[H.A.S.C. No. 111–71]

# HEARING

ON

# NATIONAL DEFENSE AUTHORIZATION ACT FOR FISCAL YEAR 2010

AND

# OVERSIGHT OF PREVIOUSLY AUTHORIZED PROGRAMS

BEFORE THE

## COMMITTEE ON ARMED SERVICES
## HOUSE OF REPRESENTATIVES

ONE HUNDRED ELEVENTH CONGRESS

FIRST SESSION

---

STRATEGIC FORCES SUBCOMMITTEE HEARING

ON

# BUDGET REQUEST FOR NATIONAL SECURITY SPACE AND MISSILE DEFENSE PROGRAMS

---

HEARING HELD
MAY 21, 2009

U.S. GOVERNMENT PRINTING OFFICE

51–958 WASHINGTON : 2010

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

STRATEGIC FORCES SUBCOMMITTEE

ELLEN O. TAUSCHER, California, *Chairman*

JOHN SPRATT, South Carolina
LORETTA SANCHEZ, California
ROBERT ANDREWS, New Jersey
JAMES R. LANGEVIN, Rhode Island
RICK LARSEN, Washington
MARTIN HEINRICH, New Mexico
SCOTT MURPHY, New York

MICHAEL TURNER, Ohio
HOWARD P. "BUCK" McKEON, California
MAC THORNBERRY, Texas
TRENT FRANKS, Arizona
DOUG LAMBORN, Colorado

BOB DEGRASSE, *Professional Staff Member*
FRANK ROSE, *Professional Staff Member*
KARI BINGEN, *Professional Staff Member*
ZACH STEACY, *Staff Assistant*

# CONTENTS

## CHRONOLOGICAL LIST OF HEARINGS

2009


Page

HEARING:

Thursday, May 21, 2009, Fiscal Year 2010 National Defense Authorization Act—Budget Request for National Security Space and Missile Defense Programs ..... 1

APPENDIX:

Thursday, May 21, 2009 ..... 41


**THURSDAY, MAY 21, 2009**

**FISCAL YEAR 2010 NATIONAL DEFENSE AUTHORIZATION ACT—BUDGET REQUEST FOR NATIONAL SECURITY SPACE AND MISSILE DEFENSE PROGRAMS**

STATEMENTS PRESENTED BY MEMBERS OF CONGRESS


Tauscher, Hon. Ellen O., a Representative from California, Chairman, Strategic Forces Subcommittee ..... 1

Turner, Hon. Michael, a Representative from Ohio, Ranking Member, Strategic Forces Subcommittee ..... 3


WITNESSES


Kehler, Gen. C. Robert, USAF, Commander, Air Force Space Command, U.S. Department of Defense ..... 6

O'Reilly, Lt. Gen. Patrick J., USA, Director, Missile Defense Agency, U.S. Department of Defense ..... 7


APPENDIX


PREPARED STATEMENTS:

Kehler, Gen. C. Robert ..... 45

O'Reilly, Lt. Gen. Patrick J. ..... 63

DOCUMENTS SUBMITTED FOR THE RECORD:

[There were no Documents submitted.]

WITNESS RESPONSES TO QUESTIONS ASKED DURING THE HEARING:

Mr. Franks ..... 119

Mr. Turner ..... 119

QUESTIONS SUBMITTED BY MEMBERS POST HEARING:

Mr. Lamborn ..... 126

Mr. Turner ..... 125

# FISCAL YEAR 2010 NATIONAL DEFENSE AUTHORIZATION ACT—BUDGET REQUEST FOR NATIONAL SECURITY SPACE AND MISSILE DEFENSE PROGRAMS

---

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ARMED SERVICES,
STRATEGIC FORCES SUBCOMMITTEE,
*Washington, DC, Thursday, May 21, 2009.*

The subcommittee met, pursuant to call, at 2:03 p.m., in room 2118, Rayburn House Office Building, Hon. Ellen Tauscher (chairman of the subcommittee) presiding.

## OPENING STATEMENT OF HON. ELLEN O. TAUSCHER, A REPRESENTATIVE FROM CALIFORNIA, CHAIRMAN, STRATEGIC FORCES SUBCOMMITTEE

Ms. TAUSCHER. Good afternoon.

This hearing of the Strategic Forces subcommittee will come to order.

Today the subcommittee will receive testimony on the President's fiscal year (FY) 2010 budget request for national security space and missile defense programs.

Traditionally, this subcommittee would have held separate hearings on both of these topics. After all, unclassified national security space programs account for over $11 billion of the President's request, and the total request for ballistic missile defense (BMD) programs tops $9.3 billion.

Unfortunately, the timing of the budget submission and the committee's legislative schedule have made it impossible to hold two separate hearings before our markup. That said, the good news is that the subcommittee has held four hearings and two briefings on specific aspects of these programs already this year.

Appearing before the committee this afternoon are two well-known witnesses. Both of them are well equipped to address these two major elements of the President's defense budget.

First, General Robert Kehler, the Commander of Air Force Space Command (AFSPC), will address the national security space aspects of the budget.

Second, Lieutenant General Patrick O'Reilly, Director of the Missile Defense Agency (MDA), will discuss the missile defense budget request.

I want to thank both of our distinguished witnesses for appearing before the subcommittee today. And I especially want to thank, on behalf of the committee, all of the men and women that serve with you both in the military and the civilian ranks, and especially the people sitting right behind you, who I know have worked very

hard on this testimony that you have submitted well before the deadline, and we very much appreciate how comprehensive it is.

But you certainly represent the Services that have the most people involved in these programs. They are very excellent people, and they are very patriotic Americans. And we want you to please extend to them, on behalf of this committee, our very heartfelt thanks for their service.

Before turning to our witnesses, I would like to briefly identify some of the key issues we hope the witnesses will address in the course of their testimony today.

National security space systems provide a wide variety of capabilities to our warfighters by offering global access, unhindered by geographic or political boundaries and unrestricted by surface or air defenses. While the funding requests for most major space programs remains consistent with past plans, the fiscal year 2010 request contains several significant programmatic shifts.

First, it recommends terminating the Transformational Communications Satellite System, or TSAT, program. Second, it expands funding for other military satellite communications systems. And, finally, the request provides a significant increase for Space Situational Awareness (SSA) programs.

During the past decade, most national security space programs have experienced significant cost increases and schedule delays.

General Kehler, I would ask you to discuss how the budget before us today will help deliver satellite systems in a more timely and cost-effective manner. More specifically, what are the Administration's plans for ensuring that the warfighter will have sufficient, protected communication bandwidth in the next decade after the termination of the TSAT program, and what will happen with the engineering and technical talent who have focused on this problem?

The subcommittee has also focused significant attention on the vulnerability of space-based systems in recent years. In that regard, General Kehler, how will the budget before us address the increasing vulnerability of our satellite system?

Turning to the issue of missile defense, Secretary Gates has incorporated key decisions into the budget that, in my view, refocus the program to its original purpose and to the most pressing threats to the security of the United States and our deployed troops and allies.

In 1999, Congress passed, and the President signed, House Resolution (H.R.) 4. That law established the policy of the United States to, "Deploy, as soon as technologically possible, an effective national missile defense system capable of defending the territory of the United States against limited ballistic missile attack, whether accidental, unauthorized, or deliberate."

Secretary Gates announced three decisions to refocus the program on their original goals and to address the most pressing threats.

First, he has proposed capping the deployment of long-range missile defense interceptors deployed in Alaska and California at 30, arguing that these 30 interceptors would be more than sufficient to counter rogue threats or unauthorized launches for the foreseeable future.

Second, he proposed cancelling three programs: the Multiple Kill Vehicle (MKV), the Kinetic Energy Interceptor (KEI), and the second Airborne Laser (ABL) prototype aircraft. These are programs that have been pursued to counter long-range missile threats that could develop in the future. Each has experienced technical challenges and some are unlikely to be cost effective if deployed.

Finally, the secretary has recommended a $900 million increase in funding for theater missile defense programs, such as the Aegis Ballistic Missile Defense System and the Terminal High Altitude Area Defense (THAAD) System. This decision will better protect our deployed forces, allies, and friends against the existing short- and medium-range ballistic missile threat, and it is consistent with the demands of our combatant commanders for more interceptors for theater defense.

General O'Reilly, in the course of your testimony today, could you describe how the Secretary reached these decisions? Were you consulted in the decision-making process? Did the Missile Defense Agency recommend these actions? And do you have any reservations about the Secretary's decision?

