunch of questions——

[Laughter.]

Admiral CALDWELL. I'm so honored to be here.

We have enjoyed great support from the subcommittee. That's enabled the success of the Naval Reactors Program. Your future support will be very important to us to continue that path of success. Additionally, we have a great relationship with members of the subcommittee and, as well, the staff. I endeavor to maintain those strong relationships.

Now, with regards to your question of the *Ohio*-class replacement submarine. We are on track to support the Navy's requirements. Those requirements are to start construction in 2021, to finish that construction in 2028, and to send that ship to sea in 2031. That's a tight timeline, especially when you consider the size and the scope of building a ship as big as *Ohio*-class replacement. It's two and a half times the size of a *Virginia*-class submarine, and we're going to build it in the same timeframe—as the initial *Virginia*-class—of 7 years. That's a tall order. It's a national priority to make sure that we do not gap our strategic deterrence coverage at sea.

Now, Naval Reactors' responsibility is the design and eventual procurement of the components for the reactor plant and the engine room. To that end, we are progressing well. The first challenge is to build the life-of-ship core. We have done the design work and we're actually going to de-risk the manufacturing of that by installing a technology demonstration core in the prototype in New York in 2019. We're on a good path to lead us down to getting that life-of-the-ship core, which will last 42 years.

Additionally, the design work that we've done to date is putting us on a good path to procure the heavy equipment in 2019. The other big challenge is the design and eventual construction of the electric drive, which will power the submarine. We're on a path now with the design work, building on decades of experience and knowledge, to prototype the electric drive unit and start actual full-scale testing in fiscal year 2018. Those are significant milestones for us and we're on a good path to get there. In addition, the fiscal year 2017 budget allows us to continue to progress along these timelines. Your support will be essential in our ability to meet the Navy's goal of starting construction in 2021.

Senator DONNELLY. Thank you, Admiral.

Admiral CALDWELL. Sir.

Senator SESSIONS. Admiral, just briefly, the *Ohio*—current *Ohio*-class has to be refueled how often?

Admiral CALDWELL. The current *Ohio*-class has to be refueled once in its lifetime, and we're progressing through those steadily. We're going to take the life of those ships out to 42 years. We've sharpened our pencils, done the study, and we're going to seek out as much life as we can from those ships.

Now, for the *Ohio*-class replacement, not having to refuel that submarine will save the Nation approximately $40 billion and will restore the operational availability to keep those ships at sea where we need them to meet our National commitments in terms of strategic deterrence. It also allows us to meet our requirements with 12 instead of—with 12 submarines instead of the current 14. Again, your support from this committee has allowed us to have the technical base and do the design work that's enabling all of these things to happen.

Senator SESSIONS. Thank you.

Admiral CALDWELL. Yes, sir.

Senator SESSIONS. Well, we're glad that looks like to be a practical and good solution.

Senator Heinrich.

Senator HEINRICH. Thank you, Chairman.

Let me start, General Klotz, by just saying thank you sincerely for coming out to Albuquerque for the interchange between SCMC and small businesses last week. We got a lot of very positive feedback on that.

To Dr. Regalbuto, fair warning, I may be asking for something similar to happen in the future at WIPP. People think we're a small State, but we're very, very large. It's hard to cover those bases sometimes in a very territorially large state with two labs as well as the WIPP facility.

I want to jump on something that the Chairman brought up with regard to this old infrastructure and deferred maintenance, just to put a very fine point on the reality of where some of these very talented folks at NNSA are working.

General Klotz, you and I had a chance to look at the Albuquerque-area complex, someplace that approximately 1200 NNSA employees work at, last week. It's a complex that was largely built as dormitories for the Air Force back in 1951. There is asbestos problems. We saw hundreds of broken windows. This is not a matter of just replacing a few tiles in the ceiling. Can you talk a little bit about what some of the factors were that drove your decision to seek authorization to deal with some of the deferred maintenance and look at a new building to replace the NNSA's Albuquerque Complex?

General KLOTZ. Thank you very much, Senator, for the opportunity—yeah—thank you again for the opportunity to come out and interact with the small business leaders in the state of New Mexico. It was both productive and actually quite enjoyable to engage with them. Thank you also for coming over to visit the Albuquerque Complex.

As you saw, and as you said, we have buildings that were essentially 1950s-era Air Force dormitories that we converted into office space, so there are multiple problems associated with asbestos, with the HVAC [Heating, Ventilation and Air Conditioning] systems that don't work. You saw the sprinklers that were kind of dropped down from the ceiling that are corroding. It's just not the kind of place that you expect a quality workforce to have to work in. We need quality work spaces for our quality workforce.

We had considered, over the years, a number of potential options to get better working conditions for our people in Albuquerque. One

of the things we had pursued for a while was the potential of a lease option. That's where I came into the picture. One of the things that the Secretary—as Mr. Trimble has pointed out—has insisted upon, in terms of our project management, a very structured, disciplined approach, in terms of how we decide to do projects and how we manage projects. One of those is to make sure we do an analysis of alternatives. I immediately called for an analysis of alternatives for Albuquerque Complex, and it worked out that actually buying—the Government constructing a facility there made a lot of sense, because we can save money, because the land we'll use is land already owned by the Government. It is, as you know, adjacent to Kirtland Air Force Base, so once construction is finished, you can move the fence around, and you save on the cost of perimeter security. There are a lot of reasons to go forward and do that.

I appreciate your support in getting some money recolored in the fiscal year 2016 omnibus bill, which allowed us to use $8 million to begin the initial design. We're requesting, in fiscal year 2017, an additional 15 million for completing that design. We have a wedge in there, in 2018, of about 50 million, but it's going to cost a lot more than that. But, we'll—again, that's part of——

Senator HEINRICH. Well——

General KLOTZ.—coming to, you know, these independent cost estimates to make sure we've got the best value.

Senator HEINRICH. Exactly. I look forward to working with you on that. One of the things I learned, local government, in working with rating agencies and bond counsel, is that deferred maintenance is not fiscal responsibility, it is a growing blackmark on your balance sheet that you have to deal with.

I want to switch gears real quick to the M&O [Management and Operating] contracts coming up at Sandia and Los Alamos. One of my concerns is just to ask you what your thoughts are on making sure that both of these labs are able to remain competitive in hiring and retaining the top scientists and engineers in key fields, particularly those fields, like cybersecurity and others, where the same talent is going to be sought by the private sector, and sending the right signals to be able to attract that talent in the midst of a new request for proposals for M&O contracts.

General KLOTZ. Thank you, Senator. That's a very good question. I've had an opportunity to read the letter, which the three laboratory directors independently have sent to you, and they, all three of them, touch on this concern, whether it's at Sandia or Los Alamos or at Lawrence Livermore. As I think you will have read in there, you know, one of the key things is LDRD, Laboratory Directed Research and Development. You know, this is a program which allows the lab directors to have brand new graduates of our top physics, chemistry, engineering programs do work at the lab while they wait for their security clearances, while they get integrated into the work of the laboratory. There has been pressure over the past to reduce the amount of—the percentage of overhead which can be used for Laboratory Directed Research and Development. I would—thanks to your leadership, we've kind of staunched the problem there. But, again, this is something that we need to work at.

There are other things in the contracts that we typically write with our laboratories. We give them flexibility to offer hiring bonuses, retention bonuses, incentives, and to engage in other activities, like teaching at the University of New Mexico, as some of our people do.

Finally, on these two particular—if and when we get to competition on both of these laboratories, one of our new procedures in NNSA over the past couple of years is that we will send out a draft request for proposal before we send out the final request for proposal. That is the opportunity for all stakeholders, whether it is the local community, local academic institutions, Members of Congress and their staff, contractors—potential contractors—to comment on what we have put into the draft RFP before we send it out. We'll do that with any M&O contracts that we do from now on.

Senator HEINRICH. Great.

Mr. Chair and Ranking Member Donnelly, I'm pleased that General Klotz brought up LDRD. One of the opportunities that we have is to fix the sort of double-dinging them for overhead on this LDRD, which is really key for attracting new scientists into the complex. I think we have a good work—working proposal for that, either through the energy bill, where I'm working on an amendment, or potentially through the NDAA. I look forward to working with you on that.

Senator SESSIONS. Very good.

Senator HEINRICH. Thank you.

Senator SESSIONS. I know you're on top of this issue.

Senator Fischer.

Senator FISCHER. Thank you, Mr. Chairman.

I thank the panel for being here today.

General Klotz, it's good to see you again.

In the fiscal year 2017 budget request, General, for the W80–4 Life Extension Program, we're looking at about 92 million, or 30 percent, less than the amount that was projected in last year's FYNSP. The justification documents note that the program, quote, "will ramp up at a slower place, and planned technology maturation activities will be reduced, but the slower ramp-up is not expected to impact planned FPU in 2025."

With respect to that statement about the technology maturation activities, we know, from previous lessons learned, that that early technology—those maturation activities, they do reduce the risk over the life of a program. I'm questioning when we are looking at cutting back on those—would you say that's cost avoidance or cost deference?

General KLOTZ. If I could, Senator, let me offer a—an initial response to that, and then if I could ask General Davis, since we brought him all this way——

[Laughter.]

General KLOTZ.—and he is the expert on this.

Senator FISCHER. Okay.

General KLOTZ. First of all, one of the reasons why the ramp is not as steep as it was—as we projected last year is, quite frankly, what programmers would call a fact of life. The amount of money we were authorized and appropriated in fiscal year 2015 was $10 million. We had asked for $195 million to begin the program in ear-

nest in fiscal year 2016, but, as you'll recall, we were in a CR for, you know, a good three months of that. As a result, we could only spend—we were—annually, 10 million, but what that worked out to was 2.5 million for that three months, because it's allocated quarterly. Thankfully, and thanks to your support, the Congress passed the full appropriations we had requested of 195 million for 2016, but, since we're already three months into the fiscal year and we had only been able to spend 2.5, we know we're going to have a significant amount of carryover. Given the fact that we had to balance a lot of programs against—in our portfolio against a cap, we chose to use—cash flow that into fiscal year 2017, and so the ramp will pick up again in our submission for fiscal year 2018.

That's—that was the thinking. It was just a business decision. We weren't sending any kind of signal. It's still an increase in the overall request for the W80–4, because we think both the W80–4 and the long-range standoff capability that the Air Force is pursuing are extraordinarily important programs for America's strategic deterrence.

Senator FISCHER. Before the General speaks—so, you're looking at, still, I think, a decrease in what's needed, though, correct?

General KLOTZ. We still think——

Senator FISCHER. Doesn't that put the completion date out even further?

General KLOTZ. There will be some increased risk, but we're still fairly confident. I noticed that one of the laboratory directors indicated that, as well, in her letter, that we're still confident we can meet the fiscal year 2025 first production unit.

Senator FISCHER. Okay.

General.

General DAVIS. Senator, I'd just add a couple of points to General Klotz's comments.

First, we certainly agree that the value of putting money in tech maturation is very important. It reduces risk to programs across the portfolio. Had we had the money, we certainly would have liked to—applied it to technology maturation.

In this particular case, the cut in fiscal year 2017 of $90 million actually helps us to fund other technology maturations across the NNSA enterprise.

Senator FISCHER. Now, is that due to the carryover——

General DAVIS. Well, that is due——

Senator FISCHER.—that was——

General DAVIS.—to the carryover. The program couldn't spend it, so we basically harvested it from the W80–4, in the short term, to apply to technology maturation and surveillance activities in fiscal year 2017. I would also add that, in fiscal year 2020 and 2021, we will add money back into the program.

Senator FISCHER. You're basically hoping that the cost—the revenue will come out in the out years, then, for it.

General DAVIS. Well, I mean——

Senator FISCHER. You're kind of banking on that in order to complete the project in the future by having more revenue——

General DAVIS. Well, in this case, the impact to the 80–4 is really based on the delay of funding and not based on the fiscal year 2017

cut. The fiscal year 2017 cut is really a fact of life. There's only so much money that we can spend on the program in fiscal year 2017.

Senator FISCHER. General——

General KLOTZ. But——

Senator FISCHER.—you want to speak, I can see that.

General KLOTZ. But, full and consistent funding is absolutely critical. If I can say it now, I've—we've said it up here before—long-running CRs [continuing resolutions] also can play havoc with schedule on any of these programs, because that's money that our laboratories cannot use to staff up to do the types of work—the procurement—long-lead procurements that they need to do.

Senator FISCHER. If I could, Mr. Chairman.

When you speak about the impact of the CR and staffing up, could you—do you have any idea, just off the cuff here, on how many positions that you would be losing due to a CR and not being able to move ahead on programs?

General KLOTZ. I'd—Senator, I think we would have to look at that by individual programs. I know, in the case of the W80–4, a lot of that money in the 195 was for Lawrence Livermore to begin to staff up to do the work on the W80–4. They had to delay some of that until they had the money in the bank to do that. Then, oh, by the way, there's also an issue with a backlog of security clearances, as well. That's the fact of life that they have to deal with.

Senator FISCHER. Okay. Thank you.

General KLOTZ. As you get further—as the program gets more mature, then it becomes an issue of, you know, procuring items that you need to actually do—to do the work.

Senator FISCHER. Thank you.

Senator SESSIONS. Senator King.

Senator KING. Thank you, Mr. Chairman.

I'm going to take it from the detail to much higher level.

One of the common questions I get in Maine, people are all concerned about the deficit and the debt that we're leaving our children. It's scandalous, but that's another discussion. But, one of the questions I get is, "Why are we modernizing nuclear weapons? Why are we building brand new submarines, new bombers?" I think I know the answer to that, but, General Klotz, you want to take a pass at that? You're talking at a—you know, to a group of my constituents in Topsham, Maine. Tell them why we need to be spending all this money, $12 billion just in your budget, and that doesn't count *Ohio*-class replacement, long-range strike bomber. You know, and they say, "Well, the Cold War was over a long time ago. Why are we doing this?"

General KLOTZ. Well, Senator, it's true, the Cold War was over a long time ago, but we still live in a very dangerous, complex world, and nuclear weapons still exist in other countries besides the United States. As long as those nuclear weapons exist, we need to maintain a capability to deter their possible use against the United States or our friends and allies across the world. The way you deter the use of nuclear weapons that we've—we have—the path we have followed for several decades is to have the—a nuclear deterrent of our own to act as a repose to that. As long as you have nuclear weapons, you have to make sure that—as I've said earlier, they have to be safe, we have to have confidence that they will

not—there will not be accidents resulting with them, that they'll be secure, that nobody can steal them, and they have to be effective, because a deterrent is only credible if it can be—if it's capable of being carried out.

These weapons that we have now—I'll just talk about the warheads, but not the delivery systems—our stockpile, average age, is the oldest it's ever been since the beginning of the Atomic Age. Nuclear weapons, you know, are made up of an—you know, inert material, but it's still material that's subject to age and the various effects associated with age.

Senator KING. Of course, it's complicated by the fact that we can't test them.

General KLOTZ. We can do a pretty good job now, by virtue of the Stockpile Stewardship Program, where we conduct diagnostic experiments on various components associated with the nuclear weapons. We put that data, along with the data from 1,054 nuclear tests that we did conduct when we were still actively testing, up until 1992, and put them together, put them in algorithms that we run on high-performance computers, and we have a very good sense, based on that, on how these weapons age or, if we make a decision that we have to manufacture a particular subcomponent of a nuclear weapon because the original manufacturer is out of business or the material they use is no longer available, or there's a cheaper, faster way to make it, that we can certify that—using that component as we do a life extension program.

Senator KING. I appreciate your answer. That's essentially the answer I give. But, I think it's important for policymakers at a high level to have this discussion so the public does understand—the only thing worse than nuclear weapons is not having them and have other people have them and use them, and the deterrent—deterrence has worked for 80 years—70 years.

Admiral Caldwell, let me turn to a different question. On questions of modernization, and particularly with the *Ohio*-class submarine, it concerns me that these projects are now taking so long from conception to construction that they are obsolete the day they come off the line. To what extent are you all considering that fact and building—the term I use is modularization—I don't—there may be a better term—but, ways that we can upgrade easily without having to go back and say, "Well, we need a third generation of *Ohio*-class submarine"? Do you see what I'm saying? A platform that can be changed out and modernized without a new platform being conceived and built. Is this part of your design strategy?

Admiral CALDWELL. Well, sir, I can talk about the Naval Reactors portion of this.

Senator KING. Right.

Admiral CALDWELL. Then I can give you some thoughts on my experience as a submariner.

I think the proof is in the history of what Naval Reactors has done. Our platforms, we are using them much longer today than we ever intended to. For example, I talked about the current *Trident*-class that was not designed to be around as long as it is today, but we designed it with toughness and high quality, and we're taking that out to 42 years of operation. I said 40 earlier. I meant—it's 42 years. That's longer than we've operated any class of sub-

marines before. Likewise, with our *Los Angeles*-class submarines, we've been able to extend the life on those ships, as well. We have a few in the inventory now that are out at 36 years and still operating. These were ships that were built at the—during the Cold War, designed to run in the Cold War, and are now operating all around the world, answering the Nation's needs. I think—and then I'll give you one final point on that. The two prototype reactors we operate in Charleston, where we train students, those are 52 years old. We are operating those plants much longer than we ever thought, in a way we never thought we were going to, to train students. They're the oldest pressurized water reactor plants in the world, and they're operating well. I've inspected them personally.

Senator KING.—would probably recognize them if he stumbled into the——

Admiral CALDWELL. Well, they're—no, I would dispute that. I think they are in great shape, and they're—they look terrific. I've inspected them myself. They're still turning out students. This is all because we built them toughly, we designed them the right way, and we're manning them and maintaining them the right way. The reactor plant, I can tell you, we build them to last, and we—and we're doing that with the *Ohio*-class replacement, as well. We're taking the lessons that we've learned, and we're making it better.

On the forward end of the ship, we've done things like taking off-the-shelf technology—commercial off-the-shelf technology. Our sonar, fire control, and electronic support systems are all upgradable. We're taking an old submarine, like the one I served when I commanded Jacksonville—that ship has a modern fire control and sonar system that would rival any submarine in the world. I think we're on a good path, sir.

Senator KING. Good.

Thank you, Mr. Chairman.

Senator SESSIONS. Thank you.

Senator Graham.

Senator GRAHAM. Thank you, Mr. Chairman.

Let's talk MOX.

[Laughter.]

Senator GRAHAM. Okay.

General KLOTZ. I'm not surprised.

Senator GRAHAM. All right. Let's inform the committee——

Senator SESSIONS. There was a gasp when you came in the room.

[Laughter.]

Senator GRAHAM. Yeah. Yeah.

General KLOTZ. We were doing so well.

[Laughter.]

Senator DONNELLY. Actually, Senator Sessions said to me, "Here comes Justice Graham."

[Laughter.]

Senator GRAHAM. Yeah. General Sessions. I like that. You know, you used to be attorney general.

[Laughter.]

Senator GRAHAM. The MOX program is designed to take 34 metric tons of weapons-grade plutonium and turn it into commercial-grade fuel. Is that right?

General KLOTZ. That's correct.

Senator GRAHAM. That 34 metric tons of weapons-grade plutonium could create thousands of warheads.

General KLOTZ. Yes.

Senator GRAHAM. Is that right?

General KLOTZ. Yes.

Senator GRAHAM. The Russians are going to take 34 metric tons of weapons-grade plutonium and do what with it?

General KLOTZ. Under the Plutonium Management Disposition Agreement, which you are very familiar with, Senator, that we signed with the Russians around 2000, they will do the same.

Senator GRAHAM. They going to MOX it?

General KLOTZ. They're going to——

Senator GRAHAM. Fast breeder reactor, right?

General KLOTZ. Yeah, fast breeder reactor. Or——

Senator GRAHAM. Okay. They're going to dispose of it, but just a different way.

General KLOTZ. Yeah, we—we're going to use light water—pressurized water——

Senator GRAHAM. Right.

General KLOTZ.—reactors to burn MOX fuel.

Senator GRAHAM. This is a good thing.

General KLOTZ. Getting rid of 34 metric tons of——

Senator GRAHAM. Yeah.

General KLOTZ.—plutonium is a good thing.

Senator GRAHAM. Yeah, it's a good thing for Russia to dispose of their excess weapons plutonium. It's a good thing for us to do that.

General KLOTZ. Yes.

Senator GRAHAM. Probably one of the biggest nonproliferation success stories in modern times?

General KLOTZ. It is—certainly ranks up there.

Senator GRAHAM. Okay. In 2010, we signed an agreement with the Russians, right?

General KLOTZ. We modified an agreement——

Senator GRAHAM. Modified an agreement.

General KLOTZ.—in 2010.

Senator GRAHAM. In 2010, they said they would use the fast breeder reactor system, and we said okay.

General KLOTZ. Yes, Senator, that is correct.

Senator GRAHAM. We told them we were to MOX it. We're going to take the plutonium pits, we're going to send everything to South Carolina, create a MOX facility, lend the weapons-grade plutonium down to commercial-grade fuel, and that was our pathway forward, right?

General KLOTZ. Yes, sir.

Senator GRAHAM. Okay. Now we come to find that the MOX program is, by some—in some people's estimation, cost-prohibitive. Is that right?

General KLOTZ. That is correct.

Senator GRAHAM. Who, in 2010, picked this program? Why did they not know it was cost-prohibitive in 2010? Has anybody been fired?

General KLOTZ. That, I don't know. I was doing other things——

Senator GRAHAM. Okay.

General KLOTZ.—in 2010.

Senator GRAHAM. Here's what I want the committee to understand. We had an agreement that's really good for the world. We picked a methodology, to dispose of the plutonium, that had been vetted for about a decade. MOX was chosen because it was an option that would work. The Russians were okay with the MOX program. Our government, in Republican and Democratic administrations, chose MOX over all other alternatives. Five years later, we're talking about canceling the program when it's 60 percent complete.

Have we talked to the Russians at all about what would happen if we changed the disposition plan?

General KLOTZ. We have had informal discussions with our counterparts in Rosatom.

Senator GRAHAM. Who makes the decision in Russia as to whether or not they would accept a change?

General KLOTZ. I can only base that based on having served in Moscow for two years in our Embassy, and I would say, like in the United States, it would be an interagency process that would involve Rosatom——

Senator GRAHAM. We don't know who the final approval authority is.

General KLOTZ. I would suspect it would be the Ministry of Foreign Affairs——

Senator GRAHAM. Okay, right.

General KLOTZ.—because they're the ones who negotiated at—with the State Department.

Senator GRAHAM. Okay. The new disposition plan is what?

General KLOTZ. The new—our preferred approach, because we think it's faster and cheaper, would be to dilute the excess plutonium in a——

Senator GRAHAM. Would that require the Russians to agree to that change?

General KLOTZ. The Plutonium Management Disposition Agreement says that you will dispose of this by irradiation or other means, as agreed by the——

Senator GRAHAM. Does that require their approval?

General KLOTZ. That's a fair reading of the——

Senator GRAHAM. We'd have to get the Russians to sign up. When you dilute it down, where do you send it?

General KLOTZ. We would send it to either WIPP or a repository like WIPP. We already have——

Senator GRAHAM. Where is that at?

General KLOTZ. The weapon—the Waste Isolation——

Senator GRAHAM. What State?

General KLOTZ.—Pilot Plant——

Senator GRAHAM. What state is it in?

General KLOTZ. In the great state of New Mexico.

Senator GRAHAM. Have you talked to anybody in New Mexico about would they accept this material?

General KLOTZ. Yes.

Senator GRAHAM. What did they say?

General KLOTZ. You will find the local communities are quite willing to——

Senator GRAHAM. Do the local communities decide?

General KLOTZ. I can't speak to all of New Mexico's——

Senator GRAHAM. All I'm telling the committee is, you're talking about sending it to New Mexico, and people in Mexico are at least divided. Have you talked to the two Senators in New Mexico?

General KLOTZ. I personally have not.

Senator GRAHAM. Don't you think it would be important to get their input?

General KLOTZ. That's where we are now.

Senator GRAHAM. Okay. It's only cheaper if it works.

General KLOTZ. Well, we—that is a fair point, but we—we're quite confident this will work. There's already——

Senator GRAHAM. Well, are you quite confident that people in New Mexico will accept the product?

General KLOTZ. There's already five million metric—five metric——

Senator GRAHAM. That's not the question.

General KLOTZ.—five metric tons there.

Senator GRAHAM. Are you confident that the people in New Mexico will buy into what you're proposing?

General KLOTZ. If you're asking Frank Klotz's personal opinion, the answer is yes.

Senator GRAHAM. Okay. Tell me what the two Senators said when you talked to them about it.

General KLOTZ. No, I said I had not yet talked to them——

Senator GRAHAM. Well, how in the world can you say that Mexico—New Mexico's okay, when you haven't talked to the two Senators? Because I've talked to both of them, and they're not okay. We're going to go from one extreme to the other. What law has to be changed to make this happen?

General KLOTZ. There would have to be—and, of course, Monica, since she has responsibility for WIPP, is probably better——

Senator GRAHAM. Would any laws have to be changed to make this accommodation?

Dr. REGALBUTO. It will require program modification and approval by the——

Senator GRAHAM. Okay. Have you told me what it would be? Do we have the votes for it? What does it look like?

Dr. REGALBUTO. There has been no record of decision to——

Senator GRAHAM. Okay.

Dr. REGALBUTO.—do any of this.

Senator GRAHAM. What we're doing is stopping a program that there's questions about the actual cost, we're coming up with an alternative that nobody has any idea if it'll work. The Russians are not on board. Nobody's really run this through the Russian system. New Mexico, which would be the new site for disposal, hasn't been consulted. There are legal changes that I don't know if we could accommodate, or not. We don't know if it works. Other than that, this is a good plan.

General KLOTZ. We think it's an excellent plan, in——

Senator GRAHAM. I think it's a lousy plan.

General KLOTZ.—in the sense that——

Senator GRAHAM. Let me just——

General KLOTZ. Okay.

Senator GRAHAM. I think this is going—this is what's wrong with the Government. Somebody five years ago—please indulge me——

General KLOTZ. Yes, sir.

Senator GRAHAM.—came up with a disposition plan that now they say costs way too much, and it's 60 percent complete. Who the hell decided that it would work, to begin with? Not one person's been fired. Sixty percent of it's done. Now we're going to change horses and come up with a plan I don't—have zero confidence in. Nobody's run this through the New Mexico traps, nobody's talked to the Russians. We don't even know if this is—has a remote chance of happening, and we're going to stop this program, with no alternative, in my view. This is exactly what's wrong with the Government.

If you could prove to me there's a better, cheaper way to do this that meets our goals, I'm all for it. But, what you've done to the state of South Carolina is get us to sign up for a pig in a poke. I spent a lot of political capital convincing the people of South Carolina this is a good mission for us and the country, to take 34 metric tons of weapons-grade plutonium, which is not a popular thing to ask your state to do, with the understanding there was a pathway forward, that we would do a certain thing with this weapons-grade plutonium, be good for the site, be good for the Nation. We're 60 percent complete, and they're going to stop it, with no alternative. This is what's wrong with the Government.

I don't know how we fix this, but somebody needs to be fired for putting this in motion. I have very little confidence that the Russians are going to agree without a heavy price to be paid. This is not the time to go to the Russians and ask for a favor. I've got almost zero confidence that New Mexico's on board, because nobody's really vetted this. When it comes to changing the program, I just don't know how it would work, legally. You're going to get sued by everybody when you start over.

We're in a mess. It's not the General's fault, like you all. But, this is an example of the Government just completely out of touch with reality. Anybody in the private sector would be fired. If you had a company, and they made this proposal to the company board, and, halfway through, 60 percent through, you said, "Well, it won't work," somebody would be fired.

Somebody needs to be fired.

Thank you, Mr. Chairman.

Senator SESSIONS. Well, Senator Graham has been involved in these issues for a long time. He has worked with South Carolina to help us save a good deal of money in cleanup.

Senator GRAHAM. Sixteen billion dollars.

Senator SESSIONS. Sixteen billion dollars. We're a long—this is not a good deal. Maybe, Mr. Trimble, could GAO tell us who made the recommendation, when they made it, and would you report back to us to that effect? Or maybe you know already.

Mr. TRIMBLE. I can take that question back. We may have some of the earlier documentation on the Analysis of Alternatives that was done in the past. I have some recollection of seeing it, but I can't recall the answers to that.

[The information referred to follows:]

DOE's actions to change from the MOX approach to the dilute and dispose approach for the disposition of 34 metric tons of surplus weapons grade plutonium started with the President's fiscal year 2014 budget, in which DOE stated that it

would slow down MOX Fuel Fabrication construction, and culminated with the President's fiscal year 2017 budget request, in which DOE requested to terminate this project. DOE's major actions and timeframes for its decision are explained below:

- In the fiscal year 2014 budget request, DOE stated that it will slow down the construction of the MOX Fuel Fabrication Facility as it will assess the feasibility of alternative plutonium disposition strategies.
- In April 2014, the department completed an analysis of alternative disposition options in its 2014 Plutonium Disposition Working Group Report. This analysis found that the dilute and dispose alternative would be significantly less expensive than the MOX approach and would face fewer technical risks. The report, however, reached this conclusion based on a life-cycle cost estimate for the dilute and dispose approach that had a high level of uncertainty and a life-cycle cost estimate for the MOX approach that we found to be unreliable in a prior GAO report (GAO–14–231).
- In the President's fiscal year 2015 budget request, DOE asked to place the MOX facility construction in cold standby, while DOE determined an alternative approach. However, in its fiscal year 2015 appropriations, Congress decided to continue to allocate $350 million a year for construction activities for the MOX facility.
- In response to a congressional request, DOE contracted with the Aerospace Corporation to assess the validity of the Plutonium Working Group's analysis and findings. In April 2015, Aerospace issued a report that also found that the dilute and dispose approach would be less costly than the MOX approach.
- The Secretary of Energy requested that an independent team at Oak Ridge National Laboratory determine what the preferred approach for the Plutonium Disposition Program should be. In August 2015, the resulting report, known as the Red Team report, concluded that the dilute and dispose approach was the preferred approach due to lower technical risks and lower costs.
- In February 2016, DOE proposed in the President's fiscal year 2017 congressional budget request to terminate its MOX facility construction project. The request stated that its MOX fuel approach to dispose of 34 metric tons of weapon-grade plutonium will be significantly more expensive than anticipated. Instead, NNSA proposed to focus on the alternative approach of diluting the surplus plutonium and disposing of it in a geologic repository.

General KLOTZ. But, may I say, this is the President's proposal. When I used to teach political science at the Air Force Academy, the saying was, you know, "The executive branch proposes, the Congress disposes." This is the proposal that we have made. We've laid out our reasons, in terms of cost and risk associated with it. We've tried to make the best case. We've done the best we can do——

Senator GRAHAM. General, I'm not blaming you. I mean, you came on after all this happened.

General KLOTZ. Yeah.

Senator GRAHAM. Somebody set in motion a system that they completely—either the people now saying it costs too much don't know what they're talking about or the person that said that it will work didn't know what they were talking about. Somebody's wrong. I want to get to the bottom of it, because we did save $16 billion, Mr. Chairman, under your leadership, by taking high-level waste and leaving part of it in the tanks. Instead of scraping it completely clean, we accepted some high-level waste by putting concrete in the bottom. It didn't pollute our environment. I had to fight every environmentalist in the Southeast, but it saved $16 billion, and it was good for the Government, it didn't hurt my state. I'm very open-minded about being reasonable. I just feel like that we're not being treated fairly. That's all I'm saying.

Senator SESSIONS. I understand.