As we dig into the details of the budget, I would also like to hear about your new plans for exploring ascent phase intercept technologies to hedge against more complicated threats in the future.

With that, let me turn to my good friend, the distinguished ranking member of the subcommittee, Mr. Turner, of Ohio, for any comments he may make.

Mr. Turner.

**STATEMENT OF HON. MICHAEL TURNER, A REPRESENTATIVE FROM OHIO, RANKING MEMBER, STRATEGIC FORCES SUBCOMMITTEE**

Mr. TURNER. Thank you, Madam Chair. I appreciate your holding this hearing and, of course, your continued leadership in this.

And I have been assured by staff that even though we all know that you are awaiting confirmation by the State Department that that process will continue and you will continue to chair our subcommittee.

I want to ensure that we get ample time to be able to congratulate you in another hearing just prior to your departure. So, please ensure that we get that opportunity, and we know we do not have to do it today.

Ms. TAUSCHER. Thank you.

Mr. TURNER. But thank you for your leadership.

Well, we have two very thoughtful and accomplished military leaders with us today, General Kehler, General O'Reilly. Welcome back. Thank you for appearing before the subcommittee. Thank you for your leadership. You are both experts in your field, and we thank you for your contributions to our national security.

We have an unusual task before us today. In a single hearing, we must cover two broad areas, space and missile defense, that under normal circumstances could equally merit their own hearing.

We also have an unusual budget request to consider this year. During last week's full committee hearing with the Secretary of Defense, we heard of profound changes in the budget that not only occurred outside the Quadrennial Defense Review (QDR) process, but

were arrived at without what appears to be a commensurate level of rigorous analysis.

As our full committee Ranking Member, Mr. McHugh, said, "the only unifying theme in this year's budget is that the aggregate fits within the top line." This appears to be an apt description of the missile defense budget this year.

During our recent subcommittee hearing on the nuclear security budget request, we learned that major program decisions at the National Nuclear Security Administration (NNSA) would not be made until the completion of the Nuclear Posture Review (NPR). Yet, over in the Department of Defense (DOD), sweeping missile defense decisions have been made ahead of the QDR and prior to the Administration's completion of its missile defense policy and strategy review. By making such decisions now, is the Department prejudicing the outcome of these reviews?

We just observed yesterday a determined Iran test of its 200-kilometer, solid-fuel Sejil-2 ballistic missile that Iran's president suggested was linked to its ongoing nuclear program. There is a clear desire by some actors to emphasize the development of longer-range missiles. How good is our intelligence?

We know short-range systems well. In many cases, they are based on decades-old technology. What concerns me, however, is our level of knowledge about rogue nations' longer-range systems. This detailed intelligence information is critical to having effective missile defenses. When such uncertainties exist, one usually compensates with increased margins and more diversification, not less.

Given this growing threat, I am puzzled by the Department's decision to: stop deployment of ground-based interceptors (GBI) at 30 rather than 44, reduce the Ground-based Midcourse Defense (GMD) program by 35 percent, and curb its development. I have not seen any analysis or formal force structure requirements to justify this decision, nor have I seen any changes in the Intelligence Communities' (IC) threat assessment that would indicate a decreasing threat.

Furthermore, what are we to make of the disconnect between Secretary Gates' testimony that the Department will, "Continue to robustly fund research and development" of GMD to improve its capability, and MDA's budget overview, which states, "We intend to . . . curtail additional GMD development"?

MDA's budget overview also calls for rigorous testing, which I agree with. But I do not see more GMD flight testing in fiscal year 2010. I hope today we can address these basic questions.

We have also been induced to a new concept this year: Ascent Phase Intercept. It sounds promising, but it also sounds a lot like parts of boost and parts of midcourse. I would like a better understanding of what this entails. It would seem risky to move away from ABL, KEI, and MKV for this, as yet, unproven concept. General O'Reilly, I would ask you to address what gives you confidence that Ascent Phase Intercept is more technically feasible, effective, and affordable?

During our last missile defense hearing, we reviewed an independent study on MDA's roles and missions requested by this committee. It recommended that MDA's mission should be refocused on research, development, test and evaluation (RDT&E), and that

science and technology (S&T) should receive renewed emphasis and increased funding. However, I am hard-pressed to find such emphasis in this year's budget. How does MDA advance our missile defense technologies and foster innovation and ingenuity when net reductions are made in future capabilities like ABL, KEI, MKV, and the Space Tracking and Surveillance System (STSS)? I am unconvinced that a $126 million decrease in Special Programs adequately captures what we lose with the nearly $1 billion cut to future capabilities.

There is one area in the budget where Congress did see rigorous analysis. In previous hearings, we noted a Joint Staff study which had recommended increasing the inventory of Aegis and THAAD interceptors. The budget request is responsive to these requirements, and I am pleased with that. However, the Joint Staff study only looked at these two systems. How do we know the force-structure requirements for other missile defense elements? Also, why does an increase in Aegis and THAAD have to come at the expense of GMD and European missile defense systems designed to protect the U.S. homeland and our allies?

Looking across the $1.2 billion cut to MDA, I believe that we have been presented with a number of false, either-or choices. We can do better.

In contrast, the budget request for space appears relatively balanced. Important acquisition programs, such as Advanced Extremely High Frequency (AEHF), Wideband Global Satellite (WGS), Global Positioning System (GPS), Space-Based Infrared System (SBIRS), and National Polar-orbiting Operational Environmental Satellite System (NPOESS) are provided with stable funding. The only substantial change is the TSAT termination.

The Air Force decided instead to fund two more additional AEHF satellites and one WGS satellite, and acknowledged the importance of sustaining the industrial base. However, these three satellites are not a long-term solution to addressing the military's increasing communications requirements. Without insight into out-year plans and funding, I find it difficult to have confidence that the Air Force has adequately committed to, and budgeted for, these capabilities.

The budget requests for Space Situational Awareness, SSA, has doubled. It appears a large portion of this increase is allocated to the Joint Space Operation Center (JSpOC).

General Kehler, I would like to better understand the Department's effort to improve SSA, space protection, and our space intelligence capabilities. Additionally, can you discuss why Operationally Responsive Space (ORS) is on the Air Force Unfunded Priorities List (UPL)?

Lastly, Air Force Space Command is in a state of transition. Can you discuss the status and challenges of divesting your nuclear mission and inheriting the cyber mission?

On a final note, I would like to acknowledge the men and women serving in the organizations you lead. These are two worthy fields to have a career in, and we are proud of their service and accomplishments.

Thank you, Madam Chair, for presiding over this important hearing. We look forward to the testimony of the witnesses.

Ms. TAUSCHER. Thank you, Mr. Turner.

We will begin with General Kehler.

We have received your prepared statement in advance and it will be entered into the record. We welcome your remarks.

General, the floor is yours.

**STATEMENT OF GEN. C. ROBERT KEHLER, USAF, COMMANDER, AIR FORCE SPACE COMMAND, U.S. DEPARTMENT OF DEFENSE**

General KEHLER. Well, Madam Chairwoman and Representative Turner, distinguished members of the subcommittee, it is a real honor for me to appear before you today both as an Airman and as the Commander of Air Force Space Command.

Thanks very much for your continued support, not only for the United States Air Force, but for the capabilities that we contribute to the Joint Force.

I will certainly take the words that you have given us today about your appreciation for the service of the men and women of the military across the board, specifically Air Force Space Command. I will take that back.

And Madam Chairwoman and the rest of the members of the subcommittee, I know you know this, but that resonates with them and they deeply appreciate that when they hear from the representatives of the American people, the appreciation of the American people. So thank you for those words, and I will definitely take those back.

It is also a great pleasure for me to appear with the Director of the Missile Defense Agency. I am very proud to lead 39,000 active duty Guard and Reserve Airmen, government civilians, and contractors who contribute to our Nation's strategic deterrence, and who deliver persistent, space-based capabilities to America and its warfighting commands around the globe.

Our mission is to provide an integrated constellation of space and cyberspace capabilities at the speed of need. All over the world, as we sit here today, in space operations units, in space launch and range facilities, in missile alert facilities, in acquisition centers, and of course, in our forward-deployed locations around the world, the men and women of Air Force Space Command are proud and pleased to be answering their Nation's call.

Our Airmen are focused on three main areas.

First and foremost, we operate, secure, and maintain our Nation's land-based strategic deterrent, with perfection as the standard. Second, we assure access to space, protect our freedom of action in space, and provide joint warfighting capabilities from space. And, finally, we are improving cyberspace capabilities by establishing an operational Cyberspace Command, which will be designated 24th Air Force, to meet the demands of the 21st-century national security environment.

Today's Soldiers, Sailors, Airmen, Marines, and Coast Guardsmen navigate with accuracy, communicate with certainty, strike with precision, and see the battlefield more clearly because of space-based capabilities.

It is our job to put those capabilities directly into their hands, and we are constantly mindful of those joint team members who are in harm's way.

We are very proud of our accomplishments. We have a long string of successful launches. We are exceeding performance standards in critical operations areas like GPS, satellite communications, weather support, and missile warning.

But we are very much aware of where we need to improve: We need to get better at acquisition; we need to restore the nuclear enterprise; and, we need to deliver new capabilities to the joint team on time. We also understand clearly our important role across the spectrum of Joint Operations, from routine activities, to irregular warfare, to deterring major conflict with regional power.

The demand for space capabilities is going up. At the same time, the threats and challenges in this operational domain are increasing. The fiscal year 2010 budget continues our progress in a number of key investment areas. You have pointed out some of those already.

It continues our assured access to space. It helps improve our situational awareness, and our space protection. And it continues modernization of GPS, our satellite communications systems, missile warning, operational responsiveness, and other areas.

If there is a thought that I could leave you with, it is this one: Make no mistake about it, the men and women of Air Force Space Command, and the men and women of the United States Air Force are in today's fight every minute of every day.

We thank you for your past support. We look forward to continuing the discussions that we have been having over the last several months. And I stand ready to answer your questions; happy to take them on whenever you are ready, and I was diligent, I think, in taking notes, so I am ready to go whenever you are.

Thanks for having us today.

[The prepared statement of General Kehler can be found in the Appendix on page 45.]

Ms. TAUSCHER. Thank you very much, General Kehler.

General O'Reilly, we have received your prepared statement in advance and it has been entered into the record. We welcome your remarks.

General O'Reilly, the floor is yours.

**STATEMENT OF LT. GEN. PATRICK J. O'REILLY, USA, DIRECTOR, MISSILE DEFENSE AGENCY, U.S. DEPARTMENT OF DEFENSE**

General O'REILLY. Good afternoon, Madam Chairman, Congressman Turner, other distinguished members of the committee. It is an honor to testify before you today on the proposed fiscal year 2010 budget for the Department of Defense's missile defense program.

During fiscal year 2008 and fiscal year 2009 to date, the Missile Defense Agency has achieved many accomplishments in the development of the Ballistic Missile Defense System (BMDS), including the execution of successful Standard Missile–3 (SM–3) Block IA, and Standard Missile–3 Block IV interceptor salvo flight test; the delivery of 28 additional SM–3 Block IA interceptors, including deliveries to Japan; a Ground-based Midcourse Defense intercept utilizing the entire sensor and command and control (C2) suite deployed in the Pacific in placement of two other ground-based inter-

ceptors and refurbishment of two other ground-based interceptors at Fort Greely, Alaska.

Deployment of the——

Ms. TAUSCHER. General O'Reilly, can you pull the mic a little closer to you please?

Thank you.

General O'REILLY. Deployment of an Army Navy/Transportable Radar Surveillance (AN/TPY–2) radar to Israel, the execution of an experiment involving the closest data collect to date of a boosting missile from a satellite, the safe destruction of a malfunctioning U.S. satellite, repeated demonstrations of the Atmospheric Laser Beam Compensation during the Airborne Laser flights, delivery of the first Terminal High Altitude Area Defense, or THAAD, unit for testing, three THAAD intercepts, including the launching of a salvo of two THAAD interceptors using the operational firing doctrine.

Earlier this month, we also successfully placed in orbit the Space Tracking and Surveillance System Advanced Technology Risk Reduction (STSS ATRR) satellite to serve as a pathfinder for the next generation space-sensor technology.

However, in addition to our successes, we also faced challenges developing the BMDS. During fiscal year 2008 and fiscal year 2009 to date, we experienced nine significant flight test delays, four target failures out of 18 target launches, and one interceptor failure in flight. These and other contributing factors have resulted in a $264 million cost growth and, further, we have incurred over $252 million in unplanned costs and 25 weeks of schedule revisions due to unplanned operational deployments of our systems under development.

In response to those challenges, we have worked with our leadership and stakeholders to engage our management oversight, strengthen our relationship with the warfighting community, and improve BMDS acquisition and test planning.

We have adopted a series of initiatives to improve acquisition and oversight of the contracts we will award over the next 18 months. I am also signing Memorandums of Agreement (MOA) with the Services to institutionalize the Missile Defense Agency and Service's roles and responsibilities for development and sustainment and fielding of the Ballistic Missile Defense System.

In fiscal year 2010, we are proposing approximately $7.8 billion for missile defense in response to Secretary Gates' guidance. As Secretary Gates announced on April 6th, this budget was the result of a holistic assessment of capabilities, requirements, and risk and needs.

For the purpose of meeting the Secretary's vision to institutionalize and enhance our capabilities, to enhance the wars we are in today, and the scenarios we are most likely to face in the years ahead, while at the same time providing a hedge against other risks and contingencies.

The Secretary further said we will restructure the program to focus on rogue-state and theater-missile threats.

Today, there are 5,900 ballistic missiles and hundreds of launchers in countries other than the North Atlantic Treaty Organization (NATO), China, Russia, or the U.S.; 93 percent, or 5,500 of those

missiles, are short-range ballistic missiles, with ranges less than 1,000 kilometers.

Six percent, or 350, are medium-range ballistic missiles with ranges between 1,000 to 2,000 kilometers. And less than one percent are Intermediate, or Intercontinental Ballistic Missiles, or ICBMs.

Both Iran and North Korea are showing significant progress in developing ICBM technology, but their number of launch complexes which exist limits the number of missiles they can simultaneously launch.

I assess the technical risk is low that 30 fully operational ground-based interceptors, or GBIs, and silos is a sufficient number to counter the simultaneously launched rogue-nation ICBMs over the next decade. Additionally, indications are early and prominent if the number of rogue-nation ICBM launch complexes increases.

Although we are proposing to limit the number of GBIs and silos to 30, we are storing additional silos, and we are continuing the production of the remaining 14 GBIs on contract to maintain the ability to produce additional GBIs for testing, refurbishment, future upgrades, and to allow programmatic flexibility to respond to the Quadrennial Defense Review, the congressionally mandated Ballistic Missile Defense Review, and other policy direction.

In contrast to our rogue-nation ICBM defense, I assess the technical risk is considerably higher that the previously planned inventory of theater missile defense interceptors and units can be overwhelmed by the large number of short- and medium-range ballistic missiles today.

Thus, to better protect our forces, allies, and friends from short and medium ballistic missile attack, we propose to add $700 million to field more Theater High Altitude Area Defense and Standard Missile–3 interceptors. We also propose to add $200 million over three years to fund the conversion of six additional Aegis ships to ballistic missile defense capabilities.

Furthermore, as a hedge against further advanced threats, we propose $368 million to leverage our emerging missile defense force structure and accelerate the development of capability to destroy missiles at all ranges in the highly advantageous early phases of flight.

To more effectively hedge against future threats, we propose to cancel the second Airborne Laser, or ABL, prototype aircraft, terminate the Multiple Kill Vehicle, or MKV, and Kinetic Interceptor, or KEI, programs in lieu of more operationally efficient, alternative technology architectures.

We will continue the research and development effort with the existing ABL aircraft, including the first attempted shoot-down of a ballistic missile this fall, to address affordability and technology issues while addressing the program's proposed operational role.

The MKV technology program was established to address complex countermeasures by identifying to destroying all lethal objects in a cluster using a single interceptor. The MKV was in the early stages of a long development process extending until 2018, and required significant research and development and very immature technology.

We plan to transfer the knowledge gained from MKV to our kill vehicle technology base. As stated previously, destroying missiles earlier in flight before countermeasures can be deployed is the better hedge against advance future threats than trying to kill all the countermeasures after they have been deployed.

The original KEI mission grew from a boost-phase-only mission to a boost and midcourse mission. The development schedule grew from 5.5 years to 12–14 years, depending on the spirals. Program costs grew from $4.6 billion to $8.9 billion, and the missile average unit production cost grew from $25 million to over $50 million per interceptor.