General Klotz—well, we just had, before you came, testimony that from 2011 to 2015 we've spent $23 billion in additional for cleanup, but now we've got a new estimate that said the total cost is going to be 77 billion more than we estimated. We didn't make any progress. We're still falling further behind.

But, General Klotz, on—in terms of money expended, what is the percentage of the money, do you know, on the MOX facility in South Carolina?

General KLOTZ. I do. If I could turn to that.

First of all, the MOX project is more than just the facility which we've been discussing, which is the MOX Fuel Fabrication Facility. It also includes a number of other facilities, one of which has been completed at South Carolina, called the Waste Solidification Building. So far, we have spent $4.8 billion on the MOX Fuel Fabrication Facility itself. The estimates of what it will cost to complete that facility alone vary as to whether you're using the Army Corps of Engineers or MOX Services—that's the contractor—or a series of about three different reports which have been done over the last couple of years within DOE by a red team chaired by Dr. Tom Mason of Oak Ridge National Laboratory and by Aerospace Corporation. Some of those numbers vary, you know, as high as $21 billion for the total project cost for that.

Now, we estimate costs complete by virtue of—percentage complete—strictly on cost. I know there's different ways of doing that. When we say it's a certain percentage, it is that 4.8 divided by the total amount that is needed for the whole project.

Senator GRAHAM. Mr. Chairman, I don't mean to belabor this, but I'd invite everybody to spend—I can show you this. Seventy six—70 percent complete, according to the—I can show you the facility. It's a big, massive thing. I'll be glad to show it to you. If there's a better way of doing it, I want to know what that is. Will it actually work?

Senator DONNELLY. We talk about 23 billion spent, 77 billion to go, and then we talk about 70 percent complete. How do the numbers match up?

Mr. Trimble?

Mr. TRIMBLE. I would have to—to give you an intelligent answer, I'd do it for the record. There's been multiple—as has been said, there have been multiple estimates in recent years. You have a challenge of doing apples to apples in comparing those numbers, because they're at different times, and sometimes they're addressing different ranges.

[The information refereed to follows:]

EM does not manage the MOX project. DOE's Defense Nuclear Nonproliferation program is responsible for the MOX project and the Plutonium Disposition Program. The environmental liability for DOE's plutonium disposition plan is $29 billion, but this figure includes more than just the MOX construction costs. It also includes the lifecycle operations of MOX and other facilities needed to complete the plutonium disposition program. Overall, DOE's environmental liability increased in 2016 by about $32 billion compared to 2015, and potential cost increases to the MOX Fuel Fabrication Facility were part of this growth in the liability.

Senator DONNELLY. I understand that, and I understand about inflation, and this and that. But, if we're 70 percent complete, how come we still have 75 percent of the cost to go? And——

Mr. TRIMBLE. Yeah. Well, I think there's disagreement or difference of opinion whether it's 70 percent complete.

Senator SESSIONS. Well, this is a matter we're going to need to wrestle with. But, what I was saying about the 77 billion in estimated increase in cleanup cost, does that include, Dr. Regalbuto, the MOX facility cost?

Dr. REGALBUTO. No, it does not include the cost of the activity in that facility at the end of mission.

Senator SESSIONS. All right. Well——

Senator GRAHAM. I share your——

Senator SESSIONS. We've got to get a grasp on this. What I want you to know, Department of Energy, is that, for $1 billion, we can maintain 10,000 soldiers. We're giving pink slips to people who want to stay in the military, because we don't have a billion dollars to keep them on duty. We just waltz in and now we go $77 billion more than we estimated, 240 billion for cleanup by 2075, and we've got this problem in South Carolina that I think we need to find out how it happened.

Senator GRAHAM. Yeah.

Senator SESSIONS. Who—maybe they've got a perfectly reasonable excuse, but I think we just can't blithely walk on and waltz into this committee and say, "We've just changed our mind." I mean, I just really feel like that. General Klotz, I'll let you comment, and anyone else that wants to, but——

General KLOTZ. Well——

Senator SESSIONS.—we have to stop. But, Senator Graham is correctly challenging and asking some legitimate information. I know our committee will want to look at it. We may have to make a tough decision and say, Senator Graham, sorry. But——

Senator GRAHAM. I get that, Mr. Chairman.

Senator SESSIONS.—he's entitled to have a clear answer.

Senator GRAHAM. Yeah. All I'm saying is, if there's better way of doing it, I want to know, Will it work? Stopping the program without an alternative is not saving money, it's just putting in jeopardy all the things we've accomplished. Nobody can tell you, or me, that there is a viable alternative, because they haven't run the traps. Nobody's talked to the people in New Mexico. Nobody knows what the Russians are going to do. At the end of the day, nobody knows what kind of legal changes you have to make, and are they possible. Other than that, we're in a good spot. We're stopping a program, whether it is—go look at it, I'll show you the facility—and saying we're going to start all over again. How can that happen, and nobody get fired?

General KLOTZ. Well, we're concerned about the cost, as well. As we look out for the longer term, the reports we've done indicate that, you know, this whole thing—not just the construction of the facility, but to operate the whole MOX chain—could cost us anywhere from 800 to a billion dollars a year for many, many years to come.

Senator GRAHAM. Why didn't they know that in 2010?

General KLOTZ. Again, I wasn't here, Senator, in 2010. I share your frustration.

Senator SESSIONS. Ms. Harrington, you were here in 2010.

General KLOTZ. But, the——

[Laughter.]

General KLOTZ. But, it's a——

Senator GRAHAM. I mean, who——

General KLOTZ. But, it's——

Senator GRAHAM.—signed this deal?

General KLOTZ. But, it's an opportunity cost. I mean, this comes out of, as you know, an NNSA budget that's only 12 to 13 billion dollars. There's a lot of other needs in that, as well as in the larger defense 050 accounts.

Senator GRAHAM. But, you agree with me, if you don't have an alternative, it's not a good idea.

General KLOTZ. Well, we think we do have an alternative. There we——

Senator GRAHAM. I've written——

General KLOTZ.—disagree.

Senator GRAHAM.—a letter about the three questions. Will New Mexico take it? Do you need legal changes? Are they—can you accomplish it? Do the Russians agree? If they don't agree—if they do agree, what price do we have to pay to get the Russians on board? We're changing an agreement with the Russians. This is a fundamental change in the agreement. I need the answer to those three things before I can go back to South Carolina and tell the people that I represent that we've been fairly treated.

Senator SESSIONS. That it?

Well, thank you all.

Is there any other question the members of the committee have on any other subject?

Senator King?

Senator KING. I'm—I apologize for being late. We had another Armed Services Subcommittee meeting at the same time, on personnel. Easy problem: healthcare. Nothing to that.

Is there a timeline and a price tag on the overall nuclear modernization project? In other words, do we have—does there exist a, "Here's what we have to do. Here's how long it's going to take. Here's how much it's going to cost"?

General KLOTZ. Yes, sir, I believe it is. I assume you're including the whole—the DOD part of that, because that's the largest part of——

Senator KING. Sure.

General KLOTZ.—of this. I don't have it with me, but I know, when we testified before this subcommittee last year, the DOD came over with a chart that showed their projections of the cost, and ours added into it. I will—I hasten to add that the NNSA portion of that is a very small percentage of the——

Senator KING. But, I think it would be helpful——

General KLOTZ. Yeah.

Senator KING.—for us to see the——

General KLOTZ. Yeah.

Senator KING.—the big——

General KLOTZ. There is.

Senator KING.—the overall picture of what——

General KLOTZ. Yeah.

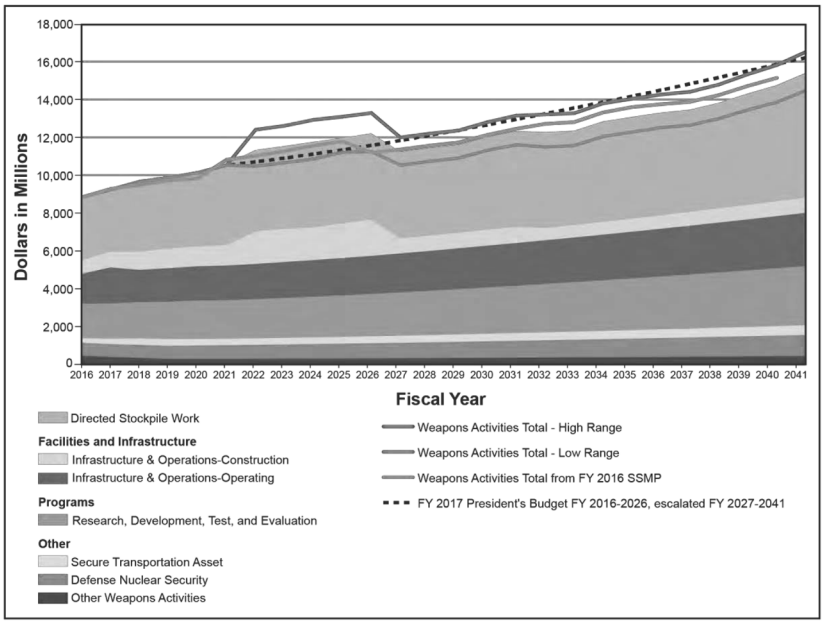
Senator KING.—what it is that we're biting off, here.

General KLOTZ. Right.

[The information referred to follows:]

Is there a timeline and a price tag on the overall nuclear modernization project? In other words, do we have—does there exist a, "Here's what we have to do. Here's how long it's going to take. Here's how much it's going to cost"?

The graph below shows estimates of out-year budget requirements for NNSA Weapons Activities in future dollars.



The figure displays the relative makeup of the Weapons Activities program in terms of its major portfolios for the period fiscal year (FY) 2016 through fiscal year 2041 by using program Future Years Nuclear Security Program (FYNSP) values for fiscal year 2016 through fiscal year 2021 and estimated nominal program costs for fiscal year 2022 through fiscal year 2041. This information shows the potential evolution in program makeup and does not represent the precise costs in the out years for any of the portfolios show.

The potential future cost for the program in the years beyond the FYNSP should be interpreted as the range between the red "high range" total lines and the green "low range" total lines for Weapons Activities shown in the figure. The range of total cost is necessary because of the significant uncertainties in the individual components that make up the estimate, in particular, for the LEPs and construction costs.

The dashed blank line represents the fiscal year 2017 President's budget for fiscal year 2017 through fiscal year 2026, with the fiscal year 2026 total escalated for fiscal year 2027 through fiscal year 2041 at the same 2.25 percent rate used in all the budget requirements estimates for those years. This line is intended to reflect the level of funding the Weapons Activities program might expect to receive for these out years, but is subject to annual adjustment based on the results of the programming cycle and interactions with stakeholders.

Senator KING. Thank you.

Thank you, Mr. Chairman.

Senator SESSIONS. Senator Donnelly.

Senator DONNELLY. Admiral Caldwell, as you look at the design of these reactors, the 40-year reactors, and they're going to be coming out in the years ahead, they're still—do you still have anybody working on looking at it as you go as to potential improvements to

make it even better? I mean, you have a design, but—you know, do you sit down and go, "Okay, here's the design, but we've just discovered this, or we've just discovered that"?

Admiral CALDWELL. In answer to your question, sir, there are different aspects of the propulsion plant and the reactor plant, and there are different answers depending on what section you're looking at. For a ship like *Ohio*-class replacement, once we put the fuel in the core and lock it in there, that's going to be in there for the remainder of its life.

Senator DONNELLY. Right.

Admiral CALDWELL. We're not going to do anything with that. Of course, along the way, like we have done with the *Trident*-class submarines, and the 688s, we have modernized the reactor instrumentation and made improvements along the way. This is all founded on a lot of decades worth of experience in the program, and looking at how we make improvements, in terms of maintenance operability, the ability to train folks. All of those things come together. The way that we do that, sir, is through what is—what I refer to as our technical base. This is the operations and infrastructure part of our budget, the developmental part of our budget, and the program direction. This technical base is the flywheel or the engine room for everything that we do. It allows us to do the design, the analysis, the lifetime support, all the way through disposal. That's always part of—that's a big part of our budget submission for fiscal year 2017, and it enables us to continue to advance the technology to do the research and development, and then to eventually apply this technology to the fleet.

Senator DONNELLY. When you look at the 40-year life of the submarine, obviously there'll be changes as we move forward during that life, changes in knowledge, changes in methods, changes in materials. This is not a—set in stone. But, is that 40-year life something that, at the end, you look and you go, "You know, this boat might well be usable for X number of additional years"?

Admiral CALDWELL. We could, and we have done that with the *Los Angeles*-class and the *Trident*-class, where we got to the end, and we looked and did the math and did the calculations, looked at the usage on the whole, and looked at the core expenditure, and decided that we could get more out of it.

The other part I would add is that we do ship alterations throughout the life of a ship. We might find a valve design that works better, or a component that needs to be replaced and upgraded. This is the way we do business in the Navy, and it's just part of our due process. As we find a system that works better, that might have been a maintenance challenge or maybe it didn't turn out to operate the way we expected, we'll go back to the drawing board and draw on all this experience, and we'll do a set of ship alterations to modernize the force. Those are going on every day throughout the Navy.

Senator DONNELLY. Thank you.

Thank you, Mr. Chairman.

Senator SESSIONS. Thank you.

Well, weapon modernization is going on around the world. Our potential adversaries, let us say, seem to be fully convinced that modernizing and advancing their nuclear weapon capacity is good

for them, both in terms of deterrence, both in terms of securing their national identity, and for a whole lot of reasons. We just have to understand that.

We've done—we were—have been the only nation that hasn't been advancing our systems. We're beginning to. I just think we have to. We've gone this many years. We have got to get this done.

We are facing a financial challenge in this country. We don't have a dollar to waste. If I were running the world, I'd say, "I want to build bombs, and I don't want to build buildings." But, maybe we have to build buildings. We'll have to deal with that. But, we need to keep the—we need to be as limited as we can be on that.

General Klotz, a modernized weapon would be more effective, more secure and safe, and be able to be protected from terrorists or errors better, too, isn't that true?

General KLOTZ. That's right, Mr. Chairman. Every time we consider how we're going to go about a life extension program for one of our weapons, that's one of the first things we look at. What can we take advantage of, in terms of the latest developments in technology related to safety and related to security that can be injected into the weapon as we extend its life?

Senator SESSIONS. You have no doubt we'll achieve that as we go through this modernization process.

General KLOTZ. Yes, sir, that's one of our top priorities.

Senator SESSIONS. General Davis, the—former Secretary of Defense Perry, who chaired the Nuclear Posture Review Commission with Secretary Schlesinger in a very important bipartisan commission on December 8th, said, quote, "Russia is embarked on a major buildup of their nuclear arsenal. It seems likely that they are developing new bombs with new characteristics," close quote. I know this is not a classified hearing. Can you—what can you tell us about that in an unclassified level?

General DAVIS. Thank you for the question, Senator. I'm certainly not an expert, in my current capacity, on—and I'm not up to speed on the current intelligence, but I can tell you that it's very clear that all of our adversaries are updating their nuclear weapons, along with our allies. I would put the Russians, the Chinese, the French, and the U.K. all in the batch of folks that are looking at how to update their nuclear weapons.

Senator SESSIONS. To some degree, we've been behind their activities. Is that right? They've been doing this for quite a number of years, most of them.

General DAVIS. Well, so certainly they've been updating their weapons. We are certainly, at this point, updating ours, as well, making them more safe, more secure, and more reliable. The thing that I'd point out—and you mentioned that that's the focus—we're in a very different world than we were when we originally designed these weapons. The security environment's completely different. We certainly have better technology. We need to take the opportunity to incorporate those improvements into these weapons.

Senator SESSIONS. Well, we wish it were different. We absolutely do. We wish that things were continuing to go down, like we hoped and saw for quite a number of years. The efforts on proliferation, Ms. Harrington, seemed to be making a lot of progress. Now we've got more and more nations expanding what they have, and other

nations moving forward to try to develop nuclear weapons. Unfortunately, it's just a fact of our life and necessary to defend America.

Senator Donnelly, you have anything else?

Thank you all. It was a very valuable hearing. We'll submit some written questions, I'm sure, and we would appreciate your assistance for the record.

Thank you very much.

We are adjourned.

[Whereupon, at 4:01 p.m., the hearing was adjourned.]

[Questions for the record with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR JEFF SESSIONS

INTEROPERABLE WARHEAD-1: THE NEXT BIG LIFE EXTENSION CHALLENGE

1. Senator SESSIONS. In our report accompanying the fiscal year 2016 National Defense Authorization Act, the SASC expressed concern about maintaining readiness to meet the technical challenges associated with the first ever interoperable warhead, designed to replace the W78 and W88 warheads. The 5 year delay of the IW–I program, from 2025 to 2030, is regrettable, but affords an opportunity to address the important technical challenges associated with designing and producing a warhead that can be used on both an ICBM and SLBM. What specifically is NNSA doing to address the technical questions associated with the IW–I approach (for example, assuring the nuclear package can be used in both an ICBM and SLBM warhead)? Are you examining how new design and production capabilities could save costs?

General KLOTZ. NNSA has undertaken a number of activities in order to maintain readiness and meet the technical challenges associated with the first ever interoperable warhead (IW). NNSA first conducted studies on IW concepts. Complex designs help to exercise a broader range of skills, and these studies provided a formidable design challenge for weapons designers. Additionally, programs such as the Joint Technology Demonstrator exercise the workforce throughout the design, develop, manufacture, and prototype lifecycle. This collaborative, United States–UK effort would exercise capabilities throughout the weapon development process. By looking at the entire development cycle, weapons designers are able to exercise a myriad of skills needed for the continued support of the nuclear deterrent, as well as isolate challenges moving through several stages of the design-and-build process. NNSA also began "Certification Readiness Exercises" to examine potential life extension program (LEP) options early to identify and reduce technical LEP risks and to enable LEP certification processes. These include hydrodynamic experiments to provide a technical assessment of proposed LEP options.

NNSA used the time during the delay to identify key areas for continued technical advancement and technology maturation. Specific areas of advancement include fuze technology, nuclear explosive package pit production capabilities, new concepts for qualification, safety and security technology, and advanced manufacturing technologies. These areas will enhance NNSA's ability to design and produce warheads with a common nuclear explosive package for intercontinental ballistic missile (ICBM) and sea launched ballistic missile (SLBM) delivery platforms. Additionally, NNSA is leading the technical development work on the W88 Alteration (Alt) 370 which the U.S. Air Force Mk21 Replacement Fuze leverages. The current technical progress being made on the W88 ALT 370 and Mk21 Replacement Fuze programs demonstrate the common and adaptable design, qualification, and production of fuze components for both the ICBM and SLBM applications. Common development of these and other technologies for use in multiple programs helps further advance the feasibility of the IW–1 interoperability concept.

NNSA continues to examine how new design and production capabilities could save costs, especially in the use of additive manufacturing. Implementation of this technology could reduce schedule risk, cost, and time to develop, assess, qualify, and certify critical deliverables for the stockpile. Continued research and development of additive manufacturing capabilities at the present time will offer us a path to design, produce, and qualify components more quickly and at a lower cost in the future.

2. Senator SESSIONS. Do you have a specific list of technical challenges that you can provide this committee?

General KLOTZ. The greatest challenge currently faced by the IW–1 program is the need to reconstitute the entire team of technical personnel for program restart in fiscal year 2020, due to the operational gap resulting from the five-year delay.

QUESTIONS SUBMITTED BY SENATOR JOE DONNELLY

LIFE EXTENSION PROGRAMS

3. Senator DONNELLY. The Stockpile Stewardship and Management Plans, from fiscal year 2014 through fiscal year 2016, have shown sharp increases beyond the Five Year National Security Program budget or FYNSP. Is NNSA continuously deferring budgets for modernization plans to out years beyond the FYNSP? What is the impact of these sharp increases on NNSA budgets in the out years?

General KLOTZ and General DAVIS. Several factors can cause sharp increases in the budget requirement estimates outside the Future Years Nuclear Security Program (FYNSP), including the conduct of multiple life extension programs (LEPs) or major alterations to weapon systems and modernization of key capabilities and infrastructure. As LEP and alterations ramp up to peak funding (typically around the first production unit), these activities constitute a significant percentage of Weapons Activities (WA) budget requirements. In the current FYNSP (from fiscal year 2017–2021), LEPs constitute about 16 percent of the total WA budget. Over this same period, LEP funding increases by about $580 million (to about $1.9 billion), and constitutes 18 percent of the WA total in fiscal year 2021. Beyond the fiscal year 2017 FYNSP period, LEP funding holds relatively steady at about $1.8–2 billion for several years. NNSA has, with this FYNSP and some of the adjustments to LEP first production unit dates in previous FYNSPs, now climbed the LEP funding ramp and smoothed the out-year LEP costs.

All program activities, including LEPs and related capabilities-focused construction projects proposed during the programming period are subject to particular scrutiny, and resources are allocated based on priorities and a balancing of all requirements. Among the highest priorities are modernization of stockpile warheads through LEPs and modernization of key capabilities, such as for plutonium and uranium. NNSA must also sustain the stockpile, the supporting infrastructure, and the intellectual capabilities that make stockpile stewardship possible. If funding is insufficient to support all proposed high priority activities and projects, funding may be slated for the period beyond the FYNSP (rather than just assuming that the requirement goes away). Many of the construction projects on NNSA's Construction Resource Planning list are early in their planning and have not yet matured enough to be included in the FYNSP. Many, however, have proven sufficiently important to merit being slated for the period immediately outside the FYNSP. Resources for these projects are in addition to the significant funding already required for the Uranium Processing Facility and the Chemical Metallurgical Research Replacement Facility project in the out-years.

4. Senator DONNELLY. GAO recently reported that the B61–12 Life Extension Program faces ongoing risks that include the weapon's potentially being incompatible with the F–35 aircraft. When will it be known whether or not the B61–12 and the F–35 are compatible, and how does the Air Force plan to mitigate the risk of incompatibility?

General KLOTZ and General DAVIS. NNSA is aggressively working with the United States Air Force (USAF) to ensure compatibility with the future Block 4.1 Dual Capability Aircraft (DCA) version of the F–35A. Representatives from NNSA's B61–12 Life Extension Program (LEP) and the USAF Joint Project Officer (JPO) jointly participate in B61–12 technical interchange meetings and interface working groups to collect best available data on early Block 2 aircraft environments and interface requirements. This information is used by the National Laboratories in developing bomb design and qualification requirements. Representatives of the B61–12 LEP also are working with the F–35A JPO to test on early developmental and Block 2 production aircraft. To date, the program has conducted mechanical fit checks, environmental flight tests, and aircraft electrical interface testing to reduce the risk of incompatibility. The B61–12 LEP will continue to partner with the USAF F–35A JPO to provide updated B61–12 test hardware and bomb simulators to facilitate integration and development testing until the Block 4.1 DCA aircraft is available for integration and nuclear certification testing. This currently is scheduled after the March 2020 B61–12 First Production Unit.

PLUTONIUM INFRASTRUCTURE

5. Senator DONNELLY. After cancelling the original Chemistry and Metallurgy Research Replacement Facility (CMRR) in 2014 after spending nearly $500 million on design activities, the President's fiscal year 2017 budget is now proposing a new alternative for addressing aging plutonium infrastructure—referred to as the modular strategy and made up of parts of the CMRR project and proposed modular facilities—which together could cost as much as $6 billion, based on a GAO analysis.

To what extent has DOE ensured the plutonium modular strategy has been or will be thoroughly analyzed against competing alternatives?

General KLOTZ and General DAVIS. Since the cancellation of the Chemistry and Metallurgy Research Replacement (CMRR) Project Nuclear Facility (NF) in 2014, NNSA has adopted and implemented a plutonium infrastructure strategy that optimizes existing infrastructure to provide analytical chemistry and materials characterization capabilities.

These efforts are being executed as subprojects under the CMRR Project.

The Plutonium Modular Approach (PMA) was developed with the recognition that the Plutonium Facility (PF)-4 will be 50 years old in 2028. Given PF–4's age and the need to produce pits at increased rates in the late 2020s, NNSA developed the PMA to address PF–4's lifetime and to provide infrastructure to support increased pit production requirements.

NNSA has initiated an Analysis of Alternatives (AoA) for the PMA as part of pre-Critical Decision (CD)-1 activities, in accordance with DOE Order 413.3 billion and Departmental project management guidance. In addition, NNSA has implemented new business operating procedures for conducting AoAs, which establish a methodical and disciplined process that follow all GAO best practices for AoAs. It requires oversight of the AoA with participation from organizations outside of the program office and an independent review by the NNSA Office of Cost Estimating and Program Evaluation to ensure alternatives are thoroughly evaluated without bias. Through the AoA, the PMA will be thoroughly analyzed against competing alternatives modular alternatives. The AoA will not consider alternatives to the modular approach. The resulting preferred alternative for the PMA will be reviewed by the DOE Project Management Risk Committee and their evaluation of the alternative's risk and viability will be sent to the Deputy Secretary for her consideration.

6. Senator DONNELLY. NNSA has justified many of its ongoing and proposed plutonium infrastructure projects, including its plutonium modular strategy, on the need for additional space to support programmatic operations. Has NNSA conducted a comprehensive, complex-wide assessment of programmatic plutonium needs and existing facilities to validate the need for new infrastructure projects? Does NNSA consider program needs NNSA-wide or are infrastructure needs assessments only conducted by contractors at the sites?

General KLOTZ and General DAVIS. The NNSA performed a complex-wide analysis of plutonium manufacturing activities during Complex Transformation efforts and determined in the 2009 Record of Decision (ROD) for the Complex Transformation Supplemental Programmatic Environmental Impact Statement—Operations Involving Plutonium, Uranium, and the Assembly and Disassembly of Nuclear Weapons (73 FR 77644) that "Manufacturing and research and development (R&D) involving plutonium will remain at the Los Alamos National Laboratory (LANL) in New Mexico." This ROD continues to frame the analysis of plutonium infrastructure and capabilities.

The Plutonium Modular Approach (PMA) proposal addresses two primary mission needs: Plutonium Facility-4's lifetime and the need to meet increased production demands in the future, which we believe requires an additional footprint. The decision to optimize existing infrastructure through new sub-projects in the Chemistry and Metallurgy Research Replacement project was based on an evaluation of capabilities across the enterprise. The PMA will undergo a rigorous NNSA led Analysis of Alternatives (AoA). This AoA will include DOD and other external participants. The AOA will evaluate the ability to use existing infrastructure to support current and future programmatic operation.

7. Senator DONNELLY. NNSA has committed to closing the Chemistry and Metallurgy Research building at Los Alamos in 2019. Will all plutonium research equipment needed to support pit production and other missions be established elsewhere in time to ensure that NNSA can keep this commitment without any loss of capability?

General KLOTZ and General DAVIS. NNSA remains committed to ceasing programmatic operations in the Chemistry and Metallurgy Research (CMR) facility in

2019. Current activities under the Chemistry and Metallurgy Research Replacement Project optimize existing facilities to provide analytical chemistry (AC) and materials characterization (MC) capabilities. We expect the necessary AC and MC capabilities to be in place to support mission requirements and do not anticipate their availability impacting the cessation of programmatic operations in CMR in 2019.

URANIUM INFRASTRUCTURE

8. Senator DONNELLY. NNSA plans to cease operations in Y–12's aged 9212 building by 2025. NNSA, through its Uranium Strategy, plans to replace the uranium processing capabilities of 9212 through a mix of new facilities, modifications to existing facilities, and the installation of new technologies and processes. Does NNSA currently have a total cost estimate for this effort program of activities (construction, modifications, and technologies)? If not, when will NNSA be able to provide the Committee with a total program cost estimate and what processes will NNSA use to manage this program of multiple/phased activities?

General KLOTZ and General DAVIS. NNSA is committed to ending enriched uranium programmatic operations in Building 9212 and delivering the Uranium Processing Facility (UPF) by 2025 for no more than $6.5 billion. To accomplish this, a subset of Building 9212 capabilities will be relocated to Buildings 9215 and 9204–2E to maximize the use of existing floor space. The remaining Building 9212 capabilities will be provided by the new UPF no later than 2025.

To further solidify planning, NNSA will ensure the project achieves 90 percent design maturity for the nuclear facilities before establishing the critical decision cost and schedule baseline, scheduled for late 2017.

9. Senator DONNELLY. What is the level of risk that NNSA will not be able meet the milestone for ceasing operations in building 9212 by 2025, and what, if any, are the consequences of delays in meeting this particular milestone?

General KLOTZ and General DAVIS. In order to cease enriched uranium (EU) programmatic operations in Building 9212 no later than 2025, the Uranium Processing Facility (UPF) must be operational and three key processes must be relocated to enduring facilities—2 MeV radiography, chip cleaning and purified metal production. To support the transition of 9212 processes, key technologies including a calciner will be employed to further enhance uranium operations.

NNSA will both construct new, separate buildings as part of the UPF project and make investments in enduring buildings. UPF will consist of a Main Process Building (MPB), Salvage and Accountability Building (SAB), Mechanical and Electrical Building (MEB), and other support facilities. Buildings 9215 (machining), 9204–2E (surveillance, assembly/disassembly) and 9995 (analytical plant lab) are designated as either transitional or enduring facilities with planned upgrades to electrical systems, HVAC and equipment controllers. Building 9995 investments were completed in early fiscal year 2016 to temporarily extend its life while a long-term replacement strategy for the analytical chemistry services it provides can be studied. Through this multipronged approach, NNSA is reducing sources of mission and safety risk in the existing plant to ensure that long term EU operations continue safely. Continued programmatic operations in building 9212 beyond 2025 significantly increase these safety and operational risks.

If UPF is not operational by 2025 and we are unable to pre-produce the required mission deliverables, then select 9212 operations, such as casting and special oxide production would be required to operate until UPF is available.

AGING FACILITIES AND INFRASTRUCTURE

10. Senator DONNELLY. DOE and its predecessor agencies have conducted research and production of nuclear weapons for over seventy years, and significant portions of the NNSA facilities and infrastructure are aging; 29 percent of NNSA's buildings are over 60 years old. Facing $3.66 billion backlogs in deferred maintenance as of fiscal year 2015, of which $497 million is for excess facilities and $354 million is for facilities to be excess in 10 years, the Department has taken steps to stop the growth of this deferred maintenance backlog. What impact, if any, have increased efforts to address maintenance backlogs had on NNSA operations? Has NNSA made progress in accelerating the decommissioning of excess facilities to reduce maintenance costs?

General KLOTZ and General DAVIS. NNSA has increased infrastructure Maintenance and Recapitalization investments aimed at reducing the greatest safety, security, environmental, and program risk. These increased investments during the last few years have allowed us to address reliability of our facilities and operations as well as improve conditions for safety, productivity, and retention of personnel. If

funded, NNSA's fiscal year 2017 budget request for additional increases in Maintenance and Recapitalization resources would have a positive impact on NNSA operations by reducing facility/equipment downtime, accelerating recovery time, and increasing productivity by replacing obsolete technologies. Continuation of this investment strategy is required in order to arrest the declining state of NNSA's infrastructure.

NNSA has made progress in accelerating the decommissioning of excess facilities to reduce maintenance costs. In fiscal year 2014 and fiscal year 2015, NNSA disposed of Buildings 9744 and 9808 at Y–12. In fiscal year 2016, NNSA is disposing of Casa 2 and Casa 3 at Los Alamos National Laboratory (LANL), 12 facilities at the Tonopah Test Range in Nevada, and several trailers at Lawrence Livermore National Laboratory (LLNL). The fiscal year 2017 budget request provides $247.3 million in fiscal year 2017 to address excess facilities by:

- Transferring the Kansas City Bannister Federal Complex to the private sector for redevelopment (this would eliminate 2.93 million square feet of excess facilities);
- Disposing of the TA–16–430 High Explosives Pressing Facility at LANL; and
- Disposing of buildings 9111 and 9112 at Y–12.