Technology issues delayed the first booster flight test date by over a year, and we assess the probability of this flight test occurring this year as very unlikely.

Additionally, KEI size limits its ability to be operationally deployed without dramatic changes to our military infrastructure and significant reduction of our firepower. Affordability and government requirements growth, not contractor performance, was the main contributor to KEI's execution problems.

Given the above facts, and only 15 percent of the $8.9 billion worth of contract until 2018 had been accomplished, the Secretary of Defense terminated the KEI program. Recently, KEI contractors indicated they can complete their flight tests by the end of September 2009, in a manner that accommodates our legal liabilities for program termination. I will assess their proposal.

Like MKV, we will review the KEI products and expertise developed to date to determine follow-on applications to Ascent-Phase Intercept mission. The Missile Defense Agency, Joint Staff, combatant commanders, armed services have intensified their collaboration on the development of the missile defense capabilities and budgets.

As announced by Secretary Gates in response to the warfighters' priorities, we are making ballistic missile defense more affordable and effective by: one, reshaping our program to enhance protection of our deployed forces, allies, and friends against existing threats; two, continue to develop and maintain the Ground-based Midcourse Defense capability to defeat a limited, long-range, rogue-state attack or accidental launch against the United States; and three, prepare to leverage emerging Ascent-Phase Intercept technologies to hedge against the threat growth and realize the greatest potential for reducing cost and increasing operational effectiveness of missile defense.

The rationale is based, in part, on a Defense Science Board (DSB) study in 2002 which emphasized the benefit of Ascent-Phase Intercepts. The study noted that the technological and operational challenges of intercepting threat missiles in the ascent phase, the phase after powered flight and prior to apogee, is significantly less challenging than boost phase.

Ascent-Phase Intercept would allow us to intercept early in the battle space and optimize our ability to execute a shoot-look-shoot tactic and defeat the threat before countermeasures are deployed, minimal potential impact of debris, and reducing the number of interceptors required to defeat a raid of threat missiles.

With this budget, we will also continue to execute to the fullest extent of the law, the upper-tier European capability program to counter long-range attacks from Iran. We will execute a rigorous test program to build the confidence of the U.S. and allied stakeholders in the BMDS, bolster deterrence against their use, and send a powerful message to potential adversaries looking to acquire ballistic missiles; thus, testing figures prominently in our proposed budget of fiscal year 2010.

Furthermore, we are collaborating with the service Operational Test Agencies (OTAs) and the support of the Director of Operational Test and Evaluation (DOT&E) to restructure our test program, to improve confidence in the missile defense capabilities under development, and ensure the capabilities transferred to the warfighter are operationally effective, suitable, and survivable.

In conclusion, the proposed fiscal year 2010 budget rebalances the development of our missile defenses to improve our ability to meet the threats we face today and provide a cost- and operationally-effective hedge against future ballistic missile threats facing our deployed forces, allies, friends, and our homeland.

I greatly appreciate your support for the opportunity to testify today. I request that I submit the remainder of the statement in writing for the record, and I look forward to answering your questions.

And, ma'am, and, sir, I greatly appreciate, also, your compliments to our workforce that works tirelessly to deliver this capability.

Thank you.

[The prepared statement of General O'Reilly can be found in the Appendix on page 63.]

Ms. TAUSCHER. Thank you very much, General O'Reilly.

General Kehler, I am going to begin the questioning with my first question.

As you know, the National Polar-orbiting Operational Environmental Satellite System, or NPOESS, program has experienced serious schedule and cost problems. The estimated launch date for the first satellite has slipped by over three years to 2014 and the total program cost has grown from $6.5 to $13.5 billion. And according to what our staff is hearing, the tri-agency acquisition arrangement between DOD, NASA, and the National Oceanic and Atmospheric Administration (NOAA) is largely dysfunctional.

What are your thoughts about how the Nation should proceed in the acquisition of new weather satellites?

General KEHLER. Thanks, Madam Chairwoman.

First of all, the requirement to provide weather data, both of the Earth and the Earth's atmosphere, and of the space environment every day, from a combatant commander perspective, remains very high. Very important for our troops to understand the weather for all the obvious reasons. Very important for our Airmen to understand the weather, our Sailors, and the list goes on.

We, right now, have three military weather satellites left on the ground. One will launch later this year, and that leaves us with two. And we are managing the timeframe of launching those two remaining satellites that we have already constructed so that we

can hedge our bet, basically, here about what might happen with NPOESS.

In terms of the NPOESS program itself, we are not happy either. I think that all of us understand there have been some significant issues here. There have been issues with the construction of the sensors. In some cases, we are stretching in terms of the technology. In other cases, we are stretching—or the program was stretching, anyway, in terms of the number of sensors we were trying to integrate on the same platform, et cetera.

A number of studies have been done about what to do. There is one going on now that is about to out-brief within the next week or so. I understand they have made some recommendations. I have not seen those. We are looking forward to getting that and see what their recommendations are, both in terms of program content and, as importantly, in terms of program management.

So I cannot give you a better answer today, Madam Chairwoman, than we are waiting to see what this latest review tells us. I know some have seen pieces of it. I have not. We are looking forward to that. And when we do, I think it is important for us to come back and explain to you what we think the right way forward is.

Ms. TAUSCHER. Do you think that you will see that review before the mark-up of the bill on June 11th?

General KEHLER. I have heard one answer that says that they are ready to report their results as early as next week. So, I would hope that we would have information before you mark.

Ms. TAUSCHER. Well, I will direct the staff. We are going to be back in our districts next week for the Memorial Day recess, but we come back on June 2nd. So as soon as you come back, if you have been briefed and you can brief us, we will gather the subcommittee and try to accomplish that as soon as we can.

General KEHLER. Yes, ma'am.

And it is a actually, it is a larger group that you probably need to invite than just me because there are others with equities in this decision as well.

Ms. TAUSCHER. We will do that.

General KEHLER. But we would be happy to come.

Ms. TAUSCHER. I have a second question.

Recently, the Government Accountability Office (GAO) found that the Air Force is struggling to build the GPS IIF satellites within cost and scheduled goals. I actually was watching one of the cable shows this morning, and they had this whole big thing about, you know, GPS and, you know, are you going to be able to turn on your GPS and get from where you are supposed to go. So I think this has hit the major media.

The program has overrun its original cost estimate by about $870 million and its launch of its first satellite has been delayed to later this year, probably November of 2009, almost three years late. GAO has also raised questions about the Air Force estimate for the GPS IIIA schedule and the possibility that delays could result in a gap in the GPS constellation in the future.

Would you describe the current health of the GPS constellation, the status of both GPS IIF and IIIA, acquisition programs, and the prospect that we might experience a gap in the GPS signal sometime in the future?

General KEHLER. Well, let me answer the final question first.

I am highly confident that we will be able to sustain at least, and I believe more than, the minimum 24 satellite constellation as far as we can see. I am highly confident that we can sustain more than 24 satellites.

Let me start with that. Now, let me backtrack.

GPS is critically important, not just to the U.S. military, not just to the citizens of America—by the way, the taxpayers who pay for it and offer it free of charge to the rest of the world—but it is important to the entire world. We are responsible for it, and we take that responsibility very, very seriously.

Right now, on orbit, we have the largest and most capable constellation we have ever had. We have 30 active satellites. We have another one that we have launched that is still in checkout. Some new signals are being checked out. And we have three additional that are not right now an active part of the constellation but are available.

We understand the issues that the GAO has raised. In some cases, you know, we are not taking exception to them. I would take some exception to the fact that I think some of what is being reported is old news. We have been working on these problems for quite some time.

We understand what the issues are. We are about to launch the first of the GPS IIF satellites. That will occur late this year. We have other launches that have to go in sequence, and so I cannot give you a specific such-and-such a date. We have got issues there that we are trying to work through. But that is not bad news. That is actually good news.

The GPS III program, at this point, is proceeding very well. It is still in development of course. But because of the problems that we had with IIF, we have taken more time, in some cases, deliberately, to get IIF right before it goes to orbit. And then we said we would buy a finite number of those and get on with GPS III, which has been a program we have started with all of the acquisition reform features built in from the start. So I have a lot of confidence in GPS III. I am also confident in the ground system that we have put together.

Why the reporting is going on today, it is because it is based on a very, very conservative analysis that is done for planning purposes. That conservative analysis suggests that we might have a problem here. But what that does not take into account is the real steps that we take to manage the constellation through times like this.