In fiscal year 2015, NNSA completed critical roof repairs at three buildings (251, 292, and 175) at LLNL. In fiscal year 2016, NNSA is currently on track to fund additional roof repairs at Y–12's Building 9201–5 (Alpha-5), Building 9204–4 (Beta-4) and Building 9206; fund the installation of a temporary power system at Y–12's Beta-4; and invest in the characterization of four buildings (280, 292, 251, and 175) at LLNL. The fiscal year 2017 request includes funding to conduct additional major risk reduction activities at Y–12's Alpha-5 and Beta-4.

11. Senator DONNELLY. The fiscal year 2017 NNSA budget request for Defense Nuclear Security notes that NNSA now estimates it may need $2 billion dollars over the next 15 years to address repairs and replacement of essential security infrastructure and for PIDAS upgrades. Please detail how NNSA developed this estimate? Please outline the major elements for repairs and replacement of security infrastructure for which this funding is intended.

General KLOTZ and General DAVIS. The $2 billion figure is a rough estimate, based primarily upon budget inputs from both Pantex and Y–12, with pre-Critical Decision (CD) 0 projects that totaled approximately $1.3 billion. NNSA added to that figure a rough estimate of approximately $700 million to recapitalize the other six NNSA sites. The total cost to refresh all NNSA sites will depend in large part on whether that work is conducted through M&O contractors as it is today, or awarded to others. The money is to be used in "refreshing and updating" infrastructure and technology systems or components that in many cases are well past their reasonable service life. Work is ongoing to assess requirements and prioritize activity. A survey across the enterprise has been completed, capturing a detailed list of equipment and infrastructure in use at each of our sites, along with its condition. Additionally, NNSA has implemented quarterly reporting requirements for each site to identify the operational status of its equipment with data reflecting adequacy of functionality, such as false and nuisance alarm rates.

All of this information is being assessed to develop a 10-year plan to identify replacement/upgrade requirements and to prioritize projects for funding and replacement scheduling. The initial focus will be on systems elements that are most critical to maintaining our security posture for protecting our highest priority assets. Initial costs are anticipated to be relatively steep as old systems are identified and replaced, with costs eventually leveling out to support a systematic refresh plan using life-cycle estimates to ensure high reliability/low failure. The 10-year plan to recapitalize the nuclear security enterprise's physical security systems is scheduled to be completed not later than December 31, 2016. Once the plan is complete, NNSA will develop mission need statements and start design activities. As noted in the question, major elements for repair and replacement will include PIDAS upgrades and associated intrusion detection systems at Pantex and Y–12, with other requirements to be based upon analysis of data for the 10–Year Plan.

CONTRACT AND PROJECT MANAGEMENT

12. Senator DONNELLY. The Secretary of Energy issued a memo in June 2015 that seeks to improve the department's less than stellar record in managing the design and construction of large nuclear facilities. The memo stated that, among other things, all departmental elements were to immediately begin using standard, commercial industry best practices when developing cost and schedule estimates for its projects. What steps are being taken by the department to ensure that the various

program offices are implementing this requirement? Can you share any evidence of improvements in projects cost and schedule estimates?

General KLOTZ and General DAVIS. In response to the Secretary's June 2015 policy memorandum, the Department and the National Nuclear Security Administration (NNSA) have made changes to various processes and policies. First, to address the Secretary's requirement for full funding of projects with a Total Project Cost (TPC) of $50 million or less, the 2017 budget adheres to this policy. To address the requirement of conducting Analysis of Alternatives (AoA) independently of the contractor benefiting from the outcome, NNSA has assigned responsibility of conducting all AoAs to the responsible Federal Program Office with oversight from NNSA's Office of Cost Estimating and Program Evaluation (CEPE). A new Business Operating Procedure was issued by the Administrator outlining the AoA process and deliverables for NNSA.

NNSA participates in the Department's Project Management Risk Committee as a means to institutionalize and share best practices across the Department. NNSA also established the Office of Project Assessments, reporting directly to the Principal Deputy Administrator, ensuring senior leadership visibility and accountability throughout the enterprise for project performance. Large nuclear projects will always be challenging and NNSA acknowledges that it needs to continue to improve its performance in this area.

NNSA, following the Government Accountability Office (GAO) Cost Estimating and Assessment Guide and NNSA's Independent Cost Estimate (ICE) Business Operating Procedure (BOP), conducted 8 ICEs during fiscal year 2015 and is scheduled to have completed 8 more by the end of fiscal year 2016. ICEs are considered an industry best practice. These reports provide NNSA senior leadership with assurance that estimated project costs are reliable and within the approved funding levels.

Since 2011, NNSA has delivered its approximately $1.4 billion project portfolio approximately $73 million (or 5 percent) under original budget. The two most recent examples of completed projects with improved cost and schedule performance are the $76 million Nuclear Facility Risk Reduction Project, which was completed $5.7 million under budget and approximately 11 months ahead of schedule and the $65 million UPF Site Readiness Subproject which was completed approximately $20 million under budget and on schedule. Another UPF Subproject, Site Infrastructure and Services, is currently on track to deliver under budget and ahead of schedule. Both UPF subprojects were acquired using Full and Open Competition under Firm Fixed Price Contracts which is considered an industry best practice when costs and risks can reasonably be estimated and accounted for.

Independent Project Reviews are conducted at least annually on all NNSA projects to ensure they are performing within their cost and schedule estimates.

13. Senator DONNELLY. Are there new department requirements also to be applied to programs and not just projects?

General KLOTZ and General DAVIS. NNSA has recently established a new business operating procedure for conducting an analysis of alternatives (AOA), applicable to programs and projects. The new procedure establishes a methodical and disciplined process that follows all GAO best practices for AoAs. It requires oversight of the AOA with participation from organizations outside of the program office and an independent review by the NNSA Office of Cost Estimating and Program Evaluation to ensure all viable alternatives are thoroughly evaluated.

14. Senator DONNELLY. What is the status of NNSA actions to address GAO findings related to NNSA's use of its Contractor Assurance System (CAS) to oversee management and operating (M&O) contractors?

General KLOTZ and General DAVIS. NNSA will execute plans to improve its governance and oversight of field operations at its laboratories, sites, and plants. The new approach will clarify the oversight roles of headquarters and field office personnel, placing emphasis on new rigorous and dependable CASs. The new CASs more closely mirror the DOE Office of Science model, including using peer reviews, incorporating corporate parent involvement, and analyzing the strengths of the CASs.

INTERNATIONAL EFFORTS

15. Senator DONNELLY. The Russian Federation and other former Soviet states are major partners for the Global Material Security program, but recent changes in Russian-United States relations have impacted a number of areas of cooperation. In December 2014, Russia reduced the scope of work in Russia and announced that an

HEU downblending program would be discontinued. Over the last year, how have NNSA nuclear security efforts changed to mitigate the effects of generally reduced United States-Russian cooperation? What is the strategy for ensuring that Russia's large nuclear complex and stockpiles of nuclear material, particularly at a time when sanctions and falling oil prices are damaging the Russian economy? Has NNSA experienced other cooperation issues that could affect the success of its nonproliferation efforts?

Ms. HARRINGTON. NNSA continues to conduct activities under existing (2014 and prior-year funded) contracts with a limited number of Russian entities and to hold technical exchanges on topics of mutual nuclear security interest. With limited opportunities to work directly with Russian facilities, NNSA has increased efforts to detect nuclear smuggling in the regions surrounding Russia by providing law enforcement and security agency partners in Eastern Europe, Central Asia, and the Caucasus with detection systems and training to detect smuggled nuclear and radiological materials.

NNSA continues to work with more than 100 international partners and organizations to meet evolving threats to nuclear security. These partnerships are not adversely affected by the current relationship with Russia.

16. Senator DONNELLY. GAO has identified a series of challenges facing DOE's efforts to secure nuclear materials, including that DOE has not completed an inventory of U.S. plutonium inventory overseas. Has DOE begun its effort to undertake an inventory of U.S.-obligated plutonium worldwide? When is this effort expected to be complete?

Ms. HARRINGTON. Yes, DOE has begun its effort to undertake an inventory of U.S.-obligated material worldwide and expects to have an initial inventory completed by September 30, 2016.

17. Senator DONNELLY. Every other year, since 2010, the United States has hosted or participated in Nuclear Security Summits, bringing together dozens of heads of state. The subcommittee understands that the final Summit will take place this year, with future high-level dialogue on these matters uncertain. What are the administration's plans for replacing the Summit process with a new means to ensure nuclear security matters continue to receive high level attention by world leaders?

Ms. HARRINGTON. The first Nuclear Security Summit was held in Washington, DC in 2010, and was followed by additional Summits in Seoul in 2012 and The Hague in 2014. These Summits have achieved tangible improvements in the security of nuclear materials and stronger international institutions that support nuclear security. Last year in Berlin, the President formally announced his plan to host a fourth and final Nuclear Security Summit in 2016. The Summit was held March 31–April 1 in Washington, DC.

The 2016 Nuclear Security Summit continued discussions on evolving threats and highlighted steps that can be taken together to minimize the use of highly-enriched uranium, secure vulnerable materials, counter nuclear smuggling and deter, detect, and disrupt attempts at nuclear terrorism. The United States seeks a strengthened global nuclear security architecture that is comprehensive, based on international standards, builds confidence in nations' nuclear security implementation, and results in declining global stocks of nuclear weapons-usable nuclear materials. To that end, the outcomes of the Summit included a high–level communiqŭ highlighting progress made and work still to be done to prevent nuclear terrorism. Leaders also endorsed "Action Plans" to strengthen the enduring international institutions and initiatives that sustain and build upon the work of the Summits. Participants are also seeking other ways to maintain and expand cooperation through continued high-level engagements, including the International Atomic Energy Agency's (IAEA's) International Nuclear Security Conference with its Ministerial-level component.

NNSA and its predecessor organizations have been working to reduce the threat of nuclear proliferation and terrorism for well over half a century. The Nuclear Security Summit process energized the international community on this issue, enabling a significant acceleration in NNSA's work with its international partners on nuclear threat reduction. NNSA will continue to take actions to sustain progress and reduce current and emerging nuclear threats.

18. Senator DONNELLY. NNSA also provides support to the IAEA through training programs, technology development, and staff support. Has the enactment of the JCPOA affected NNSA nonproliferation activities?

Ms. HARRINGTON. The JCPOA reinforces NNSA's nonproliferation activities, including NNSA's longstanding and comprehensive support to ensure that the International Atomic Energy Agency (IAEA) has the tools and resources necessary to implement its safeguards monitoring requirements under the Treaty on the Non-proliferation of Nuclear Weapons, as well as those derived from the JCPOA. NNSA provides extra-budgetary and in-kind technical and technology assistance, training, and staff support to the IAEA. While this assistance has strengthened the IAEA's ability to implement its JCPOA obligations, it is equally important that the United States continue to provide this comprehensive support across the IAEA Department of Safeguards to ensure the overall effectiveness of the IAEA as a technical organization providing credible assurances in the peaceful nature of nuclear programs in all IAEA Member States.

CIVILIAN USE OF HIGHLY ENRICHED URANIUM

19. Senator DONNELLY. While the use of highly enriched uranium (HEU) in civilian installations, such as research reactors and isotope production facilities, is considered a threat to national and international security, 74 civilian research reactors around the world use or plan to use HEU, including 8 reactors in the United States. A recent Congressionally-mandated report by the National Academies noted that conversion of the remaining research reactors has proven to be significantly more difficult than originally envisioned. What are NNSA's views on the recommendations contained in this National Academies report, particularly the recommendation of an interim solution involving downblending the 20 tons of HEU currently designated for civilian research reactor use?

Ms. HARRINGTON. NNSA welcomes the National Academy of Sciences' recommendations reaffirming the importance of the United States' continued development of a high-density low-enriched uranium (LEU) fuel for the conversion of U.S. high performance research reactors, and reaffirming the importance of our continued support for the European effort to develop a high-density LEU fuel for the conversion of European reactors. NNSA is reviewing all of the National Academy of Sciences' recommendations and exploring their potential political, legal, and technical impacts. NNSA supports the underlying premise that the goal is to eliminate highly enriched uranium (HEU) usage in civilian applications and that nothing should compromise that effort.

WASTE ISOLATION PLANT (WIPP)

20. Senator DONNELLY. In February 2014, WIPP suffered an underground vehicle fire resulting in a portion of WIPP being shut down and workers being evacuated. In an unrelated incident later that month, a radiation release was detected, caused by a chemical reaction in a waste drum. Since these events, WIPP has been shut down and has not been accepting any additional waste shipments. Partial waste emplacement is expected to resume in the first quarter of fiscal year 2017. The President's fiscal year 2017 budget request states that WIPP recovery activities will be completed and waste operations restarted by December 2016, or 9 months later than DOE originally estimated in its Recovery Plan. What is the status of efforts to reopen WIPP, and has DOE worked with sites across the country to develop a plan for prioritizing waste shipments once WIPP reopens? What will be the initial rate of operations when limited waste operations resume?

Dr. REGALBUTO. The recovery of WIPP and the resumption of waste emplacement operations, when it is safe to do so, is among EM's highest priorities. The Carlsbad Field Office (CBFO) and the WIPP management and operating (M&O) contractor are working collaboratively with the New Mexico Environment Department on regulatory permit approvals needed for resumption of waste emplacement operations.

To reopen WIPP, the interim ventilation system (IVS), a project which was initiated after the February 2014 incidents, is needed to increase filtered airflow in the underground to increase work activities in the underground. The IVS mechanical construction is nearly complete and is scheduled to be operational this spring. The remaining activities to reopen WIPP are related to safety improvements, including completing an update of the WIPP Documented Safety Analysis, and completing the readiness process.

The Department of Energy (DOE) is in the process of working with transuranic (TRU) waste generator sites to develop a plan for prioritizing waste shipments to WIPP. Since the 2014 events, EM and CBFO have met with the waste generators several times to identify the sites' needs and to discuss the National TRU Program and corrective actions required for the resumption of TRU waste shipments to WIPP. The initial focus for resuming TRU waste operations at WIPP will be the emplacement of TRU wastes currently stored on-site.

The rate of waste emplacement is currently planned to be up to five shipments per week. This rate will depend on a number of variables: ventilation airflow available; the ability to emplace waste in the radiologically contaminated underground facility; execution of the revised Safety Management Programs; and the need for mining to ensure mine stability for underground worker safety. Worker safety will continue to be paramount as waste emplacement resumes.

21. Senator DONNELLY. Given the discussion surrounding sending the plutonium at Savannah River to WIPP, has DOE looked at whether the current design for the new ventilation system and exhaust shaft to be built at WIPP would need changing to handle this new waste or whether an expansion to WIPP's underground is needed?

Dr. REGALBUTO. It is expected that the new permanent ventilation system and exhaust shaft will handle the DOE inventory of transuranic waste of defense origin, including the plutonium material from the Savannah River Site.

22. Senator DONNELLY. The accident investigations that followed the February 2014 fire and radiological release accidents at WIPP reported 122 judgements of need to DOE to address deficiencies in safety practices that contributed to the accidents. To what extent have DOE and its WIPP management and operations contractor completed corrective actions to address the judgments and evaluated the effectiveness of those actions?

Dr. REGALBUTO. There were over 300 corrective actions assigned to DOE and to Nuclear Waste Partnership, LLC (NWP), the WIPP M&O contractor, resulting from judgments of need identified in the Accident Investigation Board Reports on the fire and radiological release events at WIPP in 2014. As of the end of January, over 70 percent of these corrective actions have been completed, and are in the process of being validated and evaluated for effectiveness.

23. Senator DONNELLY. DOE has emphasized that safety will not be compromised in completing the recovery activities at WIPP. However, in October 2015, DOE released an assessment of WIPP's recovery operations by its independent oversight office that reported concerns with poor safety performance at WIPP and ineffective oversight of recovery efforts during the period May 2014 through May 2015.The independent review attributed the driver of the poor safety performance to schedule pressure to achieve the original March 2016 deadline for restarting operations. To what extent has DOE taken steps to improve safety practices and ensure effective oversight of WIPP since then?

Dr. REGALBUTO. EM and the Carlsbad Field Office appreciated the assistance of DOE Office of Enterprise Assessments (EA) in evaluating the safety and work performance conditions at WIPP. The Department and the WIPP contractor, Nuclear Waste Partnership, LLC, (NWP) take their findings very seriously. EA assessments provide independent reviews and advice that are an important part of the recovery process at WIPP.

The referenced October 2015 EA Report evaluated mine safety, stabilization, and underground habitability during the period following the events. During that time period, many of the issues identified by EA field representatives were self-reported by DOE and/or the contractor, and have been, or are being, corrected as part of the activities required for resumption of waste emplacement. Safety remains the highest priority of DOE. We have made significant progress in addressing overall safety issues at the facility, including the worker health and safety and nuclear safety management issues identified by the EA program.

DOE and NWP recognized that schedule pressure towards meeting a perceived deadline for restart was creating stress. In response, CBFO continually encourage employees to raise issues and safety concerns. Policy and processes have been initiated to reward individuals and work teams for pausing work activities to take appropriate corrective measures prior to resuming work to ensure those activities are safe. While there are milestones for completing the project, operations will only resume when it is safe to do so.

24. Senator DONNELLY. DOE is exploring construction of an above-ground storage facility for temporary onsite storage of transuranic waste at WIPP. To what extent has DOE discussed the above-ground storage concept with the New Mexico environmental regulators responsible for permitting the storage facility? To what extent has DOE identified the cost and schedule estimates for completing the storage facility?

Dr. REGALBUTO. DOE has introduced the above-ground storage concept in early discussions with the New Mexico Environment Department and is currently evalu-

ating the considerations, and developing the requirements, functionality, and path forward and the permit modification request necessary to establish this capability.

DOE has not at this time determined cost and schedule estimates for this storage capability. DOE plans to pursue the above-ground storage facility as a General Plant Project.

25. Senator DONNELLY. Has DOE sought to reclaim damages from the contractors for their actions that contributed to the accidents at WIPP? What is DOE's estimate of the costs of these accidents? What is the total fee that has been withheld and fines imposed on the contractors as a result of the accidents?

Dr. REGALBUTO. EM has held NWP, the WIPP M&O contractor, accountable for performance under its contract. NWP collected less than approximately 7 percent of the $8.2 million in fee that was available for fiscal year (FY) 2014. The CBFO Contracting Officer also submitted multiple Contractor Performance Assessment Reports (CPAR) in fiscal year 2014 to ensure that the lapses in contractor performance that were related to the fire and radiological release incidents were made part of the contractor's permanent past performance record in the central federal past performance rating system. DOE and the National Nuclear Security Administration (NNSA) strongly weighted the events that contributed to the radiological release at WIPP when determining the award fee for the Los Alamos National Laboratory M&O contractor, Los Alamos National Security LLC (LANS) for fiscal year 2014; of a possible award fee of $63.4 million, LANS received $6.2 million. The $6.2 million was earned by LANS for work performed for non-DOE agencies. In addition to withholding fee, NNSA also withheld two years of award term off the contract in fiscal year 2014. The NNSA is planning to re-compete the Management and Operating contract for LANL.

DOE estimates the cost for recovery and resumption of waste emplacement operations at approximately $244 million. This includes activities such as facility enhancements, revision of the Documented Safety Analysis, underground habitability and operations, facility upgrades, etc. This does not include the capital asset items that currently has an estimated cost range of $270 to $398 million. This also does not include activities that occur under WIPP's base operations. Of the $244 million total, $22.7 million was reallocated from base to recovery operations in fiscal year 2014, and $42.1 million in fiscal year 2015.

As a result of the findings from the Accident Investigation Board (AIB) Reports on the fire and radiological release events, EM has held the contractors accountable for performance under those contracts. NWP collected less than 7 percent of the $8.2 million in total fee that was available for fiscal year 2014. DOE and the NNSA greatly reduced the award fee for the Los Alamos National Laboratory (LANL) contractor, Los Alamos National Security LLC (LANS) for fiscal year 2014. Of a possible award fee of $63.4 million, LANS received $6.2 million. The $6.2 million was earned by LANS for work performed for non-DOE agencies.

26. Senator DONNELLY. The Plutonium Disposition Red Team Report from August 2015 assessed the options of disposing of 34 metric tons of weapons-grade plutonium, currently planned to be processed through DOE's Mixed Oxide Fuel Fabrication Facility. The Red Team found that DOE could implement the relatively simple dilute-and-dispose approach with reasonable confidence that the political and regulatory risks could be successfully managed. However, the Red Team noted that, according to DOE's WIPP inventory—divided between "WIPP-bound" quantities and "potential" quantities—the unsubscribed capacity at WIPP is approximately 19,000 cubic meters, but that significant uncertainty exists regarding this remaining capacity because it is derived from a potentially incomplete portrayal of future waste generating activities. The Red Team provided examples of future sources of TRU waste that are not yet shown in the WIPP inventory numbers, such as large-scale actinide processing facilities or a legacy facility that has not yet been transferred into EM's cleanup baseline that will eventually generate TRU waste during decommissioning and decontamination. Likewise, the U.S. will not cease all TRU waste generation once legacy TRU waste has been disposed of at WIPP and it is not clear that the lifecycle of newly-generated TRU waste from around the complex has been taken into account in the calculation of unsubscribed capacity at WIPP. In addition, while WIPP is only allowed to accept TRU waste originating from defense activities, DOE recently proposed to dispose of non-defense TRU waste at WIPP, which would add further volumes of TRU waste to the inventory of WIPP-bound material. To what extent has DOE taken into account the types of waste streams noted in the Red Team report—TRU waste that will be generated from facilities during D&D and newly-generated TRU waste—in calculating the unsubscribed capacity at WIPP? How much of this material exists across the DOE complex and has any of these

quantities of waste has already been added to the WIPP inventory, either as WIPP-bound quantities or potential quantities.

Dr. REGALBUTO. The current unsubscribed capacity at WIPP is 23,652 cubic meters (m^3), after taking into account the reported volume of transuranic (TRU) waste disposed at WIPP and the volume of WIPP-bound TRU waste identified in the 2015 Annual Transuranic Waste Inventory Report. DOE has taken into account all TRU waste identified by the waste generators as complying with the following criteria, and hence determined to be WIPP-bound: (1) meets the Land Withdrawal Act definition of TRU waste; (2) resulting from atomic energy defense activities; (3) no regulatory restrictions (e.g., meets limits on dose rates, does not contain prohibited Resource Conservation and Recovery Act hazardous waste, etc.); and (4) complete data (e.g., contains adequately described radionuclide activities, final form container data, waste stream information, etc.). All TRU waste meeting these criteria have been included in the WIPP-bound inventory of waste (see part (b) for inventory discussion). If one or more of these criteria are not met, the waste is considered "potential" TRU waste (see part (b) for inventory discussion). Potential TRU waste will reduce the unsubscribed capacity, assuming all criteria are eventually met.

On March 29, 2016, NNSA announced a decision to implement its preferred alternative for the disposition of 6 metric tons (MT) of surplus non-pit plutonium. When this waste is diluted and packaged to meet the WIPP waste acceptance criteria, the 6MT of surplus Plutonium from SRS is expected to take the form of approximately 20,000 55-gallon drums, which will occupy about 4,000 cubic meters. This volume would be counted against the unsubscribed capacity.

Currently, the 2015 Annual Transuranic Waste Inventory Report identifies both WIPP-bound and potential quantities of TRU waste as follow below. It should be noted that this report is current as of data reported by generator sites as of December 31, 2014.

1. 61,000 cubic meters of WIPP-bound TRU waste:
   a. Hanford (21,900 m^3)
   b. Idaho National Laboratory (20,800 m^3)
   c. Los Alamos National Laboratory (6,210 m^3)
   d. Oak Ridge National Laboratory (1,630 m^3)
   e. Savannah River Site (8,250 m^3)
   f. Small Quantity Sites (2,160 m^3)
2. 7,596.1 m^3 of "potential" TRU waste.

27. Senator DONNELLY. What statutory changes would be needed to dispose of non-defense origin TRU waste, and what are origins and estimated volumes of this waste from around the DOE complex?

Dr. REGALBUTO. A change to the Land Withdrawal Act would be necessary to accept transuranic waste that is not a result of atomic energy defense activities.

Of the 7,596.1 m^3 of "potential" TRU waste, some or all of those waste streams may have to go through a process to determine if it was generated from atomic energy defense activities (i.e., a defense determination). Future waste streams that may be included in the "potential" TRU waste category would go through the defense determination process as the annual inventory process continues every year moving forward. Approximately 4,000 m^3 of the potential TRU waste identified in Appendix B of the 2015 Annual Transuranic Waste Inventory Report is identified as not having a final defense determination. This includes primarily West Valley waste.

28. Senator DONNELLY. Related to "potential" TRU waste volumes, who is responsible for determining whether these potential wastes will become WIPP bound wastes, what is the process for making these determinations, and what is the specific schedule and end dates for making determinations for each of the "potential" volumes listed in the current inventory?

Dr. REGALBUTO. The transuranic (TRU) waste generator is responsible for determining if "potential" TRU waste meets the requirements for WIPP, and changing that waste to "WIPP-bound" waste, providing justification and documentation that the waste complies with the applicable criteria: (1) meets the Land Withdrawal Act definition of TRU waste; (2) resulting from atomic energy defense activities; (3) no regulatory restrictions (e.g., meets limits on dose rates, does not contain prohibited Resource Conservation and Recovery Act hazardous waste, etc.); and (4) complete data (e.g., contains adequately described radionuclide activities, final form container data, waste stream information, etc.). A determination is made in consultation with the waste generator site management, CBFO Manager, DOE's Office of Environmental Management, and the Office of the General Counsel, as appropriate. There

is no defined schedule or end dates for making determinations for specific wastes listed in the potential TRU waste inventory. The schedules are dependent on waste generator sites' needs to disposition the wastes.

HANDFORD TANK WASTE

29. Senator DONNELLY. The Waste Treatment and Immobilization Plant (WTP), intended to treat high level waste and part of the low-activity waste at the Hanford tank farms, has experienced cost and schedule overruns as well as ongoing technical and management challenges, and the resulting delays have resulted in ongoing legal activity between DOE and the state of Washington. While continuing construction of WTP's Low-Activity Waste Facility, DOE is working to resolve technical challenges associated with the High-Level Waste Facility and the Pretreatment Facility. Even when complete, the WTP as currently planned will only treat about 40 percent of the low-activity waste in the Hanford tanks. DOE has yet to make a final determination on the course of action to treat and dispose of the remaining low-activity waste, referred to as supplemental treatment. What is the status of DOE's acquisition of an owner's agent to assist in oversight of the WTP contractor?

Dr. REGALBUTO. DOE selected and has been utilizing Parsons Government Services, Inc. as the Owner's Representative to assist with the oversight of the Waste Treatment and Immobilization Plant Project (WTP).

30. Senator DONNELLY. How does DOE plan to proceed in determining a course of action for supplemental treatment?

Dr. REGALBUTO. DOE continues to evaluate supplemental treatment technologies to support WTP operations. These technologies span a broad spectrum of possibilities including process flow sheet enhancements, glass loading and future technology development programs. These programs are being developed in consort with National Labs, our tank operations contractor, and under on-going complex-wide technology initiatives with EM Headquarters.

31. Senator DONNELLY. DOE's proposal to modify the consent decree with Washington state adds 17 years to the WTP's schedule, for an estimated completion date of 2039. DOE annually receives about $690 for the WTP, meaning that at this annual funding level it will cost about $16 billion to complete the WTP. Is $16 billion a reasonable "to go" cost for the WTP, or can the committee expect a lower or higher number when the cost re-baseline is completed? If $16 billion is a reasonable "to go" cost for the WTP, has DOE explored different waste treatment options that could lessen the costs? Other sites, both nationally and internationally, have been able to treat radioactive waste for less than $16 billion.

Dr. REGALBUTO. At this time it is too soon to provide an estimate of the total project cost of WTP due to a number of uncertainties and technical and programmatic issues surrounding the WTP Project, including resolution of technical issues with the Pretreatment and to a lesser extent, the High Level Waste facilities. Note that on March 11, 2016, the United States District Court, Eastern District of Washington, issued an Amended Consent Decree between DOE and the States of Washington and Oregon regarding treatment of tank waste at Hanford.

32. Senator DONNELLY. The WTP contractor's earned value management system has been suspended for several years, meaning that DOE cannot use this standard tool to measure cost and schedule performance. During these years, there has been substantial cost growth and schedule delays. How is DOE measuring cost and schedule performance at the WTP?

Dr. REGALBUTO. EM has been using alternate Earned Value Management System tools to continue to measure the Waste Treatment and Immobilization Plant's cost and schedule performance for the near-term work that has been scheduled.

This provides us with comparable performance measurement for scheduled work, but cannot provide the estimates to complete the project.

33. Senator DONNELLY. Both GAO and the DOE IG have recently reported on the failure of the WTP contractor's corrective management program to ensure that technical, quality, and management issues are appropriately addressed and resolved in a timely manner. How can DOE be assured that the contractor will be able to address the serious technical and quality issues with WTP's three major processing facilities that have, in some cases, remained unresolved for at least a decade?

Dr. REGALBUTO. EM's Office of River Protection directed Bechtel to develop corrective action plans for each of two Priority Level 1 findings, and an integrated com-

prehensive Managed Improvement Plan (MIP) to address all systemic quality assurance program and implementation issues.

EM staff have and will continue to monitor Bechtel's actions to implement both the Priority Level 1 finding corrective action plans and the MIP. Assessment reports have been and will continue to be issued documenting implementation of the Priority Level 1 finding corrective action plans.

RISK-INFORMED DECISION-MAKING

34. Senator DONNELLY. The recent CRESP report, commissioned by DOE under direction from the Consolidated Appropriations Act of 2014, found that DOE has been slow to implement industry-standard quantitative methods, such as probabilistic risk assessment (PRA), to characterize nuclear safety risk and support risk-informed decision-making. fiscal year 2013 NDAA Section 3161 directed increased used of probabilistic or quantitative risk assessment. This CRESP report also noted that site-to-site cleanup efforts are inconsistent, with risks at some sites being addressed through remedies significantly more costly, but with potentially little additional reduction in risk, than those used at other sites. What are DOE's plans, if any, to respond to the recommendations contained in this report? What factors does DOE consider when prioritizing cleanup activities across its sites?

Dr. REGALBUTO. EM continues to pursue its cleanup objectives safely within a framework of regulatory compliance commitments and best business practices. The rationale for cleanup prioritization is based on achieving the highest risk reduction per radioactive content (activities focused on wastes that contain the highest concentrations of radionuclides and sites with the highest radionuclide contamination). EM has used probabilistic risk assessments for a number of cleanup projects across the complex. Taking many variables into account, EM has generally prioritized its cleanup activities as follows:

- Activities to maintain a safe, secure, and compliant posture in the EM complex
- Radioactive tank waste stabilization, treatment, and disposition
- Spent (used) nuclear fuel receipt and storage
- Special nuclear material consolidation, stabilization, and disposition
- Transuranic and mixed/low-level waste disposition
- Soil and groundwater remediation
- Excess facilities deactivation and decommissioning.

Most importantly, EM continues to discharge its responsibilities by conducting cleanup within a "Safety First" culture that integrates environmental, safety, and health requirements and controls into all work activities. This ensures protection for the workers, public, and the environment.

35. Senator DONNELLY. What are the primary drivers behind DOE's decisions to select its cleanup approaches at different sites? To what extent are EM's annual and long-term cleanup decisions driven by reducing environmental risks in the most cost effective manner?

Dr. REGALBUTO. EM must pursue its cleanup objectives safely within a framework of regulatory compliance commitments and best business practices.

The rationale for cleanup prioritization is based on achieving the highest risk reduction benefit per radioactive content (activities focused on wastes that contain the highest concentrations of radionuclides and sites with the highest radionuclide contamination) while meeting regulatory compliance commitments.

36. Senator DONNELLY. What are DOE's plans to improve the use of probabilistic risk assessment techniques for environmental cleanup planning? How does DOE's long-term cleanup strategy account for the various uncertainties that cleanup activities sometimes encounter, and how does EM incorporate new scientific information which may suggest alternative approaches?

Dr. REGALBUTO. DOE has taken steps to integrate Probabilistic Risk Assessments (PRAs) into its decision-making. From a nuclear safety perspective, the Department issued DOE–STD1628–2013, "Development of Probabilistic Risk Assessments for Nuclear Safety Applications," in November 2013. EM will continue to investigate ways PRAs and risk-informed decision-making can be further integrated into decision-making and identify potential benefits such integration may provide. It is worth noting that while PRAs may find routine application at commercial facilities, their applicability in the waste-management/cleanup context is less than straightforward given the unique characteristics of the waste and diverse conditions in which EM operates.

EM recognizes and understands that uncertainties exist in all facets of its cleanup—soil and groundwater, deactivation and decommissioning and waste treatment and disposal. The sequential critical decision process used by EM is based on moving through a number of steps aimed at reducing uncertainties—from conceptual to final designs for each project. Within each of these steps, uncertainty is reduced and cost estimates and plans mature. In addition, EM employs conservative assumptions and contingencies based on experience and modeling of known cleanup and waste management challenges.

EM is committed to new scientific information and technologies that may help accelerate cleanup schedules. The EM technology development and deployment program funds innovative technologies that help identify new ways to accelerate cleanup at reduced costs and improved safety. Technology readiness assessments, independent project reviews, and external independent reviews are devices employed by DOE to integrate new scientific information and technologies into EM's operations in a way that is effective, cost efficient, and safe for workers, the public and the environment.

SEPARATE DEFENSE WASTE REPOSITORY

37. Senator DONNELLY. The Nuclear Waste Policy Act (NWPA) of 1982 directed DOE to work to identify sites for a repository for high-level waste and spent nuclear fuel. In 1985, President Reagan made a determination that a separate defense waste repository is not needed, resulting in DOE work on a single repository to receive both commercial spent fuel and defense-origin waste, resulting in the NWPA being amended to identify Yucca Mountain as the site of the common repository, to be paid for by a mix of industry and federal defense spending. However, in 2015 President Obama found that a separate repository for defense waste is required, and DOE intends to pursue two repositories—one of which, a defense high level waste (HLW) repository, would be fully funded by defense appropriations. Did DOE's Office of Nuclear Energy (NE) consult with NNSA and the Navy regarding its new plan to separately dispose of defense high-level radioactive waste, particularly regarding whether the plan would meet disposal plans for defense HLW or Navy SNF?

General KLOTZ and Dr. REGALBUTO. Yes, the Office of Nuclear Energy held discussions with the Office of Naval Reactors prior to completion of the October 2014 report, entitled Assessment of Disposal Options for DOE–Managed High-Level Radioactive Waste and Spent Nuclear Fuel, and more broadly with the National Nuclear Security Administration prior to the March 2015 finding by the President related to high-level radioactive waste from atomic energy defense activities.

38. Senator DONNELLY. Have you had discussions with Colorado, Idaho, South Carolina, or Washington regarding DOE's plans to separately dispose of defense HLW? What is their reaction to the plan and what effects do they think the plan will have on defense clean up milestones and costs?

Dr. REGALBUTO. Following publication of the October 2014 report entitled Assessment of Disposal Options for DOE–Managed High-Level Radioactive Waste and Spent Nuclear Fuel, the Department sought comment and reaction from a broad range of state and local government officials, industry representatives, environmental organizations, and other stakeholder groups. The feedback collected in response to the Assessment informed the March 2015 Report on Separate Disposal of Defense High-Level Radioactive Waste and the President's finding that a defense high-level radioactive waste repository is required. Section 8 of the Nuclear Waste Policy Act allows the Secretary of Energy to develop a defense high-level waste repository using existing authority under the Atomic Energy Act if the President finds that a defense high-level waste repository is required. In March 2015, the President accepted a recommendation of the Secretary of Energy to go forward on this path, which allows the Department to develop a defense-only repository.

In fiscal year 2016 and fiscal year 2017, along with developing a consent-based siting process, the Office of Nuclear Energy is performing planning activities to evaluate a defense high-level radioactive waste repository, including organizing information on waste forms and repository concepts, identifying and completing reference cases for selected geologic media, and assessing the feasibility of engineered barrier system concepts in select geologic media.

39. Senator DONNELLY. DOE concluded this approach would cost more than a single repository, yet stated in its March 2015 report that cost efficiency favors develop of a defense waste repository. Please explain why a more expensive option is cost

efficient—why pursue a two repository approach when DOE has stated this approach will cost billions more?

Dr. REGALBUTO. The cost for disposal of radioactive waste in a geologic repository is influenced by numerous variables including the geologic medium, the quantity of waste, the emplacement method and configuration, how heat-dissipation is managed, and the depth of the repository. Since we are in the early stages of planning and evaluating alternatives for this concept, definitive plans and risk analyses have not yet been finalized.

A defense waste repository could be less expensive and easier to design and build than a comparably sized repository for commercial spent fuel. The defense waste inventory is colder, easier to handle, finite, and suitable for disposal in various geologies. Depending on the geologic media selected, there is a significant range of estimated costs. Life cycle cost efficiencies could potentially result from accelerating site closure by removing radioactive waste that currently has no disposition path and avoiding the cost to build additional storage facilities. Moreover, a defense waste repository would provide experience in repository design, siting, development, and operation that may reduce the cost of developing future repositories.

40. Senator DONNELLY. What is known about the costs and uncertainties of DOE's plans for a defense waste repository and how do they compare to alternatives? What are the key factors that could affect cost and schedule? When will the Department produce an estimate that includes a full range of costs—including storage, transportation, siting, and other tasks—for disposing of defense nuclear waste under this approach?

Dr. REGALBUTO. As the DOE moves forward, cost efficiency will continue to be examined to ensure that resources are being spent in the most effective way. Since we are in the early stages of planning and evaluating alternatives for this concept, definitive plans and risk analyses have not yet been finalized. As we go forward with the planning for a defense repository, more precise cost estimates will be developed. The cost for disposal of radioactive waste in a geologic repository is influenced by numerous variables including the geologic medium, the quantity of waste, the emplacement method and configuration, how heat-dissipation is managed, and the depth of the repository.

Another uncertainty for locating any repository is achieving local and state consent to host the site. DOE has initiated developing a consent-based process that builds a partnership with interested host communities. This process will apply to interim storage facilities, as well as a repository for defense radioactive waste and a common repository, and possible deep borehole disposal.

We are committed to keeping the Committee informed as we move forward.

41. Senator DONNELLY. In its publicly released report on its plan to separately dispose of defense HLW, DOE stated that two repositories will be more expensive than one. DOE has also stated that it plans to pursue both its repositories at the same time, as well as develop centralized interim storage facilities and borehole disposal R&D. Do you have any concerns regarding sufficient budgetary resources or DOE's human resources to pursue defense cleanup and defense repository activities simultaneously? Do you have concerns regarding human resources or the will of the American people to support defense clean up and the various facets of DOE's disposal plans? Are there any long-term implications that we need to consider now before DOE embarks on its ambitious disposal effort?

General KLOTZ. and Dr. REGALBUTO. As we move forward, cost efficiency will continue to be examined to ensure that resources are being spent in the most effective way. We believe that a key element for success is to build a partnership with interested host communities. DOE envisions developing a consent-based process that builds a partnership with interested host communities. DOE recently began its consent based siting efforts to gather public input on how to design a process that results in consent. This process will apply to interim storage facilities, as well as a repository for defense radioactive waste and a common repository.

42. Senator DONNELLY. Over successive administrations, the Department has had great difficulty in selecting a site for the permanent disposal of nuclear waste. Has DOE developed firm plans for how it will proceed with consent-based siting? Other countries' consent-based siting approaches have taken about 35 years, on average, to select a site. Does DOE anticipate a similar length of time for siting its defense and commercial repositories? How is this complicated by the need to provide siting for two repositories?

Dr. REGALBUTO. DOE recently launched its efforts to establish a consent-based siting process that is built on collaboration with the public, stakeholders, and gov-

ernment entities at the local, state, and tribal levels. DOE believes that a key element for a durable solution is to build a partnership with interested, informed, and willing host communities. The first phase of this effort involves engaging with the public and interested groups to learn what elements are important to consider when designing a consent-based siting process. The next phase will focus on creating a consent-based siting process to serve as a framework for collaborating with potentially interested host communities. Finally, DOE will use the resulting consent-based process to work closely with interested, informed, and willing communities and ultimately site disposal facilities.

This process will apply to interim storage facilities, as well as a repository for defense radioactive waste and a common repository, and possible deep borehole disposal.

In December 2015, DOE published an Invitation for Public Comment in the Federal Register to solicit input on important considerations in designing a fair and effective process for siting. In 2016, a series of public meetings will be hosted by DOE around the country to hear from the public and stakeholders on important principles, values, and considerations that should guide the development of a consent-based siting process.

PLUTONIUM DISPOSITION

43. Senator DONNELLY. The Conference Report for the fiscal year 2016 NDAA specified that NNSA prepare an analysis of the downblending option that includes the answers to several questions, including (1) what is the overall lifecycle cost of the downblending option? (2) to what extent would WIPP accommodate the downblended material from the 34 metric tons that was destined for the MOX facility? (3) would the Land Withdrawal Act need to be amended to accommodate this additional volume? What is the status of completing this analysis and when does the department plan to send the results to the committee?

Dr. REGALBUTO. DOE is preparing a Report in response to the Joint Explanatory Statement accompanying S. 1356, the National Defense Authorization Act for fiscal year 2016 that will address these questions and is planned to be submitted in late fiscal year 2016.

MANAGEMENT OF DOE'S OFFICE OF ENVIRONMENTAL MANAGEMENT

44. Senator DONNELLY. DOE's Office of Environmental Management (EM) manages the cleanup work that is critical to the nuclear security enterprise and is responsible for $6.2 billion of the $29.6 billion the Department received in fiscal year 2016. However, despite playing such an important role, EM's top official is an Assistant Secretary while other offices that manage a similar level of funding and responsibility, such as the Office of Science ($5.3 billion), are led by an Under Secretary. DOE has struggled to find the proper place within its management hierarchy for EM, moving it under the Under Secretary for Nuclear Security in 2011 and moving it yet again only two years later under the newly created Under Secretary for Management and Performance. Given the significance of EM's role and the amount of money involved in EM's environmental liability of at least $240 billion, does DOE have the right/necessary structure to support the environmental liability cleanup efforts? In addition, would you provide to the committee any examples of how the Under Secretary for Management and Performance has interacted with EM to improve EM's Management and Performance?

Dr. REGALBUTO. Yes, DOE feels that placing EM under the purview of the Under Secretary for Management and Performance is the appropriate structure because it combines, under one organization, DOE's strongest project management capabilities, resident in the Office of Project Management Oversight and Assessments (PM), directly to bear on EM's project management challenges.

The Secretary's project management reforms have repositioned the project review function that EM previously performed through its Office of Project Assessments and folded that function into PM. This structure assures the independence of the review teams. The project management executive for projects $400 million to $750 million is the Deputy Under Secretary for Management and Performance and the project management executive for projects over $750 million is the Deputy Secretary.

Also, the fiscal year 2017 Budget proposes to establish a statutory, DOE-wide Office of Cost Estimating and Program Evaluation (CEPE–DOE) in recognition of a gap in DOE's capacity to independently determine accurate costs of programs and acquisitions within DOE.

This proposal advances the Secretary's ongoing efforts to improve DOE project management, a key component of which is to adopt best practices equivalent to those implemented by the Department of Defense.

CEPE–DOE will provide independent analytic advice on all aspects of DOE programs, including cost-effectiveness, and the development and evaluation of program alternatives. CEPE–DOE will develop cost estimating policy and practices, provide timely and unbiased analysis and perform independent cost estimation for the Department. CEPE–DOE will ensure that the DOE's cost estimation and cost analysis processes provide accurate information and realistic estimates of cost for DOE's programs and acquisitions.

This new function would report to the Office of the Secretary to ensure consistent policy, procedures and practices across DOE, formalize program management practices for cost estimation and review to improve outcomes, accountability and efficiency.

The Under Secretary for Management and Performance has served a key role in:

- Developing and implementing the resumption of waste emplacement operations at WIPP; and
- Strengthening the project review and assessment function, which brings greater focus and discipline to the major projects in the EM program, including the WTP project at Hanford, the Salt Waste Processing Facility project at Savannah River, as well as numerous smaller cleanup projects across the complex.

The Office of the Under Secretary for Management and Performance, as a member of DOE senior cross-departmental boards, councils and committees represents the interests of EM in the development of DOE policy on cyber security, physical security and employee engagement, as well as on the Energy Systems Acquisition Advisory Board (ESAAB), Cyber Council and other such bodies.

45. Senator DONNELLY. My understanding is that the Office of Environmental Management working with Urenco's Louisiana Enrichment Services facility to re-enrich tails in order to support continued clean-up at the Portsmouth, Ohio Gaseous Diffusion Plant. Does the Department intend to continue this arrangement in order to re-enrich the Department's depleted uranium inventory? Are you aware of any other cost-effective alternatives beyond this operational facility?

Dr. REGALBUTO. Currently, DOE has no agreement with URENCO to re-enrich the Department's depleted uranium inventory, or to do so to support clean-up at the Portsmouth Gaseous Diffusion Plant.

No, URENCO's Louisiana Enrichment Services facility is the only operating enrichment plant in the United States.

QUESTIONS SUBMITTED BY SENATOR MARTIN HEINRICH

TRANSITION OF LANL'S EM MANAGEMENT

46. Senator HEINRICH. Regarding EM's cleanup effort at Los Alamos National Lab, I continue to have concerns about the upcoming transition in program management to a new contractor(s) and the potential impacts on the community and local small businesses. I am pleased EM's bridge contract incorporated all of LANS's required community support and subcontracting incentives. As EM prepares an RFP for management of the cleanup at Los Alamos, can I be assured that both the regional and community support and the Regional Purchasing programs from LANS's contract will continue to be required in the RFP for the new contract(s)?

Dr. REGALBUTO. The RFP will focus on accomplishing the Environmental Management (EM) program's mission to protect human health and the environment. The RFP will address other policy objectives as required and to the extent that they ensure the program is executed in a safe and cost-effective manner.

LABORATORY-DIRECTED RESEARCH AND DEVELOPMENT

47. Senator HEINRICH. The recent report of the Commission on the Effectiveness of the National Energy Laboratories (CRENEL) recommended that Congress restore the cap on LDRD to 6 percent unburdened, or its equivalent, noting that this will have the largest impact on LDRD at the NNSA laboratories. The recently-enacted fiscal year 2016 National Defense Authorization Act increased funding for LDRD with a minimum rate of 5 percent and a maximum of 7 percent of the NNSA laboratories' operating budgets, which DOE noted is a level more consistent with historic NNSA levels. What is NNSA's plan for implementing the new 7 percent maximum set aside for LDRD at the NNSA labs?

General KLOTZ. Currently there is conflicting guidance between the fiscal year 2016 National Defense Authorization Act and the fiscal year 2015 Consolidated Appropriations Act which limits the maximum Laboratory Directed Research and Development (LDRD) rate to 6 percent. The DOE General Counsel in coordination with the NNSA General Counsel is still examining the conflicting provisions. Once that is resolved, NNSA will work to implement the resulting program.

REVISED LIFE CYCLE BASELINE AND BUDGET PLAN FOR LANL CLEANUP

48. Senator HEINRICH. I continue to hear concerns over the lack of progress of cleanup at Los Alamos. I note your written testimony today lists EM's recent accomplishments, but none at Los Alamos. The local community is also concerned that the budget request for fiscal year 2017 for LANL is inadequate and requests $66 million in additional funding above EM's budget request to make significant headway on all cleanup activities, including characterizing sites. In addition, I understand a revised Life Cycle Baseline for cleanup at Los Alamos still has not been approved. The revised baseline is needed to guide near-term planning for cleanup activities and future budget requests. What is the current status and timeline for the new Life Cycle Baseline to be approved?

Dr. REGALBUTO. Addressing the legacy contamination and wastes at Los Alamos National Laboratory is among EM's high priority activities. As you know, the New Mexico Environment Department recently released a Draft Consent Order for public comment. Once the Consent Order revisions are completed, we will update the life cycle cost estimate accordingly.

THE TECHNOLOGY TRANSFER MISSION OF THE NNSA LABS

49. Senator HEINRICH. I continue to be a champion of efforts to improve technology transfer from the NNSA labs as an engine for local economic development and to ensure taxpayers get the full benefit of the extraordinary innovations in technology being developed with federal funding. The Commission to Review the Effectiveness of the National Energy Laboratories released its final report last October. One of the commission's recommendations is that all DOE programs and laboratories fully embrace the technology transition mission and continue improving the speed and effectiveness of collaborations with the private sector. Do you agree that technology transfer is part of the overall mission of NNSA's National Laboratories?

General KLOTZ. Yes. NNSA's primary mission is national security, but technology commercialization and transfer is a vital mission activity that improves the overall strength and capabilities of the laboratories, plants and sites, as well as NNSA as a whole.

50. Senator HEINRICH. How do you suggest NNSA and the labs address the difficulties small business have in engaging with the labs to commercialize innovative technologies?

General KLOTZ. NNSA's Strategic Partnerships Program is developing initiatives to facilitate engagement with partners, including small businesses. Examples of these engagements include the entrepreneurial leave and technologist-in-residence programs which allow laboratory personnel to exchange with industry or leave the lab for a period to support an existing business or "spin off" their own small business.

In some cases, states that host the labs have programs in conjunction with the labs to support small businesses directly. An example is the New Mexico Small Business Assistance (NMSBA) Program, which grants access to the unique expertise and capabilities of Los Alamos and Sandia National Laboratories free of charge to small businesses that are facing technical challenges.

51. Senator HEINRICH. With new M&O contracts coming up soon for both Sandia and Los Alamos, what are your thoughts on incorporating technology transfer as an explicit mission of the labs and including it as an evaluation factor in each lab's annual performance evaluation?

General KLOTZ. Technology transfer is, and will continue to be, a mission activity of all NNSA laboratories. Similarly, technology transfer has long been a part of each laboratory's annual performance evaluation. NNSA M&O contractors' ability to establish industrial partnerships that transfer new technologies from the laboratory to private industry and make the laboratory's unique capabilities available to private industry, enhance the laboratory's ability to meet mission requirements and improve the industrial competitiveness and national security of the United States.

MICROLAB PILOT PROGRAM

52. Senator HEINRICH. Section 3120 of the NDAA for fiscal year 2016 established a microlab pilot program to help stimulate open collaboration with the NNSA labs and the commercialization of lab-developed technologies. I am pleased Sandia National Laboratories has proposed a new Center for Collaboration and Commercialization (C3) in Albuquerque, in part to meet the goals of section 3120. Is NNSA supportive of the C3 and what is the current status and timeline for the project?

General KLOTZ. NNSA supports commercialization and technology transfer efforts and recognizes that technology commercialization and transfer is a vital mission activity that improves the overall strength and capabilities of the laboratories, plants, and sites, as well as NNSA as a whole.

However, NNSA's national security mission demands a stringent security posture that can at times be challenging to those efforts. NNSA is working to establish more direct and agile interaction pathways, including through "commercialization campuses."

NNSA has been proceeding with the Livermore Valley Open Campus in support of Lawrence Livermore and Sandia National Laboratories. NNSA intends to employ the lessons learned and best practices while working through the required process of mission need and analysis of alternatives for a similar effort (the Center for Collaboration and Commercialization, or "C3") at Sandia National Laboratories. It is anticipated that the process could take 6 to 12 months.

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 2017 AND THE FUTURE YEARS DEFENSE PROGRAM

WEDNESDAY, APRIL 13, 2016

U.S. SENATE,
SUBCOMMITTEE ON STRATEGIC FORCES,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

BALLISTIC MISSILE DEFENSE POLICIES AND PROGRAMS

The subcommittee met, pursuant to notice, at 2:34 p.m. in Room SR–222, Russell Senate Office Building, Senator Jeff Sessions (chairman of the subcommittee) presiding.

Committee members present: Senators Inhofe, Sessions, Fischer, Sullivan, Lee, Manchin, Donnelly, King, and Heinrich.

OPENING STATEMENT OF SENATOR JEFF SESSIONS

Senator SESSIONS. The committee will come to order.

Senator Donnelly is on the way and will be here in a few minutes, but I will go ahead and start with some of my opening comments. I do not think there will be anything particularly controversial.

The Strategic Forces Subcommittee meets today to receive testimony on ballistic missile defense policies and programs in review of the defense authorization request—there he is—for fiscal year 2017 and the future years defense program.

We are joined today by Mr. Brian McKeon, Principal Deputy Under Secretary of Defense for Policy, to provide the policy and strategy foundation for our missile defense programs.

As Commander of U.S. Northern Command, Admiral William Gortney is the principal military officer responsible for conducting the defense of the Homeland against ballistic missile strikes and has done a good job in that, Admiral. Thank you for your service. I do not know. Maybe you can tell us if you are going to be leaving us, but we appreciate your service. It has been tremendous for the United States of America.

Vice Admiral James Syring has been the Director of the Missile Defense Agency [MDA] for the past two and one-half years and has done a remarkable job improving the reliability and effectiveness of our Homeland and regional missile defense systems.

Finally, we are joined by Lieutenant General David Mann, the Commanding General of the U.S. Army Space and Missile Defense Command and the head of the Strategic Command's Joint Functional Component Command for Integrated Missile Defense.

Today the United States and its deployed forces enjoy a good measure of protection against ballistic missiles of all ranges. However, the Army and Navy Service Chiefs warned in 2014 in a letter to the Secretary of Defense that, quote, the growing challenges associated with ballistic missile threats that are increasingly capable continue to outpace our Active defense systems and exceed our Services' capacity to meet combatant commanders' demand. Close quote.

Likewise, Mr. McKeon, you told Congress that, quote, as North Korea and potentially Iran makes progress on ICBM [intercontinental ballistic missile] class missile technologies, we must be prepared to address new, more complex threats in the next decade. Close quote.

In other words, despite considerable progress, there is still more to do with respect to both Homeland and regional missile defense systems. Yet, while the military need for missile defense continues to increase, funding for the Missile Defense Agency has been on the decline and is projected under this budget request to decline further over the next five years.

In fiscal year 2008, MDA funding was $8.8 billion. I believe that is reflected in this chart here that is up with the jagged green line. We were at $8.8 billion, whereas in fiscal year 2017, the request for MDA is $7.5 billion. All told, MDA funding has declined 14 percent over the past ten years. I believe that is in constant dollars not inflation-adjusted dollars.

Let us see the next chart. This I think gives a visual, colleagues, if you see it there, of the fact that we are seeing a real reduction.

The next chart, please. The share of MDA funding going to research and development has decreased by 28 percent from fiscal year 2008 through 2016, with a rising share of the funding devoted to procurement and operations and support. This means there is less funding available for advanced research.

Colleagues, if you all would look at this chart. I think you may have a copy. If you would pull it out, I think it is worth taking the time to take a look at it.

What we are seeing is not only has the budget declined 14 percent, but the blue, yellow, and red represent funding items that MDA is now paying for they did not used to pay for. In 2008, their entire budget virtually was research, development, test, and evaluation. You can see the erosion of MDA's research and development budget is more significant than I had realized, frankly. I would note I am not prepared to criticize, Secretary McKeon, the fact that MDA is now doing procurement and other things. It might be good. However, it seems to be coming straight out of their research budget, which I think is something we need to be aware of as we go forward.

The future years request continues the overall trend of reducing both MDA funding and the research and development [R&D] share of that funding. MDA top line for the year 2021 is 8 percent below

the fiscal year 2016, another 8 percent drop, and the R&D share of that funding declines to under 70 percent for the first time.

I hope to explore with the witnesses the implication of these trends and what they mean for addressing ballistic missile threats in the next decade and beyond. Without sufficient funding for the advanced technologies and new approaches to missile defense, I am afraid the United States may not stay ahead ballistic missile threats, at least not in a cost-effective manner, which in this budget environment is certainly critical.

In any event, these are issues that the next administration will have to address in its review of ballistic missile defense policy and funding.

I turn to Ranking Member Donnelly for his remarks. Thank you, Senator Donnelly, for your good work on this committee and the interest and extra time you have taken to stay on top of the many issues we deal with.

STATEMENT OF SENATOR JOE DONNELLY

Senator DONNELLY. Thank you, Mr. Chairman. I want to thank Senator Sessions for holding this hearing.

Let me also thank today's witnesses for testifying. We very much appreciate your time and the work you do in the service of our Nation.

Protecting our country, our forward-deployed troops, and our allies around the world is of the utmost importance. I spent a week in the Middle East last month visiting Israel, the UAE, Bahrain, Iraq, and Spain to discuss the threat posed by Iran's ballistic missile program and to review United States and allied missile defense systems in the region. In light of the provocative behavior we have seen from both Iran and North Korea in the past six months, I believe our investments in this area are as important today as they have ever been.

I am pleased at the improvements we are making in the reliability and effectiveness of our missile defense systems. I credit that in large part to both the bipartisan support in Congress for robust missile defense funding and MDA's committed ability to prioritize investments where they are most needed.

That needs to continue. We need investment in things like the redesigned kill vehicle and improved sensor and discrimination capabilities to improve the ability of our systems to defeat incoming threats. While we must proceed with urgency, we have to learn from the mistakes of the past and be sure we are conducting smart simulation and testing on these systems before we commit to buying and fielding new technologies.

If there is one message that I carried back with me from the Middle East last month, it is that while we continue to improve our Homeland defense systems, we cannot take our eye off the ball when it comes to protecting our deployed troops and reassuring our allies and partners overseas. Our Aegis ships and THAAD [Terminal High Altitude Area Defense] and Patriot batteries are in high demand from our combatant commanders and our allies. We need to consider how best to allocate these systems and effectively train the warfighters who will operate them to provide the protection that is needed in today's budget constrained environment. The

critical part of that calculus will be how to best build the capabilities and capacity of our allies, particularly Israel, and maximize the integration and interoperability of our missile defenses with partner nation forces.

Again, thanks for coming today, and we look forward to this dialogue.

Senator SESSIONS. Very good.

Secretary McKeon, if you have a statement and your colleagues, we would be prepared to hear them at this time.

STATEMENT OF HONORABLE BRIAN P. MCKEON, PRINCIPAL DEPUTY UNDER SECRETARY OF DEFENSE FOR POLICY, DEPARTMENT OF DEFENSE

Mr. MCKEON. Thank you very much, Mr. Chairman, Senator Donnelly, and other members of the subcommittee. I appreciate this opportunity to testify on the fiscal year 2017 budget request for missile defense and the Department's continuing efforts to sustain and modernize our Homeland missile defense capabilities.

Let me begin by briefly discussing two key threats that are driving our investments. My longer statement for the record includes a description of the trends such as a return to great power competition with Russia and China that are more broadly driving the focus of our planning and budgeting.

North Korea's weapons and missile programs pose a growing threat to the United States and to our allies in East Asia. North Korea is seeking to develop longer-range ballistic missiles capable of delivering nuclear weapons to the United States and continues its 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 into orbit, thus demonstrating technologies applicable to a long-range missile.

Iran 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 the 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 we judge that Iran does not yet possess an ICBM, its progress on space launch vehicles provides Iran with the potential means and potential motivation to develop longer-range missiles, including an ICBM.

Currently the United States Homeland is protected against potential ICBM attacks from states like North Korea and Iran, were either to develop an ICBM that could reach the United States. 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 over the next decade.

Our 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. We are continuing to implement the European phased adaptive approach, and we have reached technical capability of phase II, which includes the Aegis

Ashore site in Romania last December. 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, THAAD, and our Aegis Ballistic Missile Defense [BMD] ships allow us to have flexible layered missile defense capabilities.

Additionally, we are seeking to invest in our cruise missile defense architecture, especially as it relates to the National Capital Region.

Given the threat facing the United States Homeland, we require persistent surveillance and detection of cruise missiles. To that end, we are working with the North American Aerospace Defense Command headed by Admiral Gortney 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.

Thank you very much for having us, and we appreciate and urge your support for our President's budget.

[The prepared statement of Mr. McKeon follows:]

PREPARED STATEMENT BY MR. BRIAN P. MCKEON

Chairman Sessions, Ranking Member Donnelly, 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 United States 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 United States 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 United States 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 Ira-

nian 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 fiscal year 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. 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 United States 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 United States 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 fiscal year 2018 and Japan fiscal year 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 United States 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 United States-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 United States Patriot partners late last year, a group that includes Kuwait.

U.S. Air Forces Central Command maintains a series of regular exchanges between United States 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 United States 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 fiscal year 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 fiscal year 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.

Senator SESSIONS. Admiral Gortney?

STATEMENT OF ADMIRAL WILLIAM E. GORTNEY, USN, COMMANDER, U.S. NORTHERN COMMAND, AND COMMANDER, NORTH AMERICAN AEROSPACE DEFENSE COMMAND

Admiral GORTNEY. Senator Sessions, Ranking Member Donnelly, and distinguished members of the committee, it is an honor to be with you here today.

North America is increasingly vulnerable to a vast array of evolving threats to include highly capable national powers. This complexity and volatility of our strategic environment demands that we advance and sustain the capabilities to protect our Homeland.

At NORAD and NORTHCOM, we look at threats to the Homeland from those most dangerous to most likely. On the most dangerous, the nation states, Russia, China, North Korea, where on North Korea, the peninsula is more unstable than it has ever been since the armistice, and of course, Iran.

Many of our potential adversaries are pursuing advanced weapons development not seen in decades. Individually they pose serious threats 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.

Our BMD architecture is designed primarily to defend against limited long-range ballistic missiles from North Korea and Iran. In light of an evolving threat and the increasingly unpredictable nature of North Korea's dictator, I believe it is imperative that the United States continue to develop more capable forces and broader options for effective ballistic missile defense.

I agree with and support the modernization priorities set by Vice Admiral Syring and his team at MDA, including improvement of our discrimination sensors, lethality of our kill vehicles, sustainment of the BMD architecture, and development of our kinetic and non-kinetic options.

In addition, I believe investments in new technologies for the BMDS architecture such as directed energy should remain a priority to help us stay ahead of the advancing threats. The laser technology that Vice Admiral Syring and his team are pursuing will enhance our boost phase capability against both theater and ballistic missile defense against the Homeland.

Thank you for giving me the opportunity to speak, and I look forward to your questions.

[The prepared statement of Admiral Gortney follows:]

PREPARED STATEMENT BY ADMIRAL WILLIAM E. GORTNEY, USN

INTRODUCTION

Chairman Sessions, Ranking Member Donnelly, 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 fiscal year 2017 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 servicemembers 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. 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 United States 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 United States 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 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.

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

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 mid-course 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 Mid-course 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 en-

hance 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 fiscal year 2016 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.