Those steps, when we take those steps, and when we get to the next launches, give me the confidence that would say we are going to be able to sustain more than 24 satellites on orbit. And all the indicators that we have with the on-orbit constellation supports what I am telling you here. When you take those measures into account, those real steps that we take to prolong the life of the satellites that are on orbit, when you factor those into the same analysis, it does not show the same kind of problem.

So, I have high confidence—let me say this again—I have high confidence that we are going to be able to sustain greater than 24 satellites as we continue to upgrade GPS. We are committed to re-

taining that as the gold standard for the world, and we have a commitment to do that, and we understand what our commitment is.

Ms. TAUSCHER. General, the reason you say 24 is because?

General KEHLER. That is the minimum requirement to give high-accuracy signals. And, again, as I say, today there are 30 active in the constellation, and we expect to be able to sustain 24—greater than 24 is what my projection would be. I just cannot tell you how many.

Ms. TAUSCHER. I hope your statement today goes a long way to giving confidence to people that rely on GPS for many different reasons.

I have questions, more questions for you, General Kehler. And I certainly have some questions for General O'Reilly, but I want to give my distinguished colleague, the ranking member from Ohio, Mr. Turner, a chance to ask some questions.

So, I am happy to yield to you, Mr. Turner.

Mr. TURNER. Thank you, Madam Chairman.

General O'Reilly, you have a tough message. And many people, in looking at your budget recommendations, are very concerned because they do not see that the world has changed much in the past couple months, or that the analysis at DOD has been completed in the past couple months that would justify a significant change in policy that you are bringing in front of us.

And I wanted to ask you a couple questions about that. Many times when we are faced with issues of guiding a program, you complete a strategy and then you undertake a budget.

As our Ranking Member McHugh said, it looks as if this is a budget that its only common theme is it fits under the top line, and that you have a budget and under which we are constructing strategy. And that is of a great deal of concern when the issue of missile defense is so important and goes right to the issue of our national security.

Every day in the news, the public is more and more aware of what the actors of rogue nations and other nations are doing to be able to get greater reach and greater precision, greater ability to impact the United States and our allies.

And as you look at the capabilities that we have accomplished, that your agency has worked so diligently, and others, to accomplish, it seems as if we are retreating. You and I have had conversations about my concern about the issues of innovation in that, you know, when we are advancing in technical areas and then we step away from funding, either research or development, we are losing the concept of what is the next generation of innovation that could be in front of us.

So many people have questions about how these budget decisions are being made and why and whether or not this is prudent. The Department appears to be making profound missile defense program and budget decisions prior to the Administration's completion of its missile defense policy and strategy review.

We do not, as a committee, seem to have any information in front of us that would justify the switches that are occurring in each of the programs. One such switch is the issue of a switch from long-range missiles focus, and we do not have intelligence or informa-

tion here that would indicate that people are not trying to get greater reach to impact our country.

I have several questions that I want to ask you about specific programs that I know that members on this side of the aisle have specific questions about them, but could you talk for us a moment about the issue of how this budget is put together. Because although you have answers as to, you know, comparatives; why one program over another. It appears that an overall strategy is missing as to why we are undertaking the cuts of programs that before, just a few months ago, appeared to be pretty important.

General O'REILLY. Thank you, sir.

First of all, this budget proposal reflects a process that has been developed over the last several years that I believe the most profound impact on the budget was the participatory problem—or participatory involvement of senior decision makers, and especially the combatant commanders, the Joint Chiefs, and the Services, in order to have the strategy that you refer to today and those analyses, versus the strategy before was based primarily on technical judgments by the Missile Defense Agency without the greater involvement.

So, number one, I do not believe it is so much of a strategy change, as a process change. This process has now come to fruition. There was more involvement by Combatant Command (COCOM) commanders and the warfighters than I have seen before. There also was more intense involvement by senior Office of the Secretary of Defense (OSD) leadership and the analysts that work to support them than has been in the past.

So, this is a process that was started several years ago, and I believe this is the first budget which was produced from that process as the Missile Defense Executive Board (MDEB), chaired by the Under Secretary of Defense for Acquisition, Technology and Logistics, chaired that board with the full participation of the Under Secretary of Defense for Policy, and the Director of Operational Test and Evaluation, the Service Chiefs, the Joint Chiefs, were very involved in this. This was not an isolated decision. In fact, it was the most comprehensive that I have ever seen in the missile defense area.

Again, the two aspects: number one is the programs we are referring to are aimed at 1 percent of the threat, whereas we are very concerned also about the other 99 percent of the threat that we—you are exactly right, sir—we are concerned about the research and development that is going in to counter that more deployed, more advanced threat, as far as a threat to our deployed forces today.

This is not done at the expense of the long-range threat. The reduction of the missile silos actually employs a process, then, that allows them to be more operationally ready than they are today. So, we believe this actually enhances that capability by focusing on those 30 and building of refurbishment process, and so forth, for the missiles that did not exist before.

But, primarily, sir, I must say that, yes, the Secretary of Defense did give us clear guidance to focus on the rogue threat and the theater threats, but at the same time, there was involvement that I had not seen before by senior warfighting commanders, and they set the priorities in which I was responding to.

And then it was approved up through the Secretary.

Mr. TURNER. And I have a series of questions regarding the change from 44 GBIs to 30 GBIs.

General O'Reilly, do you believe that Mr. Altwegg, your executive director, as he does, that, I believe this is his statement, "the risk may go up," by stopping GBI deployment at 30 interceptors.

So, although you say an analysis has been done, I think, you know, the committee members were a little concerned as to how exactly the process was undertaken to go from 45 to 30. I do not think we have from you the analysis that would justify or explain that. And, as I think you are aware, Mr. Altwegg, in a May 7th press conference on the budget, commented that the "risk may go up somewhat, but our intelligence data and the threat at the present time permits us to restrict the number of emplaced missiles to 30."

I am not familiar with that information. Could you comment on his statement?

General O'REILLY. Yes, sir.

As the new Director of the Missile Defense Agency, I asked for exactly what you are asking for: the analysis to show 44. Why was there 44 missiles? I have yet to see that yet.

We have looked at projections from 2002 of what the threat would be today. Those were off by a factor of 10 to 20 in that regard. So, that also underscored, with the warfighter input, senior combatant commanders, also the lack of an analysis, as you are saying for the 44, put us into a position where there was an operational risk assessment done.

And the operational risk assessment was deemed to be low for the fact that how many simultaneous missiles this system would have to engage at any one time now or over the next decade, and what would be the intelligence indicators to say that there was a surprise growth due to the fact that it takes so long to build one of these launch complexes due to the fact that there was not a strategy that I had presented, and my agency knows of about, again we believe it was a judgment in the past done on a threat.

But the analysis we have done until now and the assumptions in which that original judgment was made on, was off by a factor of about 10 to 20.

Mr. TURNER. And saying that the 44 was arbitrary, I am not quite confident that the 30 is—that the reduction that you have chosen is not arbitrary also. I look forward to you providing to the committee what other information that you have that would justify the 44 to 30.

I understand your position that the 44 was arbitrary. But, again, we are seeing increasing threats in this area, not decreasing, and yet we are seeing decreasing investment.

On May 13th, the Secretary of Defense testified that, "We will continue to robustly fund research and development to improve GMD." And on page 10 of the DOD budget overview for MDA, it clearly states, "We intend to curtail additional GMD development."

How should we interpret these two statements that appear to be a disconnect? Please—I mean, describe for us any robust R&D efforts for GMD that are going to be continued in this budget request.

General O'REILLY. Sir, the reference in the overview was in the area of the ground system, of curtailing the development or the deployment of the ground system.

However, at the same time, we are expanding the research and development, as I said, for the entire architecture which the GMD system benefits. One of the benefits of Ascent-Phase Intercept is if you are going to strengthen that, GMD automatically benefits from having early sensors, robust command and control, robust communications and secure, which is necessary.

Besides that, we also have funded a refurbishment program to take the oldest interceptors out, replace them with new ones, also to upgrade those interceptors with technical risks that we found in the original deployment.

That will be done over the entire fleet over a period of time. We also are expanding the test program, which is part of the development, and we are continuing to expand the command and control and the algorithms necessary to meet the warfighters' requirements for better command and control of the system during an attack, and also to plan for it.

We have others that I can provide for the record of efforts that we are continuing on in GMD. But I did not mean to convey that, in fact, the 30 missiles that we believe is sufficient for silos is going to halt the development of the ground-based interceptors.

In fact, we will continue on with the two-stage interceptor development, which again brings a new fresh of avionics to the GBIs and also their industrial base.

[The information referred to can be found in the Appendix on page 119.]

Mr. TURNER. One that continues to be a concern on support for the European missile defense. The budget request includes only $51 million for a European capability. Does this low funding level indicate a change of the Administration's position, or lack of support, for a European missile defense?

General O'REILLY. Sir, the Quadrennial Defense Review I know is going to address that. But in the meantime, the logic behind the fiscal year 2010 budget was that I have significant restrictions based on the law, the Appropriation, and the Authorization Act of last year, on how much I can spend for the construction and the development of the missile systems proposed in Europe and the European Midcourse Radar (EMR).

Due to those restrictions, primarily the need for ratification of the Ballistic Missile Defense Agreement in the Czech Republic and Poland, the $51 million was the most we could see that we could expend this year with those restrictions still on us.

And then there was a second one associated with the production of further GBIs for the European midcourse—or the European capability that is limited by the number of flight tests we have to occur first for a two-stage GBI, which we are proceeding with.

But in sum, sir, the limitations from last year's laws is the reason why we are limited to $51 million.

Mr. TURNER. So, then, should I interpret your answer to mean that there is still sufficient, significant support from the Administration for the European missile defense system (EMDS)?

General O'REILLY. Yes, sir.

The instructions to me was to continue with that deployment, that planning, to the greatest extent possible allowable by law, which equated to the $51 million for the development of the sites and the planning, and also we are continuing the development of the two-stage GBI.

Mr. TURNER. Thank you, Madam Chair.

Ms. TAUSCHER. Thank you, Mr. Turner.

I am going to recognize members for five minutes by their appearance before the gavel.

And first we have Mr. Andrews of New Jersey for five minutes.

Mr. ANDREWS. Thank you, Madam Chairwoman.

Thank you, General, Lieutenant General, for your service and for excellent testimony today.

I do not think either of you have made a major change in your assessment of the threat that the country faces. I do think you have made a major change in the way we assess the evidence in these programs, frankly, switching from a faith-based approach to these programs to an evidence-based approach, which we agree with.

In looking at the budget sent over, it is interesting, if you look at some zeroed-out and significantly-cut programs, BMD intercept, Multiple Kill Vehicle, the three European programs, they are reduced by a little over $1.1 billion. And then if you look at what has increased, procurement of THAAD, Aegis RDT&E, Aegis procurement, and Command, Control, Battle Management and Communications (C2BMC), they are increased by almost $1.1 billion. So, there was a balance between those two approaches.

And I do think that the evidence supports the balance that you have struck. And, Lieutenant General O'Reilly, obviously it was more directed at you, although I think the same is true in the space-based programs, I wanted to ask you a little bit about the evidence of the Multiple Kill Vehicle.

My understanding is that the emphasis on the mission has changed rather substantially when our strategy is what the multiple kill would have done. On page 25, you say we are—instead of the initial purpose of the MKV to integrate into midcourse interceptors, we are now assessing the feasibility of destroying threat missiles early in flight before countermeasures can be deployed, as a hedge against advanced, future threats.

Is it fair to say that, you know, that the old rationale for the Multiple Kill Vehicle does not fit the new strategy?

General O'REILLY. Sir, the mission of the Multiple Kill Vehicle, if we are successful with what we are trying to do with this proposed budget, we would not need that mission.

Mr. ANDREWS. And it is also true on schedule, is it not, that the initial schedule for the MKV was 5.5 years. It has now grown to somewhere between 12 and 14 years? Is that right?

General O'REILLY. Sir, that is the Kinetic Interceptor Program.

Mr. ANDREWS. Okay.

General O'REILLY. But the MKV program, sir, was on a 2018 timeframe.

Mr. ANDREWS. Where is it now?

General O'REILLY. Well, that is——

[Laughter.]

It is in the very beginning of the program, so that is why——

Mr. ANDREWS. Right.

And am I correct that the cost has, according to what I have read, gone from $4.6 billion to $8.9 billion?

General O'REILLY. Again, sir, that is the Kinetic Interceptor Program, yes, sir.

Mr. ANDREWS. Right.

And the first booster flight test was due in what year?

General O'REILLY. Sir, we re-baselined the program in 2007 for the first booster test last year. It had technical——

Mr. ANDREWS. Did it happen last year?

General O'REILLY. No, sir. They have had technical problems——

Mr. ANDREWS. Did you think it is going to happen this year?

General O'REILLY. No, sir. I do not believe it is going to happen this fiscal year. Our schedule assessment was——

Mr. ANDREWS. I understand there is some issue about September of 2009 possibly happening.

I want to compare that to the judgment you have made about THAAD and Aegis. I note that THAAD procurement is up by $316 million. Aegis RTD&E is up by $578 million. Procurement for Aegis is up by $112 million.

It was my understanding that the THAAD tests basically batted six-for-six. Is that right?

General O'REILLY. Yes, sir.

Mr. ANDREWS. And it is also my understanding that the system has proved so effective there is already a foreign sales component with the United Arab Emirates (UAE). Could you tell us a little bit about that?

General O'REILLY. Yes, sir.

They have made a request for several billion in investment of, and procurement of THAAD.

Mr. ANDREWS. My understanding is, from your testimony, is that $6.9 billion is, at least the potential for that?

General O'REILLY. Million, sir, or billion?

Mr. ANDREWS. Yes.

General O'REILLY. I know it is well over $5 billion, sir.

Mr. ANDREWS. Right.

And Aegis also has a similar record on successful testing. Could you tell us a little bit about that?

General O'REILLY. Yes, sir.

Well, THAAD has had six-for-six, as you said, sir, but what is also important is five of those intercepts were against actual threat targets.

Mr. ANDREWS. Right.

General O'REILLY. In the case of Aegis, they have had a successful string of—out of nine intercept attempts, they have had seven intercepts, but one of them, the missile did not launch because there was a command and control issue of the configuration by the soldiers.

But for the ones they attempt—they launched, it was eight-for-seven.

Mr. ANDREWS. Within the constraints of the fact that we are in a public setting, within those constraints, is it a fair conclusion that each of those two systems I just mentioned, properly posi-

tioned, would have a high degree of probability of success against the rogue missile threats that you assess exist today?

General O'REILLY. Sir, against the vast majority, the 99 percent I was referring to, yes. Against the longest-range ones, ICBMs, the way we are configured today, no, but that is what we are proceeding with on the Ascent-Phase Intercept, to give them that capability so they could handle missiles of all ranges.

Mr. ANDREWS. Thank you.

My time has expired. Thank you very much.

Ms. TAUSCHER. Thank you, Mr. Andrews.

I am happy to yield to the gentleman from Colorado, Mr. Lamborn, five minutes.

Mr. LAMBORN. Madam Chairman, before we start the questions, I have to make an unfortunate announcement.

Yesterday, the first female Air Force Academy graduate to die in combat was killed by an improvised explosive device (IED) near Kabul, Afghanistan. So, I would ask, if you could, ask for a moment of silence.

Ms. TAUSCHER. I think that is appropriate.

The committee will have a moment of silence in honor of the lost Airman.

Mr. LAMBORN. Lieutenant Roslyn Schulte.

[Moment of silence.]

Ms. TAUSCHER. Mr. Lamborn.

Mr. LAMBORN. Okay. Thank you.

General O'Reilly, here is a question about KEI. I am concerned with the decision announced on May 7th to cancel KEI, kinetic energy interceptor, in fiscal year 2010, followed by the Missile Defense Agency issuing a stop-work order on the program.

Likewise, it is troubling that these decisions to immediately halt the program and disallow the rest of the 2009 funding, which had been approved and directed by Congress, was made without a chance for congressional review.

But would you still consider proceeding with the planned KEI missile test this fall in as much as the engine set has been built and already delivered to the test site. Over $1 billion in taxpayer funds have already been invested in the program, and the completion of such a test would likely yield important scientific data that could prove useful in future missile defense R&D efforts.

General O'REILLY. Sir, first of all, the motivation for the stop-work was we have a legal liability for termination of over $39 million. Since no money was proposed for fiscal year 2010, I have got a responsibility to ensure that I can have enough funding in fiscal year 2009 to cover the termination agreements I have with Northrop Grumman and the other companies involved.

So, that was first of all. I have to protect that. And that was not sufficient, under the existing plan proposed by the company, in order to also pay for the flight test.