Senator SESSIONS. Next, Admiral Syring.

STATEMENT OF VICE ADMIRAL JAMES D. SYRING, USN, DIRECTOR, MISSILE DEFENSE AGENCY, DEPARTMENT OF DEFENSE

Admiral SYRING. Thank you, Chairman Sessions, Ranking Member Donnelly, distinguished members of the subcommittee. It is an honor again to testify before you today.

We request support of our fiscal year 2017 budget which is necessary, as I will speak to in detail, to increase the capacity and capability of fielded Homeland and regional defense systems.

With the escalation of the threat from North Korea and Iran, to include increasingly aggressive ballistic missile testing, we are working hard to find more cost-effective ways to do the missile defense mission. We need your continued strong support to improve the reliability of our Homeland defense systems and modernize our ground systems.

We are moving forward with the redesigned kill vehicle program. All the ground-based interceptor upgrades and emplacements remain on track to achieve 44 interceptors by 2017. In fiscal year 2017, we plan to conduct two intercept flight tests to more fully

demonstrate performance of the Ground-Based Midcourse Defense [GMD] system against ICBMs.

Among our planned Homeland defense improvements to identify and track lethal objects, we will begin construction in 2017 of the long-range discrimination radar in Alaska. To stay on schedule, it is critical that we receive full funding for the phase 1 of the military construction in fiscal year 2017 for the radar equipment shelter.

On the regional defense side, in fiscal year 2017, we continue to enhance the capability of the Aegis BD [Ballistic Defense] system and deliver additional SM–3 IBs. We delivered Romania to the warfighter at the end of 2015, and we remain on track to deliver the Aegis Ashore site in Poland by the end of 2018 to improve European NATO [North Atlantic Treaty Organization] defenses against medium and intermediate range missiles.

Finally, on the advanced technology front, we need to stay ahead of the threat by discriminating and killing reentry vehicles with a higher degree of confidence in all phases of flight.

Today we are focusing on directed energy, which I believe is a game-changer. Our work on laser scaling to achieve greater efficiency and lighter weight will enable a low-power laser demonstrator in 2021 to determine the feasibility of destroying enemy missiles in the boost phase of flight.

Finally, equal to any threat we face around the world, we are very aware of the growing cyber threat and working aggressively to ensure the Nation's missile defenses are resilient and able to operate in this highly contested environment. We are taking steps to ensure the cybersecurity infrastructure and the latest security upgrades and everything else that needs to happen with the system, supplier level and our acquisition processes, is accounted for. We have rigorous cyber and supply chain risk management inspection programs. We have red team efforts ongoing to examine everything about our system from the trusted supply chain to the fielded operational capability. I cannot underscore the importance of this more.

Thank you, Mr. Chairman. I look forward to the committee's questions.

[The prepared statement of Admiral Syring follows:]

PREPARED STATEMENT BY VICE ADMIRAL J.D. SYRING, USN

Good afternoon, Chairman Sessions, Ranking Member Donnelly, 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 fiscal year 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 United States 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 Fateh110 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 fiscal year 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 fiscal year 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 United States Navy accepted ownership of the Aegis Ashore site in Romania. United States 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 fiscal year 2016 we will conduct six more flight tests, and in fiscal year 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 fiscal year 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 fiscal year 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 fiscal year 2017 for the Ground-based Midcourse Defense (GMD) program, or $440 million below what we requested in PB 16. The fiscal year 2017 budget request is lower than the fiscal year 2016 budget due to the fact that the fiscal year 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 IBVto 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 fiscal year 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 fiscal year 2017 and the Cape Cod upgrade in the fourth quarter of fiscal year 2017.

With our budget request of $68.8 million in fiscal year 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 fiscal year 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 fiscal year 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 fiscal year 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 fiscal year 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 fiscal year 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 fiscal year 2015, effectively forcing the re-planning of FTT–18 into fiscal year 2017. In fiscal year 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 fiscal year 2017, MDA is requesting $369.6 million for THAAD procurement, which includes the purchase of 24 THAAD interceptors. By the end of fiscal year 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 fiscal year 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 fiscal year 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 fiscal year 2017 budget request supports continued advancement of the system to counter the growing threats.

In fiscal year 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. fiscal year 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 percent 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 demonstra-

tion 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 fiscal year 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 fiscal year 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 fiscal year 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 fiscal year 2017. To recertify SM–3 rounds that have been previously delivered and deployed to the Fleet, MDA requests $38.9 million in fiscal year 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 fiscal year 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 fiscal year 2016 and second quarter in fiscal year 2017. In fiscal year 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 fiscal year 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 fiscal year 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 fiscal year 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 fiscal year 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 United States 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 United States 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 fiscal year 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 multinational 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 fiscal year 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 fiscal year 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 fiscal year 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 fiscal year 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 fiscal year 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 fiscal year 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 United States 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 fiscal year 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 United States production AN/TPY–2).

We request $653.4 million in fiscal year 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 fiscal year 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 fiscal year 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 fiscal year 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 fiscal year 2017 under our Technology Maturation Initiatives program element. MDA requests $90.3 million in fiscal year 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 fiscal year 2015, we awarded three contracts with industry to define concepts for deploying multiple kill vehicles from a single booster. In fiscal year 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 fiscal year 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 fiscal year 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.

Senator SESSIONS. Thank you.

General Mann, thank you. You will be leaving us before long too. This may be your last day here. Thank you so much for your work. It would please me if Alabama came home.

General MANN. Yes, sir.

Senator SESSIONS. Good.

Senator DONNELLY. I will vote for Indiana.

[Laughter.]

STATEMENT OF LIEUTENANT GENERAL DAVID L. MANN, USA, COMMANDING GENERAL, U.S. ARMY SPACE AND MISSILE DEFENSE COMMAND/ARMY FORCES STRATEGIC COMMAND AND JOINT FUNCTIONAL COMPONENT COMMAND FOR INTEGRATED MISSILE DEFENSE

General MANN. Well, good afternoon, Chairman Sessions, Ranking Member Donnelly, and the other members of the subcommittee. Thank you for your continued support of our soldiers, our civilians, and our families.

This is again my third appearance before the subcommittee, and it is indeed an honor to testify before you today to discuss the importance of missile defense to our Nation and the need to maintain these capabilities in the face of a threat that continues to grow both in complexity and unpredictability.

Today I wanted to briefly discuss global missile defense operations and how Space Missile Defense Command, Army Forces Strategic Command executes its role as a force provider in support of our Nation and our combatant commands.

We have three core tasks: number one, to provide trained and ready global missile defense forces today; secondly, to build future missile defense forces and capabilities for tomorrow; and third, to evaluate emerging technologies to address future requirements.

Today we have approximately 300 full-time National Guard soldiers located at Fort Greely, Alaska and at Vandenberg Air Force Base who operate our ground-based midcourse defense system. As you know, this is the Nation's only defense against a limited intercontinental ballistic missile attack. These trained and ready soldiers fully understand the importance of the mission that they execute, and in fact, they like to refer to themselves as the 300 protecting the 300 million plus.

I also represent the Joint Functional Component Command for Integrated Missile Defense in support of U.S. Strategic Command. Specifically, this component command synchronizes operational level planning, supports ongoing operation, integrates training exercises and testing globally. It also provides recommendations on the allocation of our limited missile defense assets in support of our combatant commands. Finally, it evaluates future missile defense requirements.

This committee's continued support of missile defense and of our soldiers, sailors, marines, airmen, and civilians who develop, deploy, and operate our systems is essential.

Again, I appreciate the opportunity to speak on the value of integrated missile defense for our Nation, and I look forward to addressing any questions that you may have. Thank you.

[The prepared statement of General Mann follows:]

PREPARED STATEMENT BY LIEUTENANT GENERAL DAVID L. MANN, USA

Chairman Sessions, Ranking Member Donnelly, and distinguished Members of the Subcommittee, thank you for your continued support of our Service Members, Civilians, and Families. In the same capacity as my previous appearances before this subcommittee, I appear before you today bringing both a Joint and Army perspective on effective missile defense capabilities. Let me again express my appreciation to this Subcommittee for its continued support of the Army, the U.S. Strategic Command, the Department of Defense, and the missile defense community. I am honored to again testify before this Subcommittee along with these distinguished witnesses who provide missile defense capabilities to our Nation, forward deployed forces, partners, and allies.

As previously outlined during appearances before this subcommittee the last two years, my responsibilities encompass several main areas. First, as the Commander of the U.S. Army Space and Missile Defense Command (USASMDC), I have title 10 responsibilities to man, train, maintain, and equip space and global ballistic missile defense forces for the Army. As Commander of USASMDC, I also serve as the Army's force modernization proponent for space, global ballistic missile defense, and high altitude forces and capabilities. Second, as the Commander, Army Forces Strategic Command (ARSTRAT), I am the Army Service Component Commander (ASCC) to the U.S. Strategic Command (USSTRATCOM). I am responsible for planning, integrating, coordinating, and providing all Army space and missile defense forces and capabilities in support of USSTRATCOM missions. Third, as the Commander of USSTRATCOM's Joint Functional Component Command for Integrated Missile Defense (JFCC IMD), I am responsible for synchronizing missile defense planning, supporting ballistic missile defense operations, recommending allocation of missile defense assets, and advocating for missile defense capabilities on behalf of the combatant commanders.

Lastly, I serve as the Army's Air and Missile Defense (AMD) Enterprise Integrator. My responsibility is to synchronize the balanced implementation of the Army's AMD strategy across the functions of force planning and sourcing requirements, combat and materiel development, AMD acquisition and life cycle management, and to orchestrate consistent strategic communication messaging themes.

In accordance with these responsibilities, my intent today is to again highlight the most significant missile defense asset—our great people; to briefly outline the strategic environment; to emphasize USASMDC/ARSTRAT's missile defense force provider responsibilities with respect to the Army and the geographic combatant commanders (GCCs); to outline JFCC IMD's role as an operational integrator of Joint

missile defense for USSTRATCOM; and finally to summarize a few of the key Army air and ballistic missile defense activities and developments in the context of a comprehensive approach to addressing an evolving ballistic missile threat.

THE WORKFORCE—RECOGNIZING AND PROTECTING OUR GREATEST ASSET

The challenges that we face cannot be mitigated without the dedication of our greatest asset—our people. Just as I outlined during my previous appearances, I feel it important to highlight our workforce and my concern of potential out-year sequestration on our workforce. At USASMDC/ARSTRAT and JFCC IMD, our people remain our most enduring strength. The Service Members, Civilians, and Contractors support the Army and Joint Warfighter each and every day, both those stationed in the Homeland and those globally deployed. We remain committed to providing trained and ready Service Members and Civilians to operate and pursue enhanced capabilities for the Nation's ballistic missile defense system (BMDS).

While the 2015 Bipartisan Budget Agreement provides some short term relief and stability, the potential future return of sequestration causes great concern—especially with regards to its impact on the workforce and our overall readiness. Within my commands, any future year sequestration will negatively impact the space and missile defense enablers our soldiers and civilians provide to the combatant commanders. Specifically, readiness, training, and enhancements to space and missile defense capabilities will be degraded. Also, a return of sequestration will negatively impact the morale of our workforce. As stated last year, I believe that a more prudent course of action should be identified and implemented to ensure that we can continue to meet our current global responsibilities and those of tomorrow.

THE EVOLVING THREAT

Current global trends indicate ballistic and cruise missiles are becoming more complex, due in part to the increase in proliferation of advanced technologies, resulting in systems with greater ranges and accuracy. Additionally, many foreign ballistic and cruise missile systems are progressively incorporating advanced countermeasures including maneuverable reentry vehicles, multiple independent reentry vehicles, electromagnetic jamming, and hypersonics, with the purpose of challenging our ballistic missile defense systems. Moreover, ballistic and cruise missile platforms are increasing quantitatively, and as most are mobile field-based systems, is decreasing our ability to detect and track these systems before they are launched.

Numerous countries are developing ground-, sea-, and air-launched land-attack cruise missiles utilizing an assortment of unconventional and inexpensive launch platforms. Presently, nearly 30 countries possess ballistic missile capability. Together, these countries have approximately 50 different variants of ballistic missiles. Additionally, there are currently 13 new intermediate-range and eight intercontinental ballistic missiles (IRBM and ICBM) variants under development. As an example, North Korea, has probably tested ICBM capabilities in recent space launches and continues to develop the KN–08 road-mobile ICBM and an IRBM variant capable of reaching Guam and the Aleutian Islands.

In the future, our BMD systems will encounter more complex advanced electronic and cyber-attacks and will also need to combat directed energy capabilities that could significantly degrade U.S. missile defense operations. It should also be expected that cyber- and electronic-attacks will increasingly be part of an adversary's anti access/area-denial (A2/AD) approach.

> *"Maintaining the capability to deter and defeat attacks on the United States is the Department's first priority"*
>
> *—Quadrennial Defense Review*
> *March 2014*

To meet the objectives of the current Quadrennial Defense Strategic Guidance, USSTRATCOM and the Army continue to provide and enhance Homeland and regional missile defense. In accordance with the Department's strategy to rebalance to the Asia-Pacific region, we have worked with partners in U.S. Pacific Command (USPACOM), U.S. Northern Command (USNORTHCOM), and USSTRATCOM to review and improve our capabilities in the USPACOM area of responsibility. In addition to the deployment of a Terminal High Altitude Area Defense (THAAD) battery in Guam, we have deployed an additional forward-based sensor in Japan to bolster our regional and Homeland defense capabilities. The Army is presently working to forward station a THAAD battery on Guam to reduce the deployment turbulence and create more strategic flexibility in the THAAD force. We have completed the final environmental protection submission for the Fish and Wildlife Service and expect to have a long-term solution in place this year.

The emplacement of 14 additional Ground-Based Interceptors at Fort Greely, Alaska, scheduled for completion in 2017 and an Inflight Interceptor Communications System Data Terminal at Fort Drum, New York, will provide improved capability and capacity to defend the Nation against a limited ICBM attack. In addition, we continue to work with regional partners and allies to increase our information and data sharing and develop a global AMD force posture that leverages ever growing partner nations' capabilities. This will result in reduced strain on our force and enable more timely modernization of our AMD assets.

"Effective missile defense is an essential element of the U.S. commitment to strengthen strategic and regional deterrence against states of concern"

—USSTRATCOM Posture Statement
February 2016

The Quadrennial Defense Review also establishes a priority to maintain a strong commitment to security and stability in Europe, the Asia Pacific region, and the Middle East. In conjunction with our allies and partners, the DOD continues to maintain forward committed PATRIOT, THAAD, and Counter Rocket, Artillery and Mortar (C–RAM) air and missile defense forces in order to enhance our current AMD posture while sending a strategic deterrence message to potential adversaries. The scope and quantity of these deployments result in a highly deployed and stressed Army AMD force. We must seek to balance today's operational requirements with shaping the force to counter future challenges. Our efforts must also include the critical modernization of our AMD force over the next five years.

In summary, enemy air and missile threats continue to develop in complexity, quantity and capacity. The evolution of multiple sophisticated capabilities requires a holistic approach that effectively integrates offensive and defensive, passive, kinetic and non-kinetic, and alternative capabilities to defeat air and missile threats. The growing complexity of the strategic environment based on technological advances of the threat and fiscal realities requires cost effective methods to integrate current and future capabilities. We continue to prioritize integrated air and missile defense resources to optimize all our capabilities in support of the Warfighter, particularly in light of the expense associated with traditional approaches. We continue to partner with the Missile Defense Agency (MDA), Combatant Commands, and Services to pursue a fiscally responsible path to keep pace with evolving threats by identifying and prioritizing capabilities that provide the greatest operational value.

PROVIDING AND ENHANCING MISSILE DEFENSE CAPABILITIES

USASMDC/ARSTRAT, a force provider of missile defense capabilities, is manned by multi-component soldiers, civilians, and contractors. Commands around the world, including USSTRATCOM, USNORTHCOM, and the GCCs, leverage our capabilities. Our title 10 responsibilities include operations, planning, integration, control, and coordination of Army forces and capabilities in support of USSTRATCOM's missile defense mission. USASMDC/ARSTRAT also serves as the Army's global operational integrator for missile defense, the Army's proponent for global ballistic missile defense force modernization, and the Army's technical center lead to conduct air and missile defense related research and development in support of Army title 10 responsibilities. As the Army AMD Enterprise Integrator, our tasks include working across the AMD community of interest to balance priorities, informing resourcing decisions, and pursuing innovative approaches in order to enhance our strategic flexibility. The AMD Enterprise remains focused on meeting operational demands and AMD modernization initiatives. Achieving a balance of fiscal resources and force structure between operational requirements and timely development and implementation of the AMD modernization priorities is imperative. Collectively, the conduct and integration of these roles help to set conditions for the protection of GCCs and Joint Warfighters while maintaining their freedom of action, provide the ability to build and project combat power, and assure access to the global commons.

Our operational function is to provide trained and ready missile defense forces and capabilities to the GCCs and the Warfighter—in other words, to address the requirements of today. For example, USASMDC/ARSTRAT soldiers serving in the Homeland and in remote and austere forward deployed locations operate the Ground-based Midcourse Defense (GMD) system and the Army-Navy/Transportable Radar Surveillance Forward-Based Mode (AN/TPY–2 FBM) radars. Highlights of the missile defense capabilities provided by our missile defense professionals include:

Support to Global Ballistic Missile Defense: Soldiers from the 100th Missile Defense Brigade, headquartered in Colorado Springs, Colorado, and the 49th Missile Defense Battalion, headquartered at Fort Greely, Alaska, remain ready, 24/7/365, to

defend our Nation and its territories from a limited intercontinental ballistic missile attack. Under the operational control of USNORTHCOM, Army National Guard and Active component soldiers operate the Ground-based Midcourse Defense Fire Control Systems located at the Fire Direction Center in Alaska, the Missile Defense Element in Colorado, and the GMD Command Launch Element at Vandenberg Air Force Base, California. These soldiers, in conjunction with USNORTHCOM, also oversee the maintenance of GMD interceptors and ground system components. At the Missile Defense Complex at the Fort Greely site, 49th Missile Defense Battalion military police secure the interceptors and communications capabilities from physical threats.

"... will remain ready to deter and defeat threats to the Homeland..."
—National Security Strategy
February 2015

Recently, MDA completed the fielding of an additional Inflight Interceptor Communications System Data Terminal (IDT) at Fort Drum, New York. Just last month, the Army completed its title 10 responsibilities and, in conjunction with USNORTHCOM, declared the IDT operational. In addition to increasing the overall effectiveness of the entire inventory of ground-based interceptors, the Nation's only Active defense against an ICBM attack, the IDT will also greatly enhance the coverage and protection of the Eastern U.S.

GMD System Test and Development: Soldiers from the 100th Missile Defense Brigade actively participate in GMD test activities and continue to work with MDA developers on future improvements to the GMD system. The rigorous testing regime of MDA, conducted through their series of operational flight as well as ground-based tests, emphasizes operational realism during test design and execution. Therefore, in addition to gaining test data and insight, Soldiers of the 100th Missile Defense Brigade gain tremendous training value by executing their actual responsibilities while providing Warfighters with confidence the system will perform as planned in support of their Joint campaigns.

Support to Regional Capabilities: The 100th Missile Defense Brigade also provides GCCs with trained and certified AN/TPY–2 FBM radar detachments. These operational capabilities are present today at five strategic locations around the globe where they contribute to the early warning, cueing, tracking, and discrimination of threats to our friends and allies. These forward-based radars also represent a tangible contribution to regional defense that is the centerpiece of the Administration's Phased Adaptive Approach (PAA). In several instances, these soldiers, deployed to remote and austere locations, are the only persistent demonstration of our national commitment and resolve to the PAA.

Ballistic Missile Early Warning: Space enabled capabilities are essential for missile defense operations. Everything from communications, precision navigation and timing, intelligence, surveillance, reconnaissance, and early warning are dependent on space enabled capabilities. Through the Joint Space Operations Center, we routinely coordinate and collaborate with the Joint Functional Component Command for Space (USSTRATCOM) to ensure resilience of the space architecture that forms the backbone of the missile defense joint kill chain.

In support of the Joint Force Commander, USASMDC/ARSTRAT continues to provide ballistic missile early warning within various theaters of operations. The 1st Space Brigade's Joint Tactical Ground Station (JTAGS) Detachments, under the tactical control of USSTRATCOM's Joint Functional Component Command for Space, are operated by USASMDC/ARSTRAT space-professional soldiers who monitor launch activity and other infrared events. They provide essential information to members of the air, missile defense, and operational communities. Our JTAGS Detachments are forward deployed around the globe, providing 24/7/365, dedicated, assured missile warning to USSTRATCOM and GCCs in support of deployed and forward-based forces. We continue to optimize this capability and this year we gained support from the Government of Italy to relocate the JTAGS in Europe to Sigonella Naval Air Station.

Our second major task is to build and mature future missile defense forces—our capability development function. These are the missile defense capabilities we will provide tomorrow. A major component of our capability development function is to provide relevant and updated training on our global missile defense systems. During the past fiscal year, USASMDC/ARSTRAT trained 185 soldiers and was recertified as an Army Learning Institution of Excellence for missile defense training.

The Army uses established and emerging processes to document its missile defense needs and pursue Joint and Army validation of its requirements. As a recognized Army Center for Analysis, USASMDC/ARSTRAT conducts studies to determine how to best meet the Army's assigned missile defense responsibilities. With

these insights, we develop and operationalize the Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, and Policy (DOTMLPF–P) domains to address evolving threats and potential vulnerabilities to the GMD and AN/TPY–2 FBM missile defense systems. This disciplined approach helps to ensure limited resources are applied where Warfighter operational utility can be most effectively served.

Our third major missile defense task provides critical technologies to address future needs that will enhance Warfighter effectiveness—our materiel development function. In USASMDC/ARSTRAT, our technology development function is primarily focused on the space and high altitude domains. However, while MDA is the principal materiel developer for ballistic missile defense capabilities, USASMDC/ARSTRAT has a number of supporting missile defense related materiel development efforts, to include supporting research and development of an OSD-sponsored conventional prompt global strike capability. These technical capabilities are at the forefront of developing holistic, cost-effective approaches to address the missile defense challenge. Following is a brief summary of two of our research and development efforts, as well as an overview of the capabilities of an essential Army testing range.

High Energy Laser Technology Development and Demonstration: The objective of the Army's high energy laser science and technology project is to develop laser system components, ruggedize and integrate them onto an Army vehicle, conduct demonstrations to characterize performance capability, and transition the technology to a Program Executive Office. A solid-state laser weapon system has potential to be a low cost, effective complement to kinetic energy capabilities in countering rockets, artillery, and mortars (RAM); unmanned aerial vehicles (UAVs); and other threats. The project is building upon pathfinder demonstrations with a 10 kilowatt-class laser system in 2013 and 2014, by continuing to develop and integrate technology at higher power and technology maturity levels. The next major demonstration will occur in 2018 following integration of a 50 kilowatt-class laser system onto a High Energy Laser Mobile Test Truck (HEL MTT). In 2015, the Army Science and Technology Working Group approved changes to the laser project to better align with the Army's Indirect Fire Protection Capability Increment 2 Block 1 (IFPC Inc 2–1) program. These changes will result in a pre-prototype laser weapon system demonstration, on a family of medium tactical vehicles variant, in the early 2020s designed to meet counter RAM requirements in the draft IFPC (IFPC Inc 2–1) Capability Development Document.

Providing Future Warfighters with Innovative Missile Defense Capabilities

Low-Cost Target Development: The Army continues to pursue a technology effort to develop a suite of low-cost targets for the Patriot testing program. The intent is to design threat-representative targets at a substantially reduced cost for short-range ballistic missile testing. Over the past year, we completed detailed designs for three new short range ballistic missile targets leveraging existing excess solid rocket motors. The first risk reduction flight of these targets is planned for May 2016. The Army will realize significant savings conducting operational test events using these new targets beginning in fiscal year 2017. We will continue to leverage existing missile inventory and technology advancements to develop less expensive targets that are representative of real world threats.

Missile Defense Testing: USASMDC/ARSTRAT operates the Ronald Reagan Ballistic Missile Test Site (RTS). RTS, located on the U.S. Army Garrison—Kwajalein Atoll in the Republic of the Marshall Islands, is critical to both offensive and defensive missile testing requirements, such as the GMD system and the U.S. Air Force strategic ballistic missile systems. Including the recent successful MDA Warfighter and Homeland defense tests, FTO–02E2 and CTV–02 respectively, these tests have grown ever more challenging and complex over the last few years, providing a means to replicate theater missile defense architectures superimposed over these Pacific test sites. Through shrewd and efficient resource investments, RTS retains preeminent missile defense testing capabilities and personnel to continue to provide critical testing support. In concert with its testing mission, Reagan Test Site conducts continuous deep space surveillance and space object identification operations to further increase national capabilities and reduce expenditures for both mission sets. During the past month, the U.S. Air Force began construction of their most advanced surveillance system—the Space Fence. In a few years, this improved surveillance capability will enable proactive space situational awareness while complementing existing systems at Reagan Test Site.

JOINT FUNCTIONAL COMPONENT COMMAND FOR INTEGRATED MISSILE DEFENSE—SYNCHRONIZING GLOBAL MISSILE DEFENSE PLANNING, FORCE MANAGEMENT, AND OPERATIONS SUPPORT

The Joint Functional Component Command for Integrated Missile Defense, or JFCC IMD, is USSTRATCOM's missile defense integrating element. Like the other Joint Functional Component Commands, JFCC IMD was formed to operationalize USSTRATCOM missions and allow the headquarters to focus on integration and advocacy. Headquartered at Schriever Air Force Base in Colorado Springs, Colorado, the JFCC IMD is manned by professional Army, Navy, Air Force, Marine Corps, Civilian, and Contractor personnel.

As the Secretary of Defense and various combatant commanders have previously testified, the Warfighter remains confident in our ability to protect the Nation against a limited intercontinental ballistic missile attack, even in the face of the changing fiscal environment. While resources remain constrained, we continue to increase regional and Homeland defense capabilities. We remain partnered with the GCCs and MDA to initiate development of future capabilities in the Long Range Discrimination Radar in Alaska, development of the Redesigned Kill Vehicle (RKV) for the next GBI upgrade, and various other improvements in the global missile defense capability.

Defense of the Homeland Priority Requires Exectuion of a Holistic Global Missile Defense Plan

On behalf of USSTRATCOM, JFCC IMD is working across the DOD enterprise to improve the integration of existing capabilities in order to maximize our efficiency and effectiveness to protect the Homeland, deployed forces, partners, and allies. The key force multiplier is "integration," which is a critically important mission area for JFCC IMD and directly supports USSTRATCOM's assigned Unified Command Plan (UCP) responsibilities for missile defense.

As an operational and functional component command of USSTRATCOM, JFCC IMD has seven priorities for this year in support of USSTRATCOM UCP responsibilities:

- Remain postured to provide operational support during all missile events of interest and conduct BMDS asset management.
- Incorporate the Global Missile Defense CONOPS (GMDC) elements into policy, doctrine, and practice.
- Ensure operational realism and Warfighter priorities in tests to support operational acceptance of new capabilities.
- Conduct a holistic operational assessment through the Global Integrated Air and Missile Defense Assessment (GIAMDA) for advocacy of critical operational requirements to influence the missile defense investments.
- Recommend, through USSTRATCOM, the allocation of missile defense assets in support of geographic combatant command requirements and priorities.
- Evolve Joint BMD training to reflect technical and operational changes and improvements and to increase efficiency.
- Strengthen integration with USSTRATCOM subordinates and other organizations to improve cross-mission synergies.

To accomplish these priorities, we maintain close collaborative relationships with the GCCs, MDA, the Services, the Office of the Secretary of Defense (OSD), the Joint Staff, and our allies. We continually enhance our deployed capabilities while gaining operational experience and confidence in our collective ability to defend the Nation, deployed forces, partners, and allies. Some of our key efforts to enhance missile defense planning and capabilities for both the Homeland and regional architectures follow.

Expansion and Integration of the Missile Defense Architecture: In response to the evolving strategic environment, we continue to bolster Homeland and regional missile defense capabilities. Over the past year, we have deployed an additional AN/TPY–2 FBM radar to Japan, expanded the existing European Phased Adaptive Approach (EPAA) by operationalizing the Aegis Ashore capability in Romania, started construction of a second Aegis Ashore capability in Poland, upgraded Ft Greely, Alaska's existing GBI capability and inventory, and initiated key future capability developments in the Long Range Discrimination Radar and the RKV. Given many of the challenges associated with implementation of these architectures, JFCC IMD, in support of USSTRATCOM's global synchronizer role for missile defense, is collaborating with the GCCs to assess and address the cross-regional gaps in the areas of planning, policy, capabilities, and operations.

We will maintain "a robust missile defense capability to defend the Homeland against a limited ballistic missile attack."

—Quadrennial Defense Review
March 2014

Global Planning and Assessment: Regional and global missile threats continue to increase in numbers and complexity. This year, after successfully completing a revision to the Global Missile Defense Concept of Operations, JFCC IMD operationalized many of the emerging processes identified in this seminal document. We led the missile defense community in an objective analysis of missile defense looking at risk from the lens of impacts across multiple GCC plans given a crisis with a single adversary problem set. This assessment will identify systemic risk, inform recommendations for shortfall mitigation, and improve effectiveness in missile defense planning. The output of this analysis directly informs the GIAMDA which serves to shape recommendations for global force management and advocacy efforts for future capability investments. We have completed the 2015 GIAMDA and its findings further underscores the holistic missile defense strategy that the Department is undertaking in technology development, allied integration, left-of-launch options, and cyber operations.

Global Force Management: USSTRATCOM, as the designated Joint Functional Manager for missile defense, relies upon JFCC IMD to evaluate and recommend sourcing of BMD requirements based on assessed risk. Due to the high demand, low-density nature of missile defense assets, all sourcing decisions have a direct and significant impact to other combatant commanders' campaign and contingency plans. This year, JFCC IMD participated in a Joint Staff led effort to develop a prioritization schema for global assets. This global Prioritized Defended List will categorize GCC critical assets based on global risk to inform the Global Force Management process and enable senior leaders to make more informed decisions on the allocation of low density missile defense forces.

Multi-Regional BMD Asset Management: JFCC IMD, in coordination with USSTRATCOM and the GCCs, manages the availability of missile defense assets to balance operational readiness postures, scheduled and unscheduled maintenance activities, and the MDA and Services' test requirements. This important process allows us to continually assess our readiness to defend against a ballistic missile attack and to recommend adjustments to optimize the overall BMD architecture.

Allied Ballistic Missile Defense Integration: JFCC IMD continues to focus on the integration of allies into regional missile defense architectures, enhanced security cooperation between missile defense capable nations, and shared regional deterrence and defense responsibilities across partner nations. One tool employed to promote cooperation is the Nimble Titan campaign, a biennial series of multi-national missile defense experiments designed to explore policy and operational concepts required for coalition missile defense. The Nimble Titan campaign provides a unique venue to advance U.S. missile defense policies and combatant command regional security objectives. The Nimble Titan community of interest consists of 23 nations and 3 international organizations.

Nimble Titan 16 includes Ministry of Foreign Affairs and Ministry of Defense representatives from North America, Europe, Middle East, and Asia-Pacific regions, along with Department of State, OSD, Joint Staff, MDA, and combatant command representatives. While past Nimble Titan campaigns have focused only on Ballistic Missile Defense, Nimble Titan 16 is the first campaign that expands the focus to Integrated Air and Missile Defense (IAMD), a growing area of concern for both the United States and many of our partner nations and allies. Other discussion topics include national policies and the need for increased regional and cross-regional coordination, sensor integration, and multinational MD planning solutions.