Second of all, there was three tests that were required, as the contractor proposed prior to the flight test, again, they have had technical difficulties with components and so forth. The program—the original schedule proposed a year—two years ago, they are a year behind in that. And when we looked at the remaining activities they have, including the additional ground testing, we did not

see that it was feasible. Our estimate was it would be done, at earliest, if everything was successful, would be December.

But, I have modified the stop-work order and asked the company to propose to me so we can evaluate, is there a proposed way in which they believe they could execute the test in the timeframe, within the funding, and still cover the legal liabilities that I have.

Also, I have asked in the stop-work order to have a thorough review of the program. A lot of the technologies developed in KEI are directly applicable to what we are referring to in the ascent phase.

So, we want to ensure we leverage that technology and expertise and the follow-on work that then would benefit not just KEI, but all the missile systems we are deploying.

Mr. LAMBORN. Okay. Thank you.

What are the Department of Defense's plans for Ground-based Missile Defense, and why should Congress have any confidence that MDA can support "robust R&D," as the Secretary of Defense has talked about, to improved Ground-based Missile Defense, including plans for testing years into the future, when budget priorities may shift money away from Ground-based Missile Defense in the future?

General O'REILLY. Sir, the limitation we are proposing on GBI is the 30 silos, because it was related to the rate at which we need to launch interceptors and the number of interceptors we need to put in the air to counter any rogue-nation threats that are in the air at the same time.

However, it is dependent on an extensive architecture, the GBI program. In all of those other areas, we are upgrading those programs and they will be feeding better discrimination data, command and control data, and so forth, for the interceptors.

We designed the missile so the basic missile itself had a large capacity for new software. We can upload that software in the missiles in the silos. It was done as forethought ahead of time.

So, we will continue the lab work of our testing, the command and control work, the development of the additional nodes that tie into the GMD system, and, for example, our forward-based radars and our Sea-Based X–Band (SBX) radar.

All of those upgrades also directly feed to the GBI's capability of killing a target.

Mr. LAMBORN. Okay.

And, lastly, in light of the $1.2 billion decrease in MDA funding, can you identify any underfunded programs that would strengthen missile defense if you had additional dollars and would put them next in the list of priorities?

General O'REILLY. Sir, the part of the missile defense architecture that we can benefit the most from is our ability to see threats as early as possible and get an accurate track. So, we are launching two satellites in August on a Delta IV out of Cape Canaveral, and we are planning on utilizing them in future intercept tests over the next couple of years.

What we need is a constellation—or would be a significant benefit to the missile defense architecture, if we had a constellation that provided persistent surveillance and cold-body tracking of cold bodies after they have boosted.

That is one area. Another area is the development of airborne sensors; and we are working very closely with the Predator office and unmanned aerial vehicles (UAVs) looking at how can we exploit that capability in order to, again, get early surveillance.

The interceptor would give us some improvement, but early surveillance and persistent surveillance would give us the greatest leverage.

Mr. LAMBORN. Thank you.

Ms. TAUSCHER. Thank you, Mr. Lamborn.

I am happy to yield five minutes to the gentleman from New Mexico, Mr. Heinrich.

Mr. HEINRICH. Thank you, Madam Chair.

General Kehler, General O'Reilly, I want to thank you for joining us today. I want to address my first question to General Kehler.

General, as you know, Operationally Responsive Space's headquarters is in my district in Albuquerque, as well as the Space Development and Test Wing. And I was very pleased to hear of the successful launch of the Tactical Satellite–3 (TacSat–3) on Tuesday night, and I certainly congratulate you, Director Wegner, and all those involved with that launch, on that successful launch.

Earlier this week, the Air Force released its Unfunded Priority List, which listed ORS as number 3 out of 20. And I wanted to ask you if you could explain, specifically, what you think could be accomplished by funding this priority?

General KEHLER. Yes, sir.

We are delighted, as well, with the successful launch of TacSat–3. It was another step in what we believe is a very promising way forward for smaller satellites with highly capable payloads that will be useful for the warfighters.

What we are doing, now that we have launched TacSat–3, we are already on to the construction of the next ORS-like vehicle called ORS Satellite Number 1, ORS Sat–1. And the difference is, the TacSat series has been developmental, if you will.

ORS–1 is actually now taking a need from one of the combatant commanders and trying to apply operationally responsive principles to assembling and launching that. We have given ourselves a fixed time to do that in. We have given ourselves a fixed budget to do that in. But we have also given ourselves some off-ramps where we can make decisions.

Part of that Unfunded Requirement would be the next increment, if we get to the right decision point, and then decide to go forward with this ORS Satellite Number 1, that we can actually make it within the kinds of parameters, very aggressive parameters, that we have set up.

And then assuming that is right, the next piece is for the second of those satellites, which would complete the combatant commanders needs in a certain orbit. You cannot cover everything they need covered with one satellite. I know you know that. But, we would need to put a second one on orbit. That is what this does. It completes the first one, goes to the second one.

Mr. HEINRICH. I actually think you probably answered my second question, which related to consulting our combatant commanders in terms of what might be included on that ORS Sat–1.

General KEHLER. Yes, sir.

In fact, this is answering, specifically, a need from Central Command (CENTCOM). They have identified, among a number of intelligence, surveillance, and reconnaissance (ISR), shortfalls that they have that we are addressing; for example, even bigger picture in the Air Force with increased Global Hawk, Predator orbit, et cetera.

They have also asked us to do some things that are best done from space, and those are infrared (IR) coverage, and that is what we will do.

Mr. HEINRICH. Great. Well, thank you General Kehler.

I want to ask—sort of move to a different topic for General O'Reilly.

You know, I am a believer in maintaining a multilayered missile defense structure, and one of the programs that we have invested a lot over the years and, because of my background in directed energy that had a real interest in, is the Airborne Laser, which I think presents a lot of value in areas of directed-energy research, as well as potential in both the boost and ascent phase.

I wanted to ask you if you could discuss sort of what the Department's plan is for applying ABL's work to other directed-energy efforts, and what plans are in store for the program after the forthcoming tests and shootdown this fall?

General O'REILLY. Thank you, sir.

First of all, the achievement of the Airborne Laser last year was truly revolutionary. We were able to fire a laser to a target that was 80 kilometers or farther away in the Earth's atmosphere, and the system normally shoots upward, so this is more difficult.

We were able to measure the diffusion of the laser beam over this range and receive a return off the target and then compensate for that defocusing by the atmosphere, like your glasses, and we actually fired the laser, then, using adaptive optics with a defocused laser, and we used the Earth's atmosphere to focus it.

So, what happened was we had a very precise laser, we have done it 12 times. So we have convinced ourselves that that breakthrough technology is directly applicable for any time a high-powered laser is fired in the atmosphere. And we did it repeatedly.

That gave us the confidence to move on to take the high-powered laser, the 1.3 megawatt-class chemical oxygen iodine laser (COIL), we have installed it in the aircraft. The aircraft has flown for several weeks now. It is going through flight checkout, and we are updating the optics on it. But we are convinced that we have solved the largest fundamental problem.

We have also fired that large laser on the ground at Edwards Air Force Base over 70 times and at full power. So, it is a matter of integrating them onboard the aircraft, and that gives us the confidence for this year.

However, this is revolutionary technology. We still must prove it. So we have a shoot-down planned in the fall against a couple of targets, and then if we are unsuccessful, this budget supports another attempt later on in the wintertime. If that is unsuccessful, a third attempt in the springtime. If that is unsuccessful, I will go back to the Secretary of Defense and propose either termination or some other decision.

If it is successful, we will continue to use it as a research and development platform. It has given great indications that it can be put on military aircraft of a smaller size and be much more deployable.

So those are the type of things we would like to pursue before we begin a Tail 2-type development.

Mr. HEINRICH. You meant when it is successful this fall, right?

General O'REILLY. Sir?

Mr. HEINRICH. Sorry.

General O'REILLY. Yes, sir. [Laughter.]

Mr. HEINRICH. Thank you very much, Madam Chair.

General O'REILLY. We do want to prove it.

Mr. HEINRICH. Yes. Absolutely.

Ms. TAUSCHER. Thank you. Thank you, Mr. Heinrich.

I am happy to yield five minutes to the gentleman from Arizona, Mr. Franks.

Mr. FRANKS. Well thank you, Madam Chair. Madam Chair, I guess the first thing I would like to do is just to identify with the ranking member's comments in his opening statement, and also with Mr. Heinrich's comments and inquiries related to the Airborne Laser. I think that is very insightful.