As the premier strategic/policy level focused missile defense event in the world, this campaign provides participating nations with critical opportunities for multi-national discussions and experience in information-sharing as well as command and control procedures that enhance synchronized missile defense capabilities. Conclusions derived from this campaign continue to inform real world policy decisions and multinational BMD planning

Joint BMD Training: In coordination with USSTRATCOM, the Joint Staff, Combatant Commands, and the Services, we have developed a comprehensive and innovative training program to close gaps between Service, Joint, and regional BMD training and education. This past September, we declared Final Operational Capability for the Joint BMD Training and Education mission. Nine new mission oriented courses have been developed and fielded to enhance combatant command and warfighter training needs. Online, distant learning courseware offerings are under development to improve efficiency in delivery and reduce costs. Over the past year,

JFCC IMD provided 199 courses to over 3444 students worldwide via the Joint BMD Training and Education Center and Mobile Training Teams. Additionally, in keeping with Joint Vision 2020, JFCC IMD provided training courses to ally and partner nations using both Military-to-Military and Foreign Military Sales Training venues. We developed and launched our Community of Practice, an interactive knowledge portal for the missile defense mission, providing virtual problem solving, idea sharing, standards-setting, relationship improvement, collaboration, and joint, cross-domain awareness. Over the next two years our primary goal is to establish and gain Joint Staff accreditation as a Joint Training Center of Excellence.

"...I believe it is imperative that the United States continue to develop more capable forces and broader options for effective missile defense."

—USNORTHCOM Posture Statement
March 2016

Warfighter Acceptance and Integrated Master Test Plan: As the missile defense architectures mature, Warfighters require a credible, comprehensive assessment of new capabilities to inform operational acceptance of emerging capabilities into the global BMDS. In 2015, we jointly conducted FTO–02 E1a to test the Aegis Ashore system with the SM–3 IB interceptor and, with FTO–02 E2a, performed an integrated BMDS test with Aegis BMD, THAAD, and AN/TPY–2 FBM simultaneously engaging SRBM, MRBM, and cruise missile targets in a layer defense to support the operational acceptance of the EPAA Phase II capability. For Homeland defense capability, we participated in the January 2016 GMD CTV–02, demonstrating the Exo-atmospheric Kill Vehicle alternate divert thruster in support of GBI upgrade efforts and key discrimination capabilities for future sensor network improvements. In the coming year, the focus of our BMD tests is to begin demonstrating the operational capability of the SM–3 IIA interceptor capability for Phase III of the EPAA architecture and to test the GMD system's GBI Capability Enhancement-II Block I. The Warfighter relies on a robust and operationally relevant test campaign to confidently field and integrate new capabilities into their existing Integrated Air and Missile Defense architectures.

In summary, JFCC IMD continues to expand our nation's global missile defense architecture and explore future capabilities to maintain operational advantage against current and future threats. Our competitive edge is maintained through our deliberate investments in our capability developments by MDA and the Services, investments in our warfighters through education and training, and expansion of our collaboration with allies and partners.

ARMY CONTRIBUTIONS TO THE NATION'S MISSILE DEFENSE CAPABILITIES

As we transition from an Army at war to one of deterrence, air and missile defense (AMD) units have become a key strategic enabler. AMD is an enduring Army core function and an essential component of the Army mission to provide wide area security and support Joint campaigns. In addition to defense against ballistic missiles, the current AMD strategy seeks to develop a more comprehensive portfolio of IAMD capabilities to provide protection against cruise missiles, unmanned aerial systems, and long-range precision rocket, artillery, and mortar attacks.

The Army works closely with MDA and continually supports its materiel development efforts to develop and field systems that are integral to our Nation's air and missile defense capabilities. To ensure the mission of providing trained and ready Army AMD forces, we continue to refine and implement the strategic direction of the Army's AMD strategy. A summary of the Army's major air and missile defense ongoing strategic direction and programs, both specified and implied, follows.

Air and Missile Defense Readiness: Readiness remains the Army's top priority and the challenges to sustain the readiness of the total Army AMD forces requires constant vigilance and senior leader focus. The operational demand on the Army AMD force to meet the requirements of the Joint Warfighters continues to stress the force, impacting both current and future readiness, as well as modernization initiatives. With over 50 percent of the AMD force either forward assigned or deployed, the Army has taken steps to mitigate this stress and restore strategic flexibility. Implementation of a Sustainable Readiness Model, an Army Campaign Plan strategic effort, supported the characterization of the challenge. A recent study on striking a balance between operational demand and modernization led to the activation of an AMD test detachment in fiscal year 2018. This same study supported normalization of AMD rotations to nine months vice the current 12 month cycle.

Mission Command: Closely linked to the challenge of sustaining AMD readiness is the ability to provide low density/high demand AMD command and control elements. The command and control elements are especially critical to enable the integration of total Army AMD forces into Joint operational and technical architectures.

Operationally, the Army recently activated a third Air Defense Brigade Headquarters within the South Carolina Army National Guard to support command and control rotations for the integrated air defense mission of the National Capital Region. Additionally, a sixth Active Duty air defense brigade headquarters will soon be activated. Beginning next fiscal year, the Army will begin fielding five Dismounted PATRIOT Information Coordination Centrals (DPICC) to the Army Air and Missile Defense Commands (AAMDC), which will mitigate the requirement to deploy a Patriot Headquarters element with each 1–2 battery deployment. These operational measures are being conducted in concert with technical measures, specifically the development of the Army IAMD Battle Command System (IBCS), which will facilitate the optimal pairing and provide additional time to prosecute tracks to enhance selective target engagement and improve combat identification. The Army PATRIOT force remains the cornerstone of AMD protection for our deployed forces, friends, and allies.

Army Integrated Air and Missile Defense (IAMD): As we continue to transition from an Army at war to one of deterrence, AMD units remain a key strategic enabler. AMD is an enduring Army core function and an essential component of our mission to provide wide-area security. In addition to providing defense against ballistic missiles, the current AMD strategy continues to develop a more comprehensive portfolio of IAMD capabilities to provide protection against cruise missiles, unmanned aerial systems, fixed and rotary wing aircraft, and long-range precision RAM attacks.

The IBCS remains an Army priority effort and serves as the foundation for Army AMD modernization. Modernization is critical to stay ahead of the advancement of the threat. The program will field a common mission command system to all echelons of Army AMD forces in order to defend against cruise missiles, manned and unmanned aircraft, air-to-ground missiles, tactical ballistic missiles, and RAM attacks. The IBCS network will be capable of coordinating air surveillance and fire control across Services and with coalition partners, enabling over-the-horizon engagements that provide Joint Warfighters with more decision space and time. In 2015, the IBCS successfully executed two flight tests. During the March test, the IBCS coordinated the engagement of a surrogate tactical ballistic missile utilizing a PATRIOT radar and interceptor on the Integrated Fire Control Network. In the November test, the IBCS coordinated the engagement of a surrogate cruise missile utilizing Sentinel radar data and a PATRIOT interceptor. This was a first of its kind engagement with a PATRIOT engaging a target using Sentinel radar data. When fielded, in 2019, IBCS will componentize the AMD force, breaking the current system-centric control paradigm, which will dramatically increase capability and also facilitate open industry competition in support of the AMD community. Additional efforts are currently underway to integrate the Army's IBCS and MDA's BMD System Command, Control, Battle Management, and Communications (C2BMC) in order to fully support integrated air and missile defense interoperability with the ballistic missile defense system.

The IBCS and inherent integrated fire protection efforts will provide the future force with a means to defend against cruise missiles, unmanned aerial systems, and long-range precision rockets, artillery, and mortars. However, the Army must also be trained and ready to fight tonight. Recent conflicts, for example in the Ukraine and Israel, have highlighted the growing threat of UAS in support of tactical operations. This poses an increasing risk to the Army's combined arms team who are operating where the strategic and operational advantage of highly technical standoff weapons have limited utility. A coordinated effort involving the Army Staff, the Fires Center, PEO M&S, and select ASCCs is underway now to investigate holistic approaches to enable the Army to fight tonight against these emerging threats. The technical options under consideration run the gamut from assessing pre-PAC–3 missiles to leveraging older generation interceptors in the inventory to opportunities for the acceleration of existing AMD modernization plans. Operationally, the team is assessing the ability to leverage capabilities of the other Services, as well as the integration of allied contributions. Senior Army leaders acknowledge that these options may require reprogramming within the current Defense plan and await the team's report this summer.

PATRIOT/PATRIOT Advanced Capability-3 (PAC–3): In support of the GCCs increasing air and missile defense demands, operational tempo and stress remain high. To meet these demands, reduce stress, and avoid adversary overmatch, the Army has implemented a comprehensive modernization strategy that replaces PATRIOT's command and control hardware while upgrading the radar, launcher, and interceptor components through competitive development and procurement. The strategy's aim is to increase reliability, drive down operational and sustainment costs, in light of an evolving threat. The three significant facets of this strategy—

the development of IBCS, radar and launcher modernization, and the PAC–3 Missile Segment Enhancement (MSE), are critical to our Nation's ability to provide GCCs with greater strategic flexibility and enhanced capabilities.

A number of significant PATRIOT/PAC–3 capability enhancements have been accomplished over the past year. Among the accomplishments were the completion of the Army's planned fielding of Post Deployment Build (PDB) 7 software and the modern adjunct processor to all fifteen PATRIOT battalions and achievement of first unit equipped with the next generation PAC–3 missile, the MSE, two months ahead of schedule. The PAC–3 MSE Initial Operational Capability (IOC) is planned for next year.

PATRIOT must continually modernize through PDBs software and hardware upgrades to avoid obsolescence and provide initial launch capability of the PAC–3 MSE interceptor. As part of this continuing modernization strategy, the Army is in the process of delivering the next software build, PDB–8. The PDB–8 software upgrade has successfully completed three live fire test events, the most current occurring last month, and is on schedule to complete developmental testing this year. The PDB–8 software IOC is planned for fiscal year 2018, which when fielded, will exploit the expanded kinematic capabilities of the PAC–3 MSE interceptor. The Army continues to move forward with the next generation sensor for the PATRIOT system. An analysis of alternatives has been completed for the Lower Tier Air and Missile Defense Sensor and an Army Requirements Oversight Council review will occur soon.

Finally, while these Patriot modernization efforts are an imperative to retaining an operationally relevant capability and not risking obsolescence as threat capabilities seek to outpace the Patriot, we still remain committed to balancing modernization with operational demand and strategic flexibility requirements. We can point to the Army's recent, no-notice, deployment, integration, and redeployment of Global Response Force Patriot forces from Ft Bliss, Texas to South Korea as evidence of this commitment, and of the readiness of the force.

Terminal High Altitude Area Defense System: THAAD, a key component of the BMDS architecture, is designed to defend deployed and allied forces, population centers, and critical infrastructure against short and medium-range ballistic missiles. THAAD is a high demand, low-density asset that is mobile and globally transportable. A fully operational THAAD battery consists of 95 soldiers, an AN/TPY–2 radar, six launchers, a fire control and communications element, a battery support center, and a support element. THAAD has a unique intercept capability in both the endo- and exo-atmosphere using proven hit-to-kill technology. There are now four available THAAD batteries. Equipment training and fielding is on-going for a fifth unit and it will be operationally available next fiscal year. In April 2013, one of these batteries conducted the first-ever operational deployment of THAAD in response to the escalation of tensions in the Pacific region. By 2019, the THAAD force is scheduled to consist of seven batteries. A new training facility, which enables virtual training for the soldiers who will operate the THAAD system, is operating at Fort Sill, Oklahoma. The addition of THAAD capabilities to the Army's air and missile defense portfolio brings an unprecedented level of protection against missile attacks to deployed U.S. forces, partners, and allies.

Integrated Fire Control Capability Increment 2 Block 1 (IFPC Inc 2–1): As the operational life cycle of short-range AMD capabilities such as Avenger draw to a close, the Army is developing capabilities to defeat cruise missile, UAS, and RAM threats. The IFPC Inc 2–1, currently under development, is a mobile, ground-based weapon system designed to provide 360-degree protection capability for these threats. A block acquisition approach is being used to provide this essential capability. The Block 1 System will consist of an existing interceptor, sensor, utilize the IBCS for command and control, and the development of technical fire control and a multi-mission launcher to support the counter UAS and cruise missile defense missions. The Block 2 System will develop interceptors, sensors, and technical fire control to support the counter RAM mission. The IFPC Inc 2–1 System will be compatible with the Army IAMD command and control architecture. The IFPC Inc 2–1 System will be transportable by Army common mobile platforms and is scheduled to provide IOC capabilities against cruise missile and UAS threats in fiscal year 2020.

CONCLUSION

Mr. Chairman and Ranking Member Donnelly, as a member of the Joint missile defense community, the Army continues to pursue enhancements to the Nation's missile defense system, both at the strategic and tactical levels. As a Service, the Army has lead responsibility for GMD, AN/TPY–2 FBM, IFPC Inc 2–1, IBCS, PATRIOT, and THAAD. Our trained and ready soldiers operating GMD elements in

Colorado, Alaska, New York, California, and from remote, globally deployed locations, remain on point to defend the Homeland against a limited intercontinental ballistic missile attack. As a force provider to the GCCs, our soldiers provide essential regional sensor capabilities and ballistic missile early warning. Our regional forces continue to leverage ally collaboration and planning efforts in developing integrated and interoperable defenses against the various threat sets. USSTRATCOM, through the JFCC IMD, continues to integrate BMDS capabilities to counter global ballistic missile threats and to protect our Nation, deployed forces, partners, and allies.

While the operational, doctrine, and materiel development enhancements of the BMDS are essential, our most essential assets are the soldiers, sailors, airmen, marines, civilians, and contractors who develop, deploy, and operate our missile defense system. I appreciate having the opportunity to address missile defense matters and look forward to addressing your questions.

Senator SESSIONS. Thank you.

I believe in order here—let us see. I think Senator Donnelly was first on this side. Because he is ranking, he would be next. Senator Inhofe and Fischer, Lee—I think you were at the beginning of the hearing—and Senator Sullivan. But Senator Lee has a conflict, so I am going to yield my time to him and we will otherwise be on the same path unless there is some suggestion of a change. I know he has got something he has got to go to. Thank you for being with us, Senator Lee.

Senator LEE. Thank you very much, Mr. Chairman. Thanks to all of you for being here. We are honored by your presence and grateful for all you do for us to keep us safe.

As we look across the array of threats that we face around the world, there are two threats that stand out and that cause a lot of us to worry. One is ballistic missile attacks and the other one is cybersecurity-related threats.

I am glad all of you are here because you do a lot of work in this area, and I am grateful for that.

Secretary McKeon and Admiral Gortney, I would like to ask the two of you some questions about the cost, the cost-benefit analysis that we have in this area.

The United States has spent many tens of billions of dollars over the last three decades on missile defenses. It is a large sum. It is a sum that has drawn some criticism, and it is a sum that, regardless of how you feel about that criticism, is one that we have to pay attention to.

But in much the same way that other technologies like, for example, drone technology cost us a lot of money to develop—it cost us a lot of money to develop at the outset, but in the end has saved us and has even more potential to save us down the road a lot of money because compared to other aircraft systems, manned aircraft systems, for example, in the long run, we can actually save money.

In the same respect, how and in what respect, to what extent could having a reliable missile defense system help us save money, save money for the military and for the Government over the long haul?

Admiral GORTNEY. I guess when you look at the ballistic missile threat, there are actually two types of ballistic missile threats. It is the theater ballistic missile threat that we have servicemembers and servicemembers' families that live underneath that threat today. Then we have the ballistic missile threat, limited ballistic missile threat, that we have designed for the Homeland.

I think what is important where MDA is moving on the technologies is where is there efficiencies to get us on the correct side of the cost curve, not just engage in midcourse for both those threats, but keeping them on the ground, left of launch, having a surveillance to be able to strike them, provided we have the rules of engagement to do that, killing them in boost phase and then through the midcourse phase. A lot of those technologies that you all have provided the funding for for the research and development MDA is using. A lot of it we will be able to apply to both those particular threats. I think that is where we have to really view that is where the savings will be because they are different. They differentiate by range of a threat, but the technologies to counter them can be the same or the necessary technologies can be.

Senator LEE. Thank you.

Mr. Secretary?

Mr. MCKEON. The only thing I would add, Senator, I think the way we would think about missile defense in a very broad sense, both regionally and our Homeland missile defense is it is a deterrent against rogue states or nations engaged in activity that we disagree with. In addition to our own missile defenses, we are encouraging a lot of partners in the Middle East and in Asia to acquire missile defenses in the theater.

For example, in Iran, we are working to counter Iran and its missile capabilities. We are working very closely with our partners in the Gulf to encourage their acquisition of missile defense systems, as well as knitting them together in terms of the early warning. That is a deterrent that over the long term will save, we believe, money in other respects.

Senator LEE. Thank you.

Admiral Gortney, let us talk about North Korea for a minute. I would love to get your assessment of where North Korea's ballistic missile technology is headed in the next few years and then evaluate our ability to keep up with it and respond to that.

Admiral GORTNEY. The intel community assesses North Korea's ability to successfully shoot an ICBM with a nuclear weapon in range of the Homeland is low. But as the commander in charge that is responsible for defending that Homeland who owns the trigger to shoot that down, we do not base our readiness levels upon that low probability. We assess—it is the prudent course of action as the commander. We assess that he has the ability to do that, and we are prepared to engage that particular threat today and in the future 24 hours a day, 365 days out of the year.

Eventually we assess that his low probability will increase, and that is why the investments to have us outpace that technology, his ability to field that capability is absolutely critical.

Senator LEE. Thank you, Admiral.

Thank you, Mr. Chairman.

Senator SESSIONS. Thank you.

Senator Donnelly?

Senator DONNELLY. Thank you, Mr. Chairman, and thank you all for your service.

Admiral Syring, based on the current and anticipated threat to the Homeland, how would you prioritize where to locate additional sensor capabilities to enhance the GMD system?

Admiral SYRING. Sir, we have an ongoing AOA [Analysis of Alternatives] in the Department that is looking around the world on exactly that question. We will look at areas like Hawaii. We will look at areas like the east coast or the Atlantic region has gaps that we see in the future based on where the threat goes with both Iran and North Korea. But I have testified to this committee that sensoring is where we need to be, and certainly there are gaps not in tracking and classification, but where I see the need for discrimination in the future against the much more complex threat that may come.

Senator DONNELLY. Thank you.

Admiral Gortney, in regards to the prioritization in this area, how do you see the threat picture and where do you see the necessity for this?

Admiral GORTNEY. I am completely in line with my shipmate on the other end of the table. You know, we need to make that which we have the best we can possibly make it. We need improvements in our sensors. We need to continue to test so that we have confidence in our weapon system, that the operators have confidence in their weapon system, and our leadership has confidence in the weapon system. Then we need to make those necessary investments to get us on the correct side of the cost curve so that we get the best value for it, not just the very expensive midcourse solution. That is where MDA is moving, and we appreciate your support on that.

Senator DONNELLY. Admiral Gortney, in your view why is it important that NORTHCOM have the responsibility for providing ballistic missile defense for our country?

Admiral GORTNEY. Because I am assigned as the commander to defend the Homeland, and with that, that comes with the job.

Senator DONNELLY. Okay.

Secretary McKeon and Admiral Syring, over the past 10 years we have made significant investments in United States-Israeli cooperative missile defense programs, including Iron Dome, David's Sling, Arrow. I was in Israel last month to review a number of these, and I was wondering—and we will start with you, Secretary McKeon—how you assess the importance of these programs and what benefits we gain from our cooperation with Israel on these systems.

Admiral SYRING. Senator Donnelly, our cooperation with Israel is part and parcel of a very broad and deep security relationship with the state of Israel, and our administration, like many before it, has stood with Israel in providing the necessary security assistance so that it can protect itself against—in a pretty dangerous neighborhood.

With the R&D work that we do together with them, we obviously get some benefit that I think Admiral Syring can speak to in a little bit more detail. But we think it has been essential—our cooperation with them, and we have seen the success of the Iron Dome in some recent conflicts that has protected the Israeli people.

Senator DONNELLY. Has it been the concept of this effort with the three different system, in effect, layering? Admiral, if you would just discuss that for a second.

Admiral SYRING. Senator, thank you.

I will just pile on to what the Secretary said. The importance of those systems, the protection of Israel every day just with Iron Dome, and then the fielding soon of David's Sling and then Arrow after that will provide them an umbrella that I think will be unparalleled in the region and absolutely necessary.

We have had a close partnership and relation with them on all their programs with missile defense over the last really—you know, beyond several years, way back to Arrow 2 in terms of the relationship that we have had with Israel and MDA specifically.

I will, if I can, just transfer now to the maturity of the programs. We have worked very closely with them on David's Sling in particular. This is the mid-tier level. They were very successful. We were very successful together in testing last year, and we fully support their readiness for production this year. Arrow 3, which is the exosystem, similar to where we are with that and Aegis in the upper tier, successfully intercepted as well last year. They are progressing at a great pace with high success rates.

What benefit do we get as the United States? We get tremendous benefit. In terms of the Iron Dome procurement dollars that we and you have appropriated, we have asked for and you have appropriated and then added to even, have resulted in significant work share for U.S. companies. Thirtyfive percent of the procurement in 2014, 55 percent of the procurement dollars in 2015 go to U.S. companies. To me that is of great value to them.

We also learn a lot from what they have done in terms of choosing components and the engineering they have done on their interceptors. They have done a fantastic job of achieving good performance.

Senator DONNELLY. Are we picking up tips, in effect——

Admiral SYRING. Yes, sir.

Senator DONNELLY.—of better defense of our country from the challenges they face?

Admiral SYRING. We absolutely are in the regional area and have learned a lot from the performance and the design of their interceptors, which is critically important for why you hear us say we need the technical data package, for example, for David's Sling so we can take that information and use it to our advantage for our systems and our interceptors.

Senator DONNELLY. Thank you.

Thank you, Mr. Chairman.

Senator SESSIONS. Senator Inhofe?

Senator INHOFE. Admiral Syring, I think that is a great answer. I am glad that we are—there are so many people out there and they think that we are just—that Israel is always the beneficiary of everything that goes on. That is not true at all. We have ourselves benefited a great deal, along with where would we be in that part of the world if we did not have Israel? I am glad we are talking about that, and I think it is necessary for all of us to do that continuously.

Senator Donnelly asked the question, Admiral Gortney, about why NORTHCOM—now, your answer is accurate. You said we are assigned that and we will get it done. I think the thrust of his question was there are a lot of options out there to protect the

United States. NORTHCOM is one. Is that the best one? The question was, I think, you know, why NORTHCOM.

Admiral GORTNEY. Because it is attached to a longstanding NORAD mission, which is ITW/AA [Integrated Tactical Warning and Attack Assessment], which is from the Soviet Union days, make a declaration of an attack from the Homeland from an ICBM against, in this case, the Soviet threat. We still make that assessment today and use that architecture to help assess against the rogue nation for the ballistic missile defense of the Homeland.

It nests very well with the headquarters for us to make those assessments and to be able to hold the trigger, and we are manned, trained, and equipped to do it. We do not have the personnel. Soldiers, guardsmen predominantly, run those particular things, but they answer to me for the shot decision.

Senator INHOFE. I was not saying it critically. I just wanted to hear so I can answer the question when I am asked.

Admiral GORTNEY. Yes, sir.

Senator INHOFE. Admiral Gortney, you wrote in your statement that, quote, our potential adversaries are pursuing advanced weapons development not seen in decades. I agree with that. We can go on and quote James Clapper and Admiral Stewart on their assessments of the threat. It is greater than any threat that we have faced before. We have had them countless times in our committee hearing.

But at the last one, when General Stewart ended up assessing the threat that we have, General Stewart called it the new normal. That bothered me when I heard that. I kind of put the interpretation of that on there that do not expect anything better. What is your interpretation of it being the new normal?

Admiral GORTNEY. I think we live in the world we live in, not the world we would like to live in. With return to great power competition, as described by the Secretary, the resurgence of Russia, the evolvement of China, the capabilities that both are developing—in the case of Russia, advanced, very accurate cruise missiles that can be either conventional or nuclear warheads that they have employed conventional from aircraft into Syria and from ships and submarines TLAM [Tomahawk Land Attack Missile]-like weapons from ships and submarines into Syria, when they had no operational or tactical utility on the battlefield, according to General Austin. They were messaging us that they are fielding these capabilities. They are weapons that we have been successfully employing for the last 20–25 years. They see great value in them. It changes the dynamics. Russia today, if they chose—and I think a very low likelihood. Whereas before they developed these weapons for long-range aviation, they had to come into our battle space in order to employ their weapons.

Senator INHOFE. They are catching up or in some areas even passing us. I got the interpretation of that, we better get used to it because that is still happening.

Now, due to the proliferation of technology and the number of countries possessing the ballistic missile capability, it continues to increase.

Admiral GORTNEY. That is correct.

Senator INHOFE. We know that. Yet, while that is increasing, our budget from 2007 to, I think—here, I have got it down here—has declined 14 percent between fiscal year 2008 and 2017. With the threat that is increasing like that, can all of you say that this is adequate? We need to be doing a better job in terms of the budget. That is kind of what we are talking about in this hearing.

Admiral GORTNEY. Clearly, sir. There are tradeoffs between the near-term threat and the long-term threat, current threat, future threat. That is the choices that we have been forced to make given the size of the budget.

Senator INHOFE. We do not need to elaborate on that. I was going to get into something else, but I want to at least do this.

When we were initially starting, the first Obama budget in 2009, it cut missile defense by $1.4 billion. Now, that was when they actually addressed the Czech Republic, which had the radar, and Poland in terms of the equipment. I can remember being with Vaclav Klaus during that time, and I remember prior to that—it would have been the year before this new administration—he said, you know, we are willing to do all this, but if we do, we are taking a lot of risk in terms of alienating even further Russia. He said can you tell me that you are not going to pull the rug out from under you. I said absolutely, and of course, that is what happened.

Now we are looking at a new setup. Now, something had to replace what we had that down for, which was to protect Western Europe and eastern United States, along with increasing from 30 to 44, I understand, ground-based interceptors. What else is being done particularly to take the place of what that was designed to protect at the time before it was pulled away?

Mr. MCKEON. Senator Inhofe, you are correct that that decision was made in 2009, but the context was that we were seeing that the Iranian ICBM threat had not materialized in the way that people had anticipated. The near-term threat to Europe and our European partners and our deployed forces was an expansion of their medium-range ballistic missile programs.

Secretary Gates has spoken to some of this in his book, his own skepticism that the Czechs and the Pols were going to be able to—at least the Czechs—carry it forward in their own government. We replaced it, as you know, with the European phased adaptive approach with a radar in Turkey, some ships that are home-ported in Rota, Spain, and then two Aegis Ashore sites, one in Romania and one in Poland. The one in Romania, as Admiral Syring said, is essentially technically capable and will be fully operational this year, and the site in Poland we are going to break ground on. We have kept the commitment that we made to our European partners.

Senator INHOFE. Mr. Secretary, my time has expired some time ago. I am not going to ask you a question except for the record from the three uniforms that are here. Do you feel that we adequately replaced what we were attempting to do before the change was made in Poland and the Czech Republic? For the record, all right? Later, not now.

Senator INHOFE. Thank you, Mr. Chairman.

Senator SESSIONS. Senator Heinrich?

Senator HEINRICH. Thank you, Mr. Chair.

Admiral Syring, to follow up on the question from Senator Donnelly and talk a little bit more about our efforts with our partner in Israel, we have made significant investments to protect our ally Israel from ballistic missile threats in the region. When you look back at the last decade, I think our contribution has been over $3 billion to those efforts.

I was very pleased to see a co-production agreement signed for Iron Dome. That is allowing American companies here in the U.S. to help manufacture that very important capability. I was wondering what the status is of the co-production arrangement on Iron Dome and what progress might be being made to potentially co-produce other systems in the future, for example, David's Sling.

Admiral SYRING. The co-production agreement is in place with Iron Dome, and we are achieving the savings that were laid out in that agreement. I am confident that any additional dollars like the Iron Dome request that we have this year and 2017 will follow that agreement.

David's Sling is—those negotiations and drafts are ongoing, discussions ongoing with Israel. Our objective is to achieve the similar outcome with Iron Dome production.

Senator HEINRICH. Great. Glad to hear that.

Admiral SYRING. I am sorry. With David's Sling production. Correction.

Senator HEINRICH. I understood what you meant, not what you said.

Moving on to another issue that I know that Senator Inhofe cares a lot about—I do as well—directed energy. Last year, we saw the appropriators cut technology maturation funding to MDA, effectively delaying further progress of a laser demonstrator which would have finally gotten the work out of the lab and into flight test of that technology. How important is it that that funding be restored in this upcoming year's appropriations?

Admiral SYRING. Sir, the critical issue that I have spoken privately and publicly to members about over the last few months is the support for that demonstration. The ability for us to get a low-power laser at, we are thinking, in the 100-kilowatt range up at altitude to prove the coherency and the physics part of the problem, as you are well aware, and to see if there is a feasible design, a feasible material solution for a boost phase intercept capability.

We are asking for $278 million, if you look at the out-year budget, for that demonstrator between now and 2021. We are not asking for a $5.5 billion airborne laser program. We are asking for a prototype to go prove the feasibility to give confidence to the warfighter that they believe it is feasible and to the Department that we believe it is fiscally affordable.

Senator HEINRICH. Well, I think as we see the ballistic missile threats that we have all heard talked about here today, multiply the number of potential missiles that we could face either in theater or intercontinentally continue to increase, I think it is going to be more and more important that we look at long-term solutions that are actual game-changers like directed energy to solve some of those issues.

Admiral SYRING. I agree, sir.

Senator HEINRICH. One last question. This can be either for Admiral Gortney or you, Admiral Syring. Two of our foremost military leaders, former Chief of Naval Operations, Admiral Greenert, former Army Chief of Staff, General Odierno, said in a memo that our missile defense strategy was, quote/unquote, unsustainable and that ballistic missile threats, quote, continue to outpace our Active defense systems, unquote.

Do you agree with that assessment? What do you make of it? What needs to either change or what has changed in our capabilities, if you do not agree with that?

Admiral GORTNEY. Senator, I was in the meeting that generated that particular article. At the time, I was the force provider for the United States Navy at Fleet Forces Command down in Norfolk.

The fundamental issue is because of our current strategy, we are wearing out our Patriot, soon to be THAAD, and our Aegis capable platforms, low-density, high-demand. The threat is increasing, and we are on an unaffordable path. Very expensive rockets to shoot down maybe not so expensive rockets. That is why the necessary investments, the laser being one of those, to get us on the correct side of the cost curve, not just relying on midcourse kinetic engagement. The whole trying to knock down the threats throughout the entire spectrum is absolutely critical.

Senator HEINRICH. That is very helpful. Thank you very much.

Senator SESSIONS. Senator Fischer?

Senator FISCHER. Thank you, Mr. Chairman.

If I could follow up a little on what the Senator was just asking about specifically with the R&D [research and development]. As we look at the R&D budget, it continues to decrease. Yet, I think all of us realize the need we have for these capabilities in the future. If you are going to look long-term, the next 20 years, we are going to need these capabilities. Yet, we continue to cut back on that R&D budget.

Admiral Syring, I would ask you how do we get on the right side of this? You are saying, well, it is in the budget for this. It is in the budget for that. But looking ahead 20 years, you and I both have to say it is not in the budget. What do you propose to us? Do we stay headed in this direction? How much do you really need?

Admiral SYRING. Ma'am, it is a great question. If I can, can I point back to the chart that the chairman showed on MDA top line?

Senator FISCHER. Of course.

Admiral SYRING. I came into this job in fiscal year 2012/fiscal year 2013 time frame. I have been here almost four years now.

If I can just talk about what—let us lift up just a second, if we can, in terms of what the R&D is being budgeted to and requested for and what we are not doing. I think that is the point, Mr. Chairman, of what you are after here in this discussion, if I may.

We came in and everybody knows the sequestration reduction that happened, and that is annotated on the chart. But what is not shown on the chart in words here is that we made the decision in the 2013 time frame to pivot back to the GMD program and increase the capacity and capability really of that program that had already been fielded several years before. The investment here that you see ramping up over these years, ma'am, is to that point in

terms of improving the GMD reliability, getting the radar going in Alaska, improving our discrimination capability, and redesigning the kill vehicle, which we are not satisfied with its reliability today. That is that increase of capability here.

There was a big, nonrecurring investment actually in 2016 to add money into the GMD program that had been cut from before. I think I have talked to you about this in the past in terms of modeling, reliability, stockpile reliability programs, things like that that needed to be done to increase the warfighters' confidence in the system. All of that got going in 2016.

Now let us go to 2017. We actually requested in 2016 $7.8 billion. When the budget agreement was signed late last year, the Department was shorted—not short—it was down $22 billion from the top line. My share of that was $300 million. That is why you see a request of 7.5.

Ma'am, if I can just make the point. The last point is, okay, what are you not doing? I am continuing essentially four new start programs here under this top line and will field them in 2020. Now, does that mean that we are done? Absolutely not. There are gaps in the system still with radars, sensors, directed energy, R&D programs that we are trying to feed at a much lower level of funding to go prove whether they are feasible or not. I think once we prove that, you will see a ramp-up in the request for R&D if we can make the case that it is feasible and affordable.

It is a much different way of looking at it, as let us go prove it first and prove to the warfighter, prove to the community, prove to the Department that it can be done, prove to you that it is feasible before we come forward with a big R&D program. There was not one POM 18 [Program Objective Memorandum] issue, meaning above the line, that I—I am sorry—POM 17 issue above the line that I submitted to the Department. Not one. To me, that is us being good stewards of the taxpayer dollar and being careful on how far we lean into advanced technology if it is truly not ready to go.

Senator FISCHER. As we look at our adversaries, if we look at China, if we look at Russia and the arsenals that they have, if we look at the developing capabilities of the Iranians and the North Koreans, how are we going to stack up against them when we look out in 20 years?

Admiral SYRING. Do you want me to take that or maybe Admiral Gortney from the warfighter standpoint?

Senator FISCHER. That would be good. Admiral Gortney?

Admiral GORTNEY. We are designed against the rogue nation right now, ma'am, limited capability against North Korea today, Iran, should Iran have the capability today. That is what we are designed against. I see the investments designed to outpace that particular threat. It is not targeted at Russia. It is not targeted to China.

Senator FISCHER. Should it be?

Admiral GORTNEY. I will defer to the policy——

Senator FISCHER. I knew you would say that. Thank you, sir.

I see my time is up. Thank you, Mr. Chairman.

Senator SESSIONS. Thank you. Good questions.

Let us see. It is now Senator Manchin.

Senator MANCHIN. Thank you, Mr. Chairman.

I thank all of you for your service and thank you for being here.

To General Mann, I am a strong supporter of the National Guard and its versatile role in supporting national Homeland security especially in the area of missile defense. Knowing that one of your responsibilities is missile defense, what is your assessment of the National Guard's performance in the missile defense operations for the Pacific theater? How are they performing?

General MANN. Sir, you are referring to Fort Greely and from Vandenberg, the GBI support that we are providing?

Senator MANCHIN. Correct.

General MANN. Quite frankly, I am extremely pleased. Those soldiers who have been doing that mission now for many, many years are extremely competent and confident. They take this mission very, very seriously. Quite frankly, when we talk about the ground-based midcourse defense program, that is different from THAAD and Patriot. That is a unique system.

Senator MANCHIN. Right.

General MANN. They bring to the table a unique skill set that they have been able to develop over time, and they are constantly raising the bar in terms of the level of sophistication, the difficulty of the scenarios that they train against every day. I am very, very pleased with what the National Guard is doing.

I would also like to say that we are very, very pleased with the way the National Guard is supporting a lot of other activities in terms of air missile defense over in Europe, a lot of different rotations, training rotations that are taking place over there, as well as throughout the Pacific. I am very, very pleased with them.

Senator MANCHIN. I would follow up by saying what is your assessment of the future missile defense needs for the east coast.

General MANN. I agree with Admiral Syring very clearly that I think what is really key is that we maintain a level of predictability in terms of our resources, whether it is this administration or going into the future. I think the level of predictability is extremely important and making sure that we maximize that current capability.

It is more than just how many arrows that we have in our quiver. It really is, at the end of the day, making sure that we maximize current capabilities, increasing the reliability of those current capabilities as we look into the future. The sensor piece is critically important to making sure that the numbers that we have, 30 going to 44 GBIs, that we maximize that capability to the fullest extent possible. That is what that sensor will do for us.

Senator MANCHIN. Admiral Gortney, you previously assessed that North Korea has the ability to miniaturize a nuclear weapon and put it in a KN08, intercontinental ballistic missile, and shoot it to the Homeland.

Based on recent reporting, the South Korean government has assessed that North Korea is capable also of mounting a nuclear warhead on a medium-range Rodong ballistic missile, which could reach all South Korea and most of Japan. Do you share the South Korean government's views on North Korea's capabilities?

Admiral GORTNEY. Yes, sir, I do.

Senator MANCHIN. That is a threat that you said that we are prepared to deal with?

Admiral GORTNEY. That is correct. Yes, sir, it is.

I would also like to reinforce the General's comment about the great work that the Guard are doing in defense of the mission and also the guardsmen who are protecting up at Fort Greely. It is the Puerto Rican National Guard that has the security force up there.

Senator MANCHIN. Are you constricted at all by using the Guard or asking for that Guard to——

Admiral GORTNEY. No, sir. We have worked through those authorities. It works seamless.

Senator MANCHIN. It is all seamless now?

Admiral GORTNEY. Yes, sir.

Senator MANCHIN. Thank you. That is all my questions.

Senator SESSIONS. Senator Sullivan?

Senator SULLIVAN. Thank you, Mr. Chair.

Gentlemen, thank you for all the hard work that you are doing for our Nation.

Admiral Gortney, I just want to follow up and commend you on the way you are laying out the threat with regard to North Korea. You mentioned low probability with regard to the ability to miniaturize a nuclear weapon and hit the continental United States. But it is prudent and smart to make to sure that as the warfighter, you are ready.

Let me ask two questions on that. Is it low probability to be able to range Alaska or Hawaii, or is it a higher probability from the threat assessment? Do you know if there is a difference there?

Admiral GORTNEY. We do not treat it any differently. They are all States. I am accountable to defend them, and we have the ability to defend them.

Senator SULLIVAN. Great. I am glad that we do not treat the noncontiguous States different from the lower 48 States.

But you mentioned the low probability right now. But in your assessment that is unlikely to stay low. Is that not correct? It seems like almost every day we are seeing a news story about ICBM engines and other things being developed. Is it not prudent to assume that that low probability is going to morph into moderate or maybe even high within the next 5 to 10 years?

Admiral GORTNEY. Yes, sir. The reason the intel community assesses this as low probability of success is they have not seen the tests occurring. However, as the Secretary talked about, the TD–2 shows that they have the capability. You put that capability with a road-mobile capability with the right engines with designing a reentry vehicle with a nuclear weapon and a miniaturization, it is only a matter of time before they put it together. That is why we watch their test efforts so closely because although they have not done the end-to-end test, which we would do, they may not be compelled to wait for that end-to-end test.

Senator SULLIVAN. Let me ask actually, since you brought up the issue of testing, with regard to the GMD, Admiral Syring, General Mann. In your testimony, you actually emphasized the importance of testing our system. How often do we test our system, and what are the benefits? Do we need to budget more resources to testing our system?

Admiral SYRING. Sir, we are on about an annual test cadence, and that can be 10 months. That could be 14 or 15 months depending when the range is available and when it fits in. More importantly, when do we need to test to field a capability? A GMD test is very expensive, very intrusive. We take up the entire Pacific with the targets that we need to launch and the interceptor that is launched from Vandenberg. We are testing at a rate that——

Senator SULLIVAN. Given importance, though, I think most Americans would recognize that a little bit of inconvenience in that regard is okay.

Admiral SYRING. Yes, sir, and they do. We are never hindered by that.

But there is a lot of engineering and analysis that you do before a test, and then you execute the test and then there is post-analysis.

The test sequence and cadence that we have in our test plan that will be signed and has been signed in the past by me and Dr. Gilmore has this very detailed mapping to what requirements do we need to test and when. We will test against an ICBM this year. We will actually salvo test against an ICBM next year, and then we will start testing the new kill vehicle in a controlled flight and then an intercept flight the following year. Given the development that is going on specifically with RKV, we are absolutely at the right cadence for that testing between now and 2020.

Senator SULLIVAN. Do you agree with that, General Mann?

General MANN. Yes, Senator. We work very, very closely with MDA. In fact, the master test plan is coordinated with all the services to make sure that we are in agreement. We feel that the test cadence right now is appropriate. I would like to commend MDA for the fact that we are really looking at opportunities where we can test out multiple platforms, whether it is Aegis or THAAD or Patriot. There is a lot of very, very close coordination that goes on between the services, as well as with MDA.

Senator SULLIVAN. Thank you.

Admiral Syring, you know, I have often talked about my state being the cornerstone of America's missile defense. I know you were recently up in Alaska, and I apologize for not having the opportunity to accompany you. But I am wondering if you could provide any insights or observations from your time at Clear and Fort Greely and some other locations. I would love to, in another setting, get a download from you on your trip. But any that you care to offer the committee and educate all of us on Alaska would be welcome right now.

Admiral SYRING. Yes, sir. We went to all three. We went to three areas. We went to Kodiak. We went to Clear and we went to Fort Greely. I talked to the community about the radar that is coming to Clear, which will be fielded by 2020, took their questions. Very supportive of what we are doing.

But more importantly for me and the military and Admiral Gortney is the strategic importance of that radar in the middle of the state and what it will provide him in the future for this discrimination capability that is absolutely required to stay ahead and keep our advantage against the threat that we see coming. The strategic location of Alaska is why we are there. Very important.

I think General Mann talked about Fort Greely. I am a material developer, support part of that with Admiral Gortney and General Mann. Great work going on there.

Then finally, down at Kodiak we visited the range facility down there for future test opportunities that we might see coming and is there a way to more affordably test in the future there, for example.

Senator SULLIVAN. Thank you.

Thank you, Mr. Chairman.

Senator SESSIONS. Thank you.

Very briefly, Admiral Syring, for Senator Sullivan's benefit perhaps, but why is geographically Alaska a special place for missile defense?

Admiral SYRING. Sir, I will try to keep it unclassified, if I can. I will get kicked under the table. But the trajectories that we are concerned about make it an ideal spot for the threats to Alaska and to the United States and to Hawaii.

Senator SESSIONS. Thank you.

Senator King?

Senator KING. Thank you, Mr. Chairman.

Admiral Syring and perhaps for the Secretary as well, would we be adding capabilities that would be significant by deploying THAAD in South Korea and/or Aegis? Mr. Secretary, the policy implication is how would China react to such?

Mr. MCKEON. Senator King, as I think you probably know, we have announced that we have opened consultations with our Korean partners about deploying THAAD to the peninsula. We will engage in discussions about a possible site before we reach an announcement. The purpose of the THAAD battery would be to protect our deployed forces in Korea and our partners in Korea. It is not about China. It is not a threat to China, and we have made that plain to them and offered to explain it to them.

Senator KING. Have we had any reaction from China?

Mr. MCKEON. They are not happy about it, but we have tried to reinforce the point that it is not about them. It is about our deployed forces.

Senator KING. I wanted to go back. We have talked about directed energy. I am really disappointed that that seems to be falling off the budget table when to me it is pennywise and pound foolish. Directed energy would be a lot cheaper, if it works, than sending a rocket up every time. You are nodding.

Admiral SYRING. We have been trying to get the directed energy program ramped up in past budget requests, and I just ask for the support this year.

Senator KING. Well, you will certainly have it from myself and I think others because that is the next technological development, and it would be a lot less expensive and perhaps even more effective.

What about sensors? When we have had these meetings before, that has been a high priority. Is that on track? Do we have sufficient sensor technology, and is it placed in the right place? Is that something that needs to be upgraded?

Admiral SYRING. The first step in that discussion was what we did in Alaska, Senator, in terms of your support for that and that

radar and its strategic importance for the threat from North Korea and a much more complex threat than they even have today that we are planning for.

There are other gaps in the sensor architecture that we are looking at, and the Department has looked at many different alternatives for both radar sensor locations and space sensor options. It is both radars and space that will be required for the future.

Senator KING. I cannot help but notice. The reason I was late to this hearing, we had a Seapower Subcommittee going on in the next room where I am sure if Senator Wicker were here, he would also want to point out that the Aegis is one of the key elements of this whole system, which happen to be—we are very proud—built in Maine and Mississippi. Do you see more deployment of the Aegis Ashore capabilities, or where does that stand? We are sort of testing it in several places. Is that right, Mr. Secretary?

Mr. MCKEON. Senator, we have just completed the site for Aegis Ashore in Deveselu, Romania, and that will be operational later this year. We are going to break ground in Poland and finish that by the end of 2018. We do not have any other plans or requirements for Aegis Ashore at the moment, nor have we had any requests for it from foreign partners.

Senator KING. But it is a nice capability.

Mr. MCKEON. It is a nice capability and it is advancing. We will put a more advanced missile in the site in Poland that is still under co-development with our partners in the Government of Japan.

Senator KING. You mentioned the Government of Japan and Poland. How are our allies contributing to this process, much of which is designed to defend them? Are we getting cooperation and money from our allies on these systems?

Mr. MCKEON. Well, in Japan, they are investing quite a bit on the co-development of the standard missile 3–2-A, and they have got their own Aegis capable ships. We have put a couple of radars there, the TPY–2 radars. In Europe, Romania and Poland are, obviously, offering and contributing the sites. Turkey is hosting a TPY–2 radar. The Spanish Government is hosting our Aegis BMD ships in Rota. Then other governments are contributing in different ways. The French have their own system. Other NATO partners have Patriots and have deployed them in Turkey. I cannot say that all 28 NATO partners are contributing to NATO missile defense, but many of them are.

Senator KING. Admiral Syring, I could not hear the full exchange with Senator Heinrich. Is the Iron Dome completely built here or is it partially? What is the deal with Israel on Iron Dome and David's Sling?

Admiral SYRING. The co-production agreement had 35 percent work share for the United States in fiscal year 2014 and 55 percent in 2015.

Senator KING. A growing share of the work is to be done here.

Admiral SYRING. That is correct, sir.

Senator KING. That system has been effective. Has it not?

Admiral SYRING. Very effective. I will not go to the percentage, but very effective.

Senator KING. Yes. I had a son in Israel during the war two summers ago, and I appreciate the effectiveness. He was in Ashkelon right adjacent to where those rockets were coming from. I know from his observation that it was an effective system. I congratulate you and thank you for that.

Admiral SYRING. Yes, sir. As will David's Sling and Arrow as well, the follow-on systems after Iron Dome. Their testing has been extremely successful.

Senator KING. Is it fair to say that we are gaining important insights and experience from that relationship on those weapon systems?

Admiral SYRING. Yes, sir, absolutely, not just the weapon interceptor itself, but we have learned a lot on what they are doing with targets as well.

Senator KING. Thank you, Mr. Chairman.

Senator SESSIONS. Thank you, Senator King.

On the Israel question, what was the President's request this year? What did we do last year? How many million? What was the President's request this year and the President's request last year?

Admiral SYRING. Sir, I will talk about numbers I think from the top of my head. I asked for—if I am not right, I will correct it for the record. But last year, it was roughly $150 million we requested. What was appropriated and enacted was $488 million.

This year, we requested just under $150 million, and there are requests on the Hill that total almost $600 million.

Senator SESSIONS. Well, that is quite a contribution to the effort. I hope we are working together to gain benefit from that. I know we are some.

With regard to the question of—Secretary McKeon, I think it was a good question about contributions of Japan. They have got a big economy. The European economy is bigger than ours, and their population is bigger than ours. In Rota, Spain, they host our ships but it is quite an advantage to them economically. I would like to have that fort in Alabama. It would be good for our economy.

There is no doubt about it. There is a growing feeling that our allies need to contribute more to the mutual defense of what used to be called, I guess, the free world. How do you think about that?

Mr. MCKEON. Senator, in a broad sense, we certainly agree with you. Our NATO partners have made new commitments to increase their defense spending at the Wales Summit in 2014 and set targets on both percentage of GDP [Gross Domestic Product] that they are supposed to try to hit and investments in R&D. Many of them are lagging. That is a fact. I am not going to try to sugar-coat it. There is only a handful that have reached the two percent of GDP target. The important thing is the trend lines are going in the right direction in terms of NATO spending by countries, although the financial stress is hitting many of them because different countries, particularly in southern Europe, have been undergoing significant economic disruption like Greece and Italy.

I should have also said in response to Senator King's question, there are a lot of countries in the Middle East that are investing in missile defense, the Saudis, the Emiratis, the Kuwaitis. They are doing their share in contributing to the regional missile defense. We are working to try to encourage both them acquiring sys-

tems but also cooperating together, and that will be the topic of a meeting next week in the Middle East. The President is convening a second round of what he called the Camp David Summit last year. Secretary Carter will have a meeting with his counterparts the day before, and missile defense will be one of the issues on the docket.

Senator SESSIONS. Well, just to summarize that, we have heard this song before. When I have asked questions for the last decade and others have, they say the Europeans are getting better and they are going to do better. But basically the trend line has been negative. Germany is at 1.1 percent I think of GDP. They have the strongest economy in Europe. It is a very problematic thing.

It goes beyond even money. It goes beyond how do you have a right to demand that we defend Europe when Russia is not on our border? You want us to pay two-three times as much as you do.

Anyway, we have discussed that with the NATO leader last week, and I thought it was a healthy discussion and exchange. But it is not a little matter, and it is not going to go away anytime soon.

Let me ask you maybe, Admiral Syring—any others that would like to comment. The President's budget includes money to build a long-range discrimination radar in Alaska.

The Missile Defense Agency analyst also concludes that, quote, additional missile defense sensor discrimination capabilities are needed to enhance the protection of the United States Homeland against the potential long-range ballistic missiles from Iran. Close quote.

Congress in 2016 directed deployment by December 31st, 2020 of a long-range discrimination radar or other appropriate sensor to support the defense of the Homeland against Iran. That is in a mandate.

While MDA is examining locations best suited for future deployment of this advanced discrimination radar, there is no funding in that whole five-year spending plan budgeted for such a development and deployment, nor has Congress received a plan from MDA to meet the deployment deadline as directed in section 1684 of the act.

The administration opposed an east coast ground-based interceptor site, and we had a big discussion about that and acquiesced in that determination. I think it was your recommendation we did not need another site. But we did, I think, agree that we needed an increased discrimination on the east. If we need it for Alaska, do we not need it for the east coast?

How would you respond to that?

Admiral SYRING. Sir, I will respond that we are, obviously, very well aware of language that came in the NDAA [National Defense Authorization Act] last year. We have started the work on siting and looking at the options in terms of where SBX [Sea-based X Band Radar], for example, can be home-ported. In the follow-on analysis, where are the sites on the east coast that could help in terms of sensor capability? Sir, that work is going on in parallel with the Department's work that has gone on the sensor AOA [Analysis of Alternatives] worldwide, and I can tell you this point

of what are we going to do with an Atlantic radar is part of that discussion.

It is true today that there is no money in the 2017 budget, but I think you will see the Department come through this question before 2018 comes over on what are we going to do to meet the intent of the language to include a discussion, sir—I will let Admiral Gortney jump in here—on what is his ability to surge SBX if the Iranian threat did escalate.

Senator SESSIONS. It is problematic that there is no money in the whole five-year plan. Admiral Gortney?

Admiral GORTNEY. Yes, sir. We have the ability to move SBX if we need it. But the higher priority right——

Senator SESSIONS. Now, the move of SBX—this is not the Alaska——

Admiral GORTNEY. No, sir.

Senator SESSIONS. This will be a new system. This will be the one that was in Hawaii.

Admiral GORTNEY. This is what is on a very large oil platform that was built in Texas and we moved on a heavy-lift ship to Hawaii. Should we need, if the threat demanded that we needed a site before the study is completed and we put a site in, we would be able to maneuver—move SBX to the other coast. But right now, the priority is to keep it where it is focused on North Korea today.

Senator SESSIONS. Senator King, you wanted to follow up.

Senator KING. Yes. We have learned in hearings over the past year of a growing anti-satellite capability. I guess the question I wanted to ask is to what extent do all these systems rely upon satellites because in a war or a hostility situation, one of the first things that is going to happen is there is going to be a diminution of our satellite capability. You understand the question is if satellite capability is compromised, does that compromise the underlying effectiveness of these various systems or are there alternatives? Admiral Gortney, do you want to take a crack at that?

Admiral GORTNEY. Sir, I am afraid to do it in this forum. I need to come to you in a classified forum and talk to that.

Senator KING. That is fine. Thank you.

Mr. MCKEON. Senator King, the one thing I would say about that is, as you may recall, in last year's budget we significantly increased our investment in protection of our satellites and other investments in the space domain. We are very focused—the Secretary and the Deputy—in a big way about these investments, and we have sustained them in fiscal year 2017. We are well aware of the issues that you are raising and making the right investments for it.

Senator KING. I am aware of what you are talking about. I just want to be sure—for want of a nail, the shoe was lost. For want of a shoe, the horse was lost. You know where that ends. We will discuss that in another setting. Thank you.

Senator SESSIONS. Thank you, Senator King. I think that is critical.

I believe we have got Senator Donnelly and Sullivan. We will not go in a full round, just ask questions as you feel appropriate.

Senator DONNELLY. Two real quick questions.

Admiral Syring, are you comfortable with the level of risk MDA is balancing in order to meet deadlines set in law for programs like MOKV [Multi-Object Kill Vehicle] or an additional sensor to deploy off the east coast?

Admiral SYRING. Sir, an MOKV—we are putting those gates together in terms of where do we think the knowledge points are over the next year to prove where we need to be for a full program. We do not have a full program requested for an MOKV yet. Until I work through that and see where the companies are at level of maturity over the next 12 to 18 months, that will help me get my mind around when are we ready and what is the schedule for it.

Senator DONNELLY. Then lastly, Admiral Gortney, when I talked to the Chinese, they talked about how little influence they have over North Korea, that it seems to be getting less in their mind. I am wondering how much of that is fluff and how much of that is real. I was wondering if you could fill us in a little bit.

Admiral GORTNEY. I think it is safe to say that the influence that China used to have they no longer have with the current leader. At this level, I would like to leave it at that.

Senator DONNELLY. Thank you.

Senator SESSIONS. Senator Sullivan?

Senator SULLIVAN. Thank you, Mr. Chair. Just two quick follow-up questions.

One is kind of a broader on really education for the committee and those watching. We talk a lot in acronyms and technology.

Admiral Syring or Admiral Gortney, can you describe, particularly given the North Korean evolving threat and even the [ICBM] intercontinental ballistic missile pursued by the Iranians, why the LRDR [Long Range Discrimination Radar] makes sense and why that is so important strategically for the country, what that is doing in really kind of a follow-up to the chairman's question on that issue? That is one.

Then I will ask a final one after that.

Admiral GORTNEY. It is absolutely critical, and it is why Admiral Syring's investments in sensors is so important. One of the ways we are going to achieve getting on the correct side of the cost curve is to drive our effectiveness up. With better sensor discrimination, I may have the ability to shoot fewer missiles, or as the threat evolves, I will have a better idea to discriminate what the threat is doing, what a maneuvering warhead is doing to then drive the probability of kill of our existing warheads. You cannot kill what you cannot see, and we need to see better.

Senator SULLIVAN. It drives up our ability to kill any incoming missile?

Admiral SYRING. Both simple and complex.

Senator SULLIVAN. Looking at the budget request, from what I can see, there seems to be about a $74 million shortfall in the BMD midcourse defense account where last year, the President's budget was expected and where PB–17 is today. Am I reading that correctly? If so, what accounts for that shortfall?

Admiral SYRING. The request was down slightly from last year from what we were expecting in 2017. Part of that was driven by part of the share of the $300 million cut that flowed down. It took part of that in that line.

Also, I would say, sir, there were refined estimates from the companies on what it would take to do what they are going to do. Obviously, we do not do 100 percent of everything that is offered. This is a matter of what do we need to do to do the mission-critical work that is important for the program.

Senator SULLIVAN. That budget shortfall is not something that you or we as the oversight committee should be concerned about?

Admiral SYRING. No, sir. We and you have adequately funded the GMD program with a big nonrecurring spike last year, and all of those efforts are ongoing this year. I am comfortable with where we are.

Senator SULLIVAN. Thank you, Mr. Chairman.

Senator SESSIONS. Mr. Secretary, so the first chart again shows a 14 percent overall decline in funding for MDA.

If you will put back the second chart there. This chart reflects an additional troubling trend in that in 2008, 98–99 percent of the budget went to R&D, whereas in 2016, that number had dropped—2015 it went up a little in 2016 and begins to drop again in the five-year submission we got this year. It dropped down to 19 to a little over $5 billion there, which is a little more than half. You drop about 40–45 percent of your R&D spending.

Tell us what is happening. First of all, MDA originally, Admiral Syring, was not designed to be a procurement agency. It was designed to produce the technology that would be paid for by the services who would use it. Is that correct?

Admiral SYRING. That is correct.

Senator SESSIONS. Now you are purchasing some of it.

What I had not ascertained fully was a lot of that is coming out of your R&D budget. That is a pretty troubling thing. What does that put us on track for for the next several years, the next five years?

Admiral SYRING. Mr. Chairman, I was just thinking the answer. Let me just provide, I think, some context because I have studied the exact problem in terms of we are absolutely spending more on procurement than R&D, and there is certainly much less than there used to be.

What I have done, for historical context, is gone back and looked at the 2005–2010 time frame when everything in MDA was R&D, including the fielding of the entire ground-based midcourse defense system. What we have done with that and Aegis in particular is done the R&D and now shifted those to procurement. That is why you see——

Senator SESSIONS. Now you would say that you probably incorrectly included the deployment on the system in Alaska as R&D when it really was procurement?

Admiral SYRING. Sir, I was not here. We had a mandate and had the charter to deliver capability as soon as possible from the President to get this in the ground at light speed.

Senator SESSIONS. I remember that. The deal was, Senator Sullivan, that North Korea proposed a threat, and we decided to accelerate the process to actually get these things in the ground. We believed they would work and we would prove it as time went by. I think it would have worked had we had to use it at that time. I think it is probably more effective today than then.

But anyway, so how do you explain this now?

Admiral SYRING. There was also a big airborne laser program in that R&D as well that never fielded. It did its mission. It proved that we could shoot down a ballistic missile with a laser. But that did not become a program. That was R&D.

There are some big drivers here in terms of where that R&D went prior to when you start seeing the blue. What you see here is you see us finishing the design, finishing the testing of the SM–3 and now procuring it quickly because there is a regional combatant commander requirement that they need ships, they need missiles, they need batteries, they need missiles for THAAD. That is what has happened. Certainly the programs that I spoke about are going to be negotiated with the services on when do I transfer—which is the question. When do I transfer these programs to the services similar to what I did with Patriot? That is the question.

General MANN. Senator, I would like to add, speaking for the Army, we are in consultation with MDA on the transfer of some of these different programs just to make sure that MDA is able to get after exactly the emphasis that you alluded to. We are working closely with MDA on how we can transfer some of this, when appropriate, to the Army.

Senator SESSIONS. Briefly before I go to Senator Sullivan, what programs are on track to be transferred from MDA to the Army or other services?

General MANN. Right off the top, THAAD is one of the programs that we are looking at and also——

Senator SESSIONS. THAAD is included in the MDA budget now?

Admiral SYRING. That is correct.

General MANN. Yes, sir. As well as the TPY–2, those sensors that we have globally we are looking at. Right now, some of those are manned by contractors, and as we put in place life support capabilities, we will transfer that to soldier-run. That will also be assumed by the Army.

Senator SESSIONS. Senator Sullivan?

Senator SULLIVAN. Let me just ask one more follow-up question related to the chairman's question. In that chart, very simple, which is should our missile defense budgets be flat or really going down when there is no doubt that the threat is going up. I will pose that to all four of you. It seems to me we have no doubt the threat is increasing. I appreciate what the administration was focused on with kind of a rapid deployment. But right there, you are looking at either a declining budget or at best a flat budget, which does not seem to make sense.

You know, Admiral Gortney, your testimony, which I really appreciate—you were talking about staying in front of the curve. But I am not sure that is staying in front of the curve when we know the threat side is going like this.

Senator SESSIONS. Could I just follow up with that? The fiscal year 2017 MDA budget request is $300 million below what the President anticipated last year in the 2016 5-year budget. This is about $300 million, Secretary McKeon, less I believe than what we anticipated last year would be the President's request.

Admiral Gortney, I will let you answer that question.

Admiral GORTNEY. I am out of my lane a little here since I am lucky enough to only own the trigger.

But I think what you are seeing up there is reluctance of investing dollars against the capability using the current technology that we are using, that even though we are investing in it and we are investing dollars, capability, platforms, burning up OPTEMPO, PERSTEMPO of the low-density, high-demand, it is not able to outpace the threat.

Senator SULLIVAN. But if that were the case, would we not still want an increased budget and maybe have you weighted towards R&D? Right there, that is just all——

Admiral GORTNEY. I am in vehement agreement with you, sir. But I am just trying to explain why I think we are seeing what we are seeing because on our current process, our current strategy, the current technology lacking the R&D investments that MDA is making to see if we can get on the correct side of the cost curve, reliability, better sensors, multi-object kill vehicle, an airborne laser that really works would make those dollars more effective. I am just saying I think reluctance to fund a program correctly, given the technology that we are using. I am not sure if I am articulating it clearly.

General MANN. Senator, if I could just add to this. In addition to new technologies in R&D investments and whatnot, I think it is important that we note that we are also looking at current capabilities and what can we do to maximize the current fleet that we have on the team, whether it is Patriot, the Patriot modernization plan. It is more than just leap-ahead technologies. Yes, we are focused on that, but we are also trying to make sure that we are looking at the current capabilities and how can we make that even more effective. We talked about the sensors, the sensor upgrades, the discrimination side of the equation. I think it is important that we recognize the fact that it is more than just new R&D programs. It is also how can we be more effective with what we have already.

Senator SULLIVAN. Mr. Secretary, Admiral, any final thoughts on a declining or flat budget and a clear, increasing threat?

Mr. MCKEON. I would say a few things, Senator Sullivan.

First, stepping back and looking at the overall DOD budget over the last six to eight years, there has been a decline due to the change in the fiscal environment and the limits of the Budget Control Act [BCA]. I do not know the number off the top of my head, but I think the last budget Secretary Gates submitted around 2011 or 2012 projected an over $600 billion budget for the Pentagon in fiscal year 2016. Our base budget last year was $520 billion.

Senator SULLIVAN. I think there is no doubt that the Congress and the BCA were part of the issue. But I do not think that is what is driving that chart right there.

Mr. MCKEON. Well, sir, in terms of the overall top line, I think across the Department, every program has suffered a little bit because of the BCA limits and we are still staring at them out in the out-years of our current FYDP. You all have given us a couple years of relief under last year's agreement, but in 2018 to 2021, we have got $100 billion in our program that is $100 billion above the BCA limits. We are very worried about that in a broad sense.

Senator SULLIVAN. Some of us are as well too.

Mr. MCKEON. Yes. No, I appreciate that.

Secondly, I would say we are not only thinking about terminal defense of our ground-based midcourse systems or Terminal High Altitude Area Defense [THAAD], as we have talked about, we are looking at new technologies and other capabilities militarily in addition to missile defense to deal with the threat of missiles from either North Korea or Iran. Some of that we would have to talk to you in a different venue about.

Then the last thing on the procurement I would talk about a little is MDA has different procurement authorities to buy things faster than the services. Now, you could obviously give the services acquisition authority for missile defense that would speed things up if we were to shift procurement to the services, but I think part of the reason you see a lot of that procurement that MDA has done is because they have got this faster acquisition authority that was a demand signal from both the President and the Congress.

Admiral SYRING. Senator, I would just reiterate that this is today, and we are into some very important concept studies right now with directed energy in particular and the importance of that demonstrator to get going to inform a much wider, more expansive R&D program. That is one example. MOKV, the multiple-object kill vehicle, is very important for us to get through the next 12 months on feasibility from the contractors, and then the R&D requests will go up. There are things here on the technology side that you will see come. The last one would be a space-based system of some sort to help us with tracking and discrimination worldwide.

There are R&D programs that are not shown here yet that we will, through the Department, work and come forward with as they compete with everything else in the Department. But this is not the end. I do see the R&D requests for the future of MDA ramping up once I am to the point of proposing mature concepts that I know will deliver on time and within the budget that we have.

Sir, I think it is a shift for us in terms of—Mr. Chairman, you made the point of deliver a capability very fast with what we were given back in the 2000–2005 time frame, and we did that. They put interceptors into the ground.

Today I do not—and I endorse entirely the threat on where it is going. At the same time, we as the program executors must be very careful about just throwing money at the problem and must be very deliberate on maturity of the technology and the progression of the system engineering and the architecture and the component testing and analysis that supports a program before I bring it forward and ask for billions of dollars. That is where we are at. It is not decades away, sir. It is in this FYDP that we will be to the point to make the case to the Department and make the case over here on the next technology in many of the areas that we talked about.

Senator SESSIONS. All right. Well, thank you.

One more question on the airborne laser system. Will you have sufficient money this year to do what you would like to do with regard to advancing that program?

Admiral SYRING. Sir, the request that we have on the low-power laser demonstrator, if supported, will get us started down that path to do a competition for that platform in 2017. Then some partner

will win. Two partners will win. We will down-select one eventually, and we will get to a flight in 2020 with a final demonstration in 2021.

Senator SESSIONS. All right.

Thank you very much. It has been an excellent afternoon, and we value your insight and professionalism.

We are adjourned.

[Whereupon, at 4:07 p.m., the hearing was adjourned.]

[Questions for the record with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR JAMES M. INHOFE

DIRECTED ENERGY WEAPONS

1. Senator INHOFE. How can directed energy weapon systems be used to improve our missile defense capabilities?

Mr. MCKEON. The Missile Defense Agency is working to deploy lasers on high altitude, long endurance unmanned aerial vehicles (UAV) to acquire, track, and eventually destroy threat ballistic missiles in boost phase of flight. When successfully demonstrated and fielded, in many operational scenarios, a UAV-borne laser would be able to engage an enemy missile at a much lower cost than existing Ballistic Missile Defense System interceptors.

Admiral GORTNEY. Directed energy weapon systems could help enhance our layered approach to missile defense and increase our overall level of effectiveness. Equally important, these systems could help get us on the right side of the cost curve.

VADM SYRING. MDA's overall vision is to shift the calculus of our potential adversaries by introducing directed energy into the BMDS architecture. This could revolutionize missile defense by dramatically reducing the role of interceptors. Our vision is to add high altitude airborne and/or space-based sensors into the BMDS architecture that can acquire, track, and discriminate ballistic missile targets.

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 fiscal year 2017. The airborne low power laser demonstrator supports demonstrating the concept of a UAV-borne solid state laser in realistic flight environments in the 2021 timeframe capable of acquiring, tracking, and eventually destroying an enemy missile at a lower cost than the existing BMDS.

Additionally, the Agency is exploring two promising high-energy laser candidates for a potential future operational capability—the Diode Pumped Alkali Laser system and the Fiber Combining Laser system—using a system of engineering knowledge points to measure progress. In the 2025 timeframe, our goal is to integrate a compact, efficient, high power laser into a high altitude, long endurance aircraft to engage targets in the boost phase.

LTG MANN. Within a regional theater of operations, a mobile, ground-based high energy laser weapon system capable of acquiring, tracking, and destroying low-cost, highly-proliferated rockets, artillery, and mortars and unmanned aerial systems is a recognized necessary capability. The Army is developing a High Energy Laser Tactical Vehicle Demonstrator that employs precision application of energy to deliver a low-cost-per-kill capability against these common threats. A tactical platform vehicle is being considered for inclusion into the Indirect Fire Protection Capability (IFPC) program.

Regarding intercontinental ballistic missile threats, a directed energy weapon system could provide intercept capabilities during boost phase, while complementing kinetic energy capabilities and potentially reduce the cost of intercepting ballistic missiles. A directed energy weapon system for ballistic missile defense applications will require significantly greater power levels and high altitude platforms. The Missile Defense Agency is pursuing directed energy development activities against long range missile threats.

2. Senator INHOFE. Are current funding levels sufficient to develop and rapidly field these weapons systems in support of our missile defense requirements?

Mr. MCKEON. Yes. In the fiscal year (FY) 2017 Budget, the Missile Defense Agency (MDA) requested $71.8 million in Weapons Technology to continue development

and testing of the high-powered directed-energy program to build the foundation for the next-generation unmanned aerial vehicle (UAV)-borne laser system. In its effort to mature laser technology for missile defense, MDA continues to partner with industry to produce concepts for an airborne low-power laser demonstrator. MDA will use these concepts to guide requirements for the follow-on competitive design contracts in fiscal year 2017 under the Technology Maturation Initiatives program element.

Admiral GORTNEY. It is my understanding that development of directed energy capability remains a priority for the Missile Defense Agency (MDA). MDA is leading this effort and I recommend contacting VADM Syring for a detailed explanation of directed energy capability development and funding plans.

VADM SYRING. MDA's PB17 request provides adequate funding for directed energy weapon research and technology maturation. MDA is working to lay the technological foundation for the next generation laser system integrated into a high-altitude platform capable of defeating advanced threats and raids at a much lower cost per kill than existing missile interceptors. MDA's research and development of directed energy is structured to incrementally demonstrate required components through disciplined technology maturation. It is critical to achieve size, weight and power knowledge points in our laser research and development to inform future investment and planning. Just as importantly, we must work with industry to integrate and test laser systems beam control technology on a high altitude, long endurance airborne platform

LTG MANN. Current funding is sufficient to develop and demonstrate laser weapon technology capabilities to complement kinetic energy capabilities in countering rockets, artillery, and mortars and unmanned aerial systems. The highest visibility effort is the High Energy Laser Tactical Vehicle Demonstrator (HEL TVD). The Army is developing the HEL TVD, a 100 kilowatt-class laser system on a family of Medium Tactical Vehicles to demonstrate the means to defeat these common threats in a cost effective manner. The current funding level in fiscal years 2017–2022 is sufficient to achieve the scheduled fiscal year 2022 HEL TVD demonstration and keeps the Army on path for a scheduled milestone decision in fiscal year 2024.

I defer funding level sufficiency to the Missile Defense Agency regarding their technology development effort for a UAV-borne laser system.

3. Senator INHOFE. Have we set estimated costs and a timeline to fully develop or field this type of weapon system?

Mr. MCKEON. As directed by the fiscal year (FY) 2016 National Defense Authorization Act, section 1680(b), the Missile Defense Agency (MDA) is preparing a report on the funding constraints, schedule aggressiveness, and technical risks of developing a directed energy boost phase intercept capability. They expect to complete their report in the near future.

MDA has requested $71.8 million in the fiscal year 2017 budget in Weapons Technology to continue development and testing of its high-powered directed-energy program to build the foundation for the next-generation unmanned aerial vehicle (UAV)-borne laser system. I defer any further specific questions on this to MDA.

Admiral GORTNEY. I believe the Missile Defense Agency (MDA) is adequately resourced for developing directed energy capabilities. For a detailed explanation of directed energy capability development, to include funding and timelines, I recommend contacting the Missile Defense Agency.

VADM SYRING. The Missile Defense Agency's PB17 request for directed energy includes $278 million over the Future Years Defense Plan (FYDP) to support a low power laser demonstrator for boost phase missile defense. This will result in a fully integrated laser demonstrator capable of engaging a ballistic missile in flight with directed energy. The request also includes $291 million over the FYDP to develop high-powered laser technology that will be needed to achieve size, weight and power levels for a future operationally effective capability. These investments are essential to maturing the needed technology that is required to achieve an operational capability.

LTG MANN. The Army has developed and is executing a program schedule, with specified milestones, to demonstrate a 100 kilowatt tactical laser capability in fiscal year 2022. However, the Army has not yet developed a detailed cost estimate to field a final configuration capability that will best align with the Army's Indirect Fire Protection Capability Increment 2 Block 1 program.

4. Senator INHOFE. I understand these weapons still face technological challenges to include power, beam control, lethality, and platform development. Is the main limiting factor to fielding these weapons funding, technology or something else?

Mr. MCKEON. The main limiting factors to fielding these directed-energy weapons are related to miniaturization of subsystems, specifically power and cooling requirements, while ensuring beam coherence and efficiency. I would defer any further questions on the specifics of this advanced technology development to the Missile Defense Agency.

Admiral GORTNEY. My understanding is there are technological challenges with the directed energy program, primarily in terms of miniaturization of components and power.

VADM SYRING. We assess all of these factors as important. Our strategy to address technology challenges is to divide the system into components and compete different approaches from industry and national laboratories. We will then combine the components into subsystems for testing on the ground first and then in the air. Our PB17 budget submittal reflects our best assessment as to the proper funding levels necessary to move this technology forward. We respectfully request you support for PB17.

LTG MANN. The major limiting factor to fielding directed energy weapons is the present maturity of the technology and the ability to operationalize this capability in support of the warfighter.

BALLISTIC MISSILE THREATS AND DEFENSE

5. Senator INHOFE. Are the threats outpacing our missile defense capability given current and projected budgets?

Mr. MCKEON. The President's fiscal year 2017 budget request continues funding missile defense capabilities to ensure we remain well ahead of adversary ballistic missile threats, and lays the foundation for investment in innovative programs to lower the cost-per-intercept and defeat emerging ballistic missile threats.

With regard to Homeland defense, we continue 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 intercontinental ballistic missile (ICBM) threats as they emerge and evolve. This year's budget request also reflects the 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 for the GBI.

Regarding regional missile defense, DOD's fiscal year (FY) 2017 budget request continues deploying missile defense systems that are tailored to the security circumstances in the Asia-Pacific region, Europe, and the Middle East. Our focus is on developing and fielding missile defense capabilities that are mobile and relocatable, which allow us to address regional crises as they emerge. Patriot, Terminal High-Altitude Air Defense (THAAD), and our Aegis ballistic missile defense (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 and develop interoperable missile defense capabilities. We recognize the need to 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.

Admiral GORTNEY. No, but the ballistic missile threats from North Korea and Iran continue to mature. Both countries have demonstrated progress in their ballistic missile capabilities in recent years, but each country would need to achieve several additional milestones before being capable of fielding a reliable ICBM that could target the United States. I 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.

VADM SYRING. The Missile Defense Agency's (MDA) President's Budget 2017 budget request addresses keeping pace with the current and projected long-range ballistic missile threat from North Korea and Iran. Overall, we continue to work hard to find more cost-effective ways to do the missile defense mission. In regional contexts, 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 reengagement firing strategy, I believe we can reduce the cost per kill. We are also investigating solutions that help reduce reliance on expensive kinetic intercept solutions.

LTG MANN. While the ballistic missile threats continue to evolve and grow more complex, I believe we are postured to defeat the near-term threat. However, the regional threat is becoming more challenging and ubiquitous. Continued and predictable funding to improve interceptor capacity, reliability, and performance; persistent sensor tracking and discrimination; and expansion of Warfighter battlespace are necessary to maintain pace with the threat. Additionally, we need to continually invest in all pillars of missile defense (passive defense, offensive operations, and command & control) to holistically address the evolving ballistic missile threats.

6. Senator INHOFE. Is Iran and North Korea sharing ballistic missile technology?

Mr. MCKEON. As Director of National Intelligence (DNI) Clapper noted in his testimony to the Senate Armed Services Committee (SASC) on February 9, 2016, "North Korea's export of ballistic missiles and associated materials to several countries, including Iran ... illustrate its willingness to proliferate dangerous technologies." I would defer any further questions on the specifics of adversary technology sharing to the Intelligence Community.

Admiral GORTNEY. There is ample evidence that North Korea and Iran have shared ballistic missile technologies in the past. While we believe this relationship continues, the extent of Active cooperation between the two countries' missile programs is unclear.

VADM SYRING. As Director of National Intelligence James Clapper noted in his testimony to the United States Senate Committee on Armed Services on February 9, 2016, "North Korea's export of ballistic missiles and associated materials to several countries, including Iran ... illustrate its willingness to proliferate dangerous technologies." I would defer any further questions on the specifics of adversary technology sharing to the Defense Intelligence Agency.

LTG MANN. Yes, it is the Intelligence Community's assessment that Iran and North Korea have collaborated on missile defense technology. Dating back to the 1980s, Iran and North Korea developed a close working relationship on many ballistic missile programs. During the 1990s, various Intelligence Community assessments continued to note several recurring trends between the two nations. Technical exchanges, as well as the transfer of missile-related components, has significantly supported Iran's ability to become more self-sufficient while improving the quality of their systems. More recent Intelligence Community assessments indicate ballistic missile technology development cooperation between the two countries has continued during recent years.

7. Senator INHOFE. What North Korea and Iran current and projected capability to strike the United States with a conventional ICBM? A nuclear ICBM?

Mr. MCKEON. I would defer questions on the specifics of the Department's assessment of North Korean and Iranian capabilities to the Intelligence Community. I know that Director Clapper provided updates on both North Korea and Iran's ballistic missile capabilities in his statement to the Senate Armed Services Committee on February 9, 2016.

Admiral GORTNEY. North Korea has test-detonated four nuclear devices and, through its space program, has demonstrated many of the technologies required for an ICBM that could target the continental United States. Meanwhile, North Korean military parades have showcased road-mobile ICBMs which, if deployed, could complicate our ability to provide warning of an attack. However, North Korea's road-mobile ICBMs have not been flight-tested and are assessed to have low reliability.

Iran has likewise committed considerable resources to enhancing its ballistic missile capabilities and has begun testing a new booster that could serve as a demonstrator for ICBM technologies. However, we have no reporting to suggest Iran's leaders plan to field that system as a weapon, and we assess Iran is unlikely to deploy an operational ICBM—regardless of payload—until at least 2020.

VADM SYRING. As Director of National Intelligence James Clapper noted in his statement to the United States Senate Committee on Armed Services on February 9, 2016:

"North Korea has also expanded the size and sophistication of its ballistic missile forces—from close-range ballistic missiles to intercontinental ballistic missiles (ICBMs)—and continues to conduct test launches. In May 2015, North Korea claimed that it successfully tested a ballistic missile from a submarine. Pyongyang

is also committed to developing a long-range, nuclear-armed missile that is capable of posing a direct threat to the United States; it has publicly displayed its KN08 road-mobile ICBM on multiple occasions. We assess that North Korea has already taken initial steps toward fielding this system, although the system has not been flight-tested.

We judge that Tehran would choose ballistic missiles as its preferred method of delivering nuclear weapons, if it builds them. Iran's ballistic missiles are inherently capable of delivering WMD, and Tehran already has the largest inventory of ballistic missiles in the Middle East. Iran's progress on space launch vehicles—along with its desire to deter the United States and its allies—provides Tehran with the means and motivation to develop longer-range missiles, including ICBMs."

I would defer any further questions on the specifics of the Department's assessment of North Korean and Iranian capabilities to the Defense Intelligence Agency.

LTG MANN. The Intelligence Community assesses that neither North Korea nor Iran presently possess current capability to reach any portion of the United States with an intercontinental ballistic missile (IBCM). However, as many in the Intelligence and Missile Defense Communities do, I believe that, left unabated, both countries will soon possess the capability to successfully strike the Homeland with a conventional ICBM.

Regarding a nuclear intercontinental ballistic missile, recent claims of successful nuclear tests, the stockpiling of weapons grade fissile materials, and continued ballistic missile development indicate a future North Korean nuclear capability. The Intelligence Community is presently not aware of Iran's intent to develop nuclear weapons.

8. Senator INHOFE. What are we doing to protect our missile defense capabilities against a cyber-attack?

Mr. MCKEON. The Missile Defense Agency (MDA) is very aware of the growing cyber threat to our missile defense capabilities. MDA is working very closely with the Services, Combatant Commands, especially U.S. Strategic Command's U.S. Cyber Command (USCYBERCOM), and other agencies in DOD and the Federal Government to counter this growing threat.

I would defer any other questions on specific efforts MDA is taking with regard to cybersecurity to MDA.

Admiral GORTNEY. My assigned cyber protections teams work close with the Missile Defense Agency to ensure the vulnerabilities to the Ballistic Missile Defense System are identified and mitigated. For specific details on cyber protection, I recommend contacting the Missile Defense Agency.

VADM SYRING. The Missile Defense Agency (MDA) remains cognizant of the growing cyber threat and aggressively works to ensure the Nation's missile defenses are able to operate in a highly contested cyber environment. Key goals are to protect MDA program and technical information for both government and supporting Defense Industrial Base (DIB) networks and systems from our potential adversaries.

MDA has implemented a comprehensive layered cyber defense strategy, which includes key partnering efforts with USSTRATCOM, USCYBERCOM, Multiple National, Service and COCOM Cyber Protect Teams (CPT), Defense Security Service (DSS), JFHQ DODIN, AT&L, FBI and our missile defense industry partners in the Defense Industrial Base. In addition, MDA Co-chairs the Global Missile Defense Cybersecurity Integration Steering Group (GCSG) which is chartered by CDR USSTRATCOM and Director MDA. This group unites RDT&E and operational BMD stakeholders as mandated by CJCSI 3295.01, Policy Guidance for BMD Operations. The GCSG takes actions and tracks status in four areas: cyber threat, cyber assessments, network operations/defense, and certification and accreditation.

MDA has also placed special emphasis on incorporating evolving Federal and DOD cybersecurity requirements early in the acquisition life-cycle, to include improvements in supply chain risk management and bolstering program protection into the BMD specifications. These efforts increase our cybersecurity robustness of fielded BMD capabilities in fielded systems and supporting networks.

Finally, we have implemented Active monitoring and are building 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 (DOT&E) 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 (CONOPS) to ensure every network defender in every location knows how to react to cyber challenges.

LTG MANN. Within the Army, as well as the Department's missile defense community, we continuously assess technology gaps and potential vulnerabilities in our missile defense capabilities. These assessments include testing and exercising cyber-attack related scenarios to our intrusion detection and protection systems within the integrated fire control networks, sensors, shooters, and command and control systems. We continuously perform security activities to reduce cyber threats introduced through the supply chain, such as malicious tampering of commercial hardware or software. We also routinely perform audits of our defense industrial base to ensure that they are properly safeguarding our critical intellectual property. In conjunction with multiple organizations and commands within the Department, we are continuing to enhance our cyber-attack defense posture.

Within the Ballistic Missile Defense System (BMDS), we continue to collaborate with others to enhance the cyber defense posture of our missile defense capabilities. The Joint Functional Component Command for Integrated Missile Defense, in coordination with U.S. Strategic Command and the Missile Defense Agency conduct the Computer Network Defense mission for the BMDS ensuring cyber defenses and operations are planned and executed in a coordinated effort.

HOMELAND MISSILE DEFENSE

9. Senator INHOFE. What is the status of MDA's efforts on the Multiple Object Kill Vehicle? I understand it is currently underfunded by approximately $55 million. How does that effect the program?

VADM SYRING. We are on track to establish the technological foundation to engage and destroy multiple, credible lethal objects from a single Ground Based Interceptor through our (MOKV) program. We are currently investing in developing concepts and reducing technological risk. In fiscal year 2015 (FY15), we awarded contracts to three major kill vehicle primes—Boeing, Lockheed Martin, and Raytheon—to define concepts and identify key areas of technical risk. In the next several years, we will invest in reducing the risk so that each of these concepts can enter prototype development at a high technology readiness level and then progress to flight testing.

MDA's fiscal year 2017 requested funding is sufficient to support this effort at this time.

10. Senator INHOFE. Do we have enough Ground Based Interceptors given the growing threat? If no, will development of the Multiple Object Kill Vehicle mitigate any shortage or do we need more GBIs?

VADM SYRING. Yes we currently have enough Ground Based Interceptors. In 2013, the Secretary of Defense directed MDA to increase the number of emplaced GBIs from 30 to 44 by the end of 2017, upgrade Missile Field #1 at Fort Greely, Alaska, and deploy the second AN/TPY–2 to Japan, which is already operational.

In addition, we are currently making critical development investments to significantly improve Ballistic Missile Defense System (BMDS) performance to counter the growing threat. The Redesigned Kill Vehicle and Configuration 3 booster will improve GBI reliability and survivability, which will provide greater flexibility for combatant commanders when determining BMDS engagement tactics. A highly reliable interceptor provides greater confidence for the warfighter when determining the number of interceptors required for an engagement scenario.

The MDA is also working to further influence shot doctrine and improve the missile defense cost curve by increasing the number of kill vehicles delivered by a single boost vehicle, which is the goal of the MOKV effort. The more kill vehicles we can deploy per booster, the greater capability our Ground-based Midcourse Defense system will have in the future to defeat complex threats.

MDA's current investments in increasing the number of GBIs from 30 to 44 by 2017, our efforts on the RKV and our plans for MOKV, along with other BMDS-wide improvements are planned and funded appropriately to pace current threat projections.

11. Senator INHOFE. What is the status of the new Long Range Discrimination Radar in Alaska—funding, planning and timeline? How does this radar improve our missile defense capabilities?

VADM SYRING. As a component of the 2020 Ballistic Missile Defense System (BMDS), the Long Range Discrimination Radar (LRDR) is designed to address both discrimination and operational readiness challenges. The LRDR will provide persistent long-range midcourse discrimination, precision tracking and hit assessment against complex long-range missile threats for Homeland Defense. The increased discrimination capability of the LRDR improves Ground Based Interceptor shot doc-

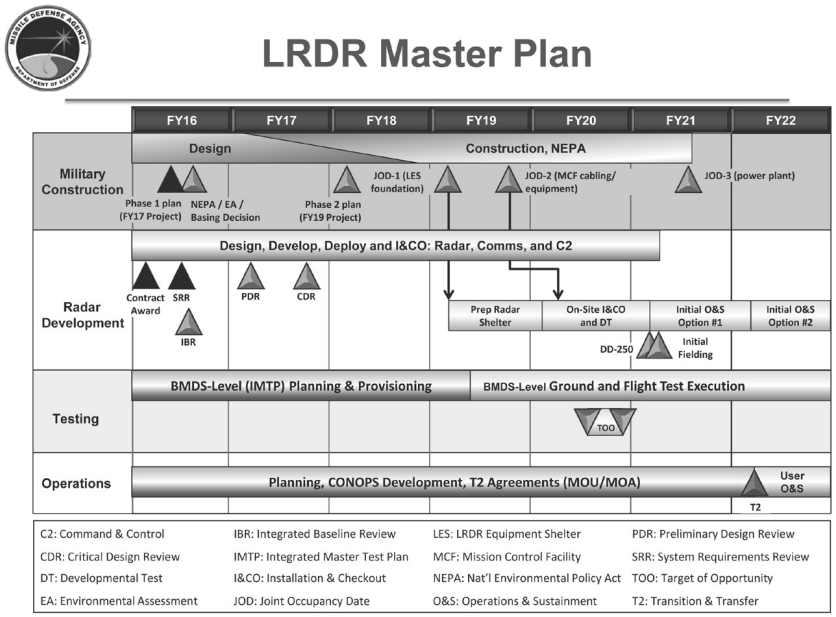
trine and preserves inventory for the BMDS. Additionally, the LRDR can support the Space Situational Awareness mission as directed.

The LRDR funding profile is as follows:

PB17 w/o PWS	FY15	FY16	FY17	FY18	FY19	FY20	FY21		FY15-21
LRDR Controls	49.606	131.514	305.203	300.338	221.133	94.843	99.080		1201.717
LRDR RDT&E	49.606	131.514	150.203	300.338	71.133	94.843	99.080		896.717
LRDR MILCON-Two Projects			155.000		150.000				305.000
LRDR O&S									

The LRDR contract was awarded in October 2015 to Lockheed Martin. Sensors Directorate completed a Systems Requirements Review with the prime contractor in February 2016 and system development is underway. Initial fielding at Clear Air Force Station in Alaska will occur in first quarter fiscal year 2021 (FY21) and transition/transfer to the Air Force will occur in fiscal year 2022. Attached is a detailed schedule outlining prime contractor radar development activities, MILCON Facilities construction, and integration and testing.

Attachment:



12. Senator INHOFE. The fiscal year 2016 NDAA directed deployment of a long-range discrimination radar or other appropriate sensor capability to support the defense of the Homeland against Iran by 31 Dec 2020. Without this sensor, the GBIs deployed in Alaska will have a difficult time defending against an Iranian ICBM. Are we on track to have this sensor in place by 31 Dec 2020? Can you provide this committee a detailed planning, funding and operational capability timeline?

VADM SYRING. Atlantic Radar options are still under evaluation. In section 236 of the fiscal year (FY) 2014 National Defense Authorization Act (NDAA), Congress directed the Secretary of Defense and U.S. Strategic Command to conduct an evaluation of options and alternatives for future sensor architectures for ballistic missile defense in a cost and operationally effective and timely manner as part of section 236 of the 2014 NDAA.

In response to the 2014 NDAA language, the Missile Defense Agency (MDA) is collaborating with the Department to include U.S. Northern Command, U.S. Strategic Command, U.S. Pacific Command, U.S. European Command, the Office of the Under Secretary of Defense (Acquisition, Technology, and Logistics), and the Office of Cost Assessment and Program Evaluation, on a Global Sensor Ballistic Missile

Defense (BMD) Architecture Analysis of Alternatives (AoA) to define the future sensor architecture to meet the evolving BMD threat, "Sensor AoA".

The Sensor AoA efforts focus on current and potential future threat capabilities from both North Korea and Iran. The AoA will provide an analytical comparison of the technical feasibility, operational effectiveness, operational suitability, military utility, risk, cost and developmental schedule for future Ballistic Missile Defense System sensor architecture options.

Planning, funding, and operational capability options are being analyzed within the sensor AoA study that is described above. Completion of the Sensors AoA study is anticipated in summer 2016. Decisions by the Department will be made after completion of the AoA.

Progress on addressing the potential future Iranian threat has begun. In November 2015, MDA commenced a siting study to identify candidate East Coast homeports for SBX. We expect to complete the study by December 2016. Working with the Navy's Military Sealift Command and other Navy and Combatant Command stakeholders, MDA expects this study to identify environmental assessments or impact statements required by the National Environmental Policy Act, inform homeport agreement, identify pier or other infrastructure modifications, and define communications support and other requirements for a potential future move of SBX to an East Coast homeport.

In March 2016, MDA completed an operational area analysis that identified potential sensor locations best suited for added discrimination capability against potential future long range threats from Iran. This analysis supports the siting study for potential reassignment of the Sea-Based X-band radar (SBX) as required by section 1684(b) and the siting study for additional sensor sites for defense against Iran as required by section 1684(c) of the fiscal year 2016 NDAA.

In fiscal year 2017, data from these efforts will inform siting and necessary engineering studies for future Department consideration of these and other program options to address the potential future Iranian threat.

QUESTIONS SUBMITTED BY SENATOR DAN SULLIVAN

GROUND-BASED MISSILE DEFENSE (GMD) PRIORITIES

13. Senator SULLIVAN. Within the GMD missile defense budget, there are a number of needs, both near- and long-term. Within the categories of 1) Imminent Near-Term Needs; 2) Critical Mid-Term Needs; 3) Important Long-Term Investments; and 4) Long-Term Wish List, how would you categorize the following priorities and any additional MDA priorities within GMD: 44 GBIs, LRDR, new 2-stage GBI Boosters, East Coast LRDR-type radar, new Kill Vehicles (RKV/MOKV), Fort Greely ground system upgrades, investment in "left of launch" capabilities, and an East Coast missile site?

VADM SYRING. Our imminent near-term priorities for enhancing Homeland Defense are increasing the Ground Based Interceptor (GBI) fleet from 30 to 44 by the end of 2017 and upgrading the GMD Ground System. MDA's highest priority investments to address emerging threats in the mid-term period includes deploying the LRDR at Clear AFB, Alaska, developing and testing of the Redesigned Kill Vehicle, developing software to permit a 2–Stage mode for our 3–Stage GBI, and completing Fort Greeley ground system upgrade.

The Multi-Object Kill Vehicle (MOKV) and consideration of a potential future (Atlantic) East Coast LRDR type radar could address the anticipated evolving threat. MDA's fiscal year 2017 funding request is sufficient to support concept development and technology risk reduction for MOKV. Investment in discrimination and sensor capabilities will yield more cost-effective near-term improvements to U.S. Homeland missile defense than deployment of an additional Continental United States Interceptor Site.

I defer to the Office of the Secretary of Defense (OSD) on Left-of-Launch investments and capabilities.

QUESTIONS SUBMITTED BY SENATOR JOE MANCHIN

UTILITY OF WEST VIRGINIA MOUNTAIN RECLAMATION AREAS FOR THE U.S. MISSILE DEFENSE SYSTEM

14. Senator MANCHIN. The state of West Virginia has conducted strip mine land reclamation projects in the state's mountains. These mountain sites offer high altitude flat terrain useful for military operations such as the Alpha Natural Resources

C–130 airstrip in Logan County. During the April 13, 2016 hearing, you indicated the need to improve missile defense sensors and sensor operations. Has the Missile Defense Agency considered reclaimed mountain sites in West Virginia as useful for sensor operations in support of ICBM, SLBM, and cruise missile defense for the National Capital Region?

VADM SYRING. The Missile Defense Agency (MDA) has not looked at strip mine reclamation sites for missile defense systems. The MDA interceptor siting study initiated in January 2013 used the Department of Defense Base Structure Report (BSR) as directed with 457 properties in the 28-state area of consideration. West Virginia had 10 properties on the BSR list. Application of the "Parcel Size" exclusionary criterion eliminated nine of the West Virginia properties and the last property was eliminated based on the "Useable Land/Space" exclusionary criterion. ICBM and SLBM threat trajectories flying toward the United States fly over or near the North Pole. Interceptor and sensor locations in northern most Continental U.S. provide the best system performance. MDA has not examined cruise missile defense for the National Capital Region. That mission typically is allocated to Army or Air Force air defense systems.

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