Let me thank both of you for being here. I never want to forget that while those of us on this panel talk a lot about freedom, it is people such as yourselves that give all of your life to it and sometimes, literally, give your life for it. And you are the most noble people we have in our society.

And often times, I think it is probably the most manifest in that you take whatever we do, imprudent or not, and you do the very best you can to protect this country. And I am very grateful to you.

I have two new little babies, so I am more grateful than I have ever been to what you do, because what you do today certainly affects generations to come.

One, perhaps, example that I might mention, General O'Reilly, in your testimony you talked about some of the legal impediments in the law in the last Congress that, perhaps, has impeded progress on the European site.

And I continue to believe that the missile defense, and especially related to the European site, could potentially have the ability to devalue a nuclear program in Iran and help some of our other ancillary efforts to keep that country from going nuclear, which I feel is an imperative of the highest priority and may keep us from facing a, you know, a Jihadist terrorism in our own country.

So, with that, General O'Reilly, let me direct my first question to you, sir. Pretty basic question: Do you believe that the threat from long-range missiles has increased or decreased in the last six months, as it relates to the homeland here?

General O'REILLY. Sir, I believe it has increased significantly, and I base that assumption on the intelligence information. I am a customer. I do not develop intelligence, but I use it. And the demonstration of the capability of the Iranian ability to put a satellite in orbit, albeit small, shows that they are progressing in that technology.

Additionally, the Iranians yesterday demonstrated a solid-rocket motor test, which is much more feasible to deploy and sustain in the field, and that is disconcerting.

Third, the North Koreans demonstrated, even though their attempt to put a satellite in orbit failed, they had a first and second stage that performed fairly well, which, again, shows that they are improving in their capacity, and we are very concerned about that.

Mr. FRANKS. Sure.

Well, I know that the reports that you mentioned show a difference in the strategic emphasis from 2002 to 2010, and I am hoping, just for the ability to educate the committee, that any reports or data that you are able to release to the committee that would help us understand, for instance—related to the ground-based midcourse. I think that some of your testimony is very compelling, and I would hope that any information or studies that you reference in your testimony, would that be possible to give that to the committee?

General O'REILLY. Yes, sir.

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

Mr. FRANKS. All right. Thank you.

Let me shift gears here on you. I think probably related to GBI, there has been a lot of questions that I will not repeat. But the manufacturing line and industrial base continues to be a great concern in any situation that we face. When does the line go cold for the second- and third-tier suppliers, and how will this affect your ability to keep options open for the future production of ground-based interceptors?

General O'REILLY. Sir, for the lower-tier suppliers, the last procurement of the current 44 GBIs was made in 2008 and there was some long-lead procurements before that. So, their deliveries are occurring this year.

One area that we are looking at is to upgrade the avionics of the missile fleet. And those are the types of initiatives the Secretary if referring to as continuing that work so that we have flexibility to respond to the decisions of the QDR and others, the Ballistic Missile Defense Review.

So, we have attempted to be as flexible as possible from a programmatic point of view on those ultimate decisions, so that we are not prematurely limiting our ability to have an industrial base to produce GBIs.

Also, the refurbishment program does replace a large part of the missile avionics system and other components, and so, by having a refurbishment program, also keeps the supplier base active to supply those components.

Mr. FRANKS. Well, again, I thank you both very much for your service to the country.

And thank you, Madam Chair.

Ms. TAUSCHER. Thank you, Mr. Franks.

I am happy to yield five minutes to the gentleman from South Carolina, Mr. Spratt.

Mr. SPRATT. Thanks very much.

General, [audio break] talk about the significance and size of this program ... [INAUDIBLE] ... to bring that money to a current

value in today's dollars, we have probably spent $150 billion trying to master the threats of missile defense and the threat of other missile attacks. And clearly the threat is out there, but there are additional threats on top of that.

Thank you, sir. Shows you my technical expertise.

Let us cut straight to the BMD, or the GMD. In a way, you diminish that program with faint praise by cutting it from 44 back to 30. Is this because you have reassessed the threat posed by rogue enemies, or is it because the system itself has limitations and there may be better options?

And if the STSS turns out to be successful and proves that we can master the track and also that we can discriminate, is there a future for this system that is beyond the size that you have in mind right now?

General O'REILLY. Sir, for the GMD system, sir, we believe that the threat continues to grow, but what we are watching is the rate at which these missiles can be launched, the raid size, how many can be launched at one time. That is critical to us to determine what size missile field do we need to respond. That is one.

Second of all, the STSS program is a pathfinder for what we are exploring as a satellite system that is focused on basic functionality so that we do not run into the pitfalls we have seen in other satellite programs of cost and schedule overrun, and so forth, and I know General Kehler can respond to that better.

But we are trying to narrow the requirement so that it delivers exactly what we need in a manner that uses proven technology for that program, so——

Mr. SPRATT. We have been following these systems, the SBIRS-High and the SBIRS-Low and now the STSS for a long time, and their potential was always just over the horizon.

Are you confident that we are about to know whether or not it can perform the mission? If not, we may have to look elsewhere for something of its——

General O'REILLY. Yes, sir.

We are going to launch those satellites, those demonstrators, those two, in August, and we have a robust test program for the next year-and-a-half to demonstrate all of its capability. And that may be its shelf life, but traditionally they last on orbit much longer than that, and we are going to take advantage of every possibility we can to test this system and use it in different ways to prove out the benefit of a satellite constellation system for ballistic missile defense surveillance.

Mr. SPRATT. General O'Reilly, you testified before that there has been an increase of 5,900, I believe, of various missiles, but the vast majority of those, 93 percent, I believe, are short-range and medium-range missiles.

Are we putting our money in the right place? Are we developing systems like the—adequate systems—like the THAAD and the Patriot Advanced Capability–3 (PAC–3) to counter the threat, or is there something else? Should not this be where we are putting substantial resources since this is where the threat primarily resides right now?

General O'REILLY. Sir, our intent is, this is a fiscal year 2010 budget. But, our intent is to increase the production capacity for

both those systems so that we can, in our out-years, we are exploring to triple the number that we previously were going to procure for the very reason you said, sir.

So, we have a near-term greater capability against those shorter-range threats to cover our deployed forces and our allies.

Mr. SPRATT. Thank you very much for your testimony.

General KEHLER. And, Madam Chairwoman, if I could just add a point, Mr. Spratt, sir, just as a point of reference.

The first two SBIRS payloads are, in fact, flying. Payload number one——

Mr. SPRATT. SBIRS-high?

General KEHLER. Yes, sir. Well, it is the elliptical orbit, but yes sir, it is a part of the SBIRS-high program. The first two are flying. The first one is performing exceptionally well—has been handed over to the Commander of Strategic Command (STRATCOM) for use.

The second one is also flying and about two-thirds of the way through checkout and looks very promising, just as a point of reference.

Ms. TAUSCHER. Thank you, Mr. Spratt.

I am happy to yield five minutes to the gentleman from Washington, Mr. Larsen.

Mr. LARSEN. Thank you, Madam Chair.

And, General—start with General Kehler this time.

With the termination of the TSAT, it leaves open the question of the future of protected communications-on-the-move. And the increase from four to six satellites for AEHF, as well as the addition of the seventh for advanced procurement for WGS, brings home the question whether, you know, whether or not we are going to continue to have what we projected to be a TSAT capability. Is it going to migrate to AEHF or WGS, and I am just curious, in terms of thinking ahead on this, what the answer to that might be?

General KEHLER. Yes, sir.

The decision on TSAT was really made in the context of all of the budget decisions. The requirement to provide for protected communications-on-the-move remains—protected communications across the board, really, but the requirement remains.

But when you have to get to the source of capabilities the TSAT was going to bring is really the question. And in the context of the other budget decisions, some of the big demand for protected communications-on-the-move has slipped to the right with the other budget decisions.

That has given us an opportunity to continue on a pathway that we have just really started. First of all is WGS, which is wideband unprotected, but very wideband, highly-capable pipes that we are putting up in the sky.

The first one of those is flying—has been turned over to the combatant commander for use. The second one is on orbit and in checkout, and it looks like that is going to be a highly successful program.

We then will continue to fly for a little while longer the Milstar system until we can put the first of the Advanced EHF satellites on orbit. It looks to us like we can—the decisions that Congress made last year to go to a fourth AEHF now gives us an opportunity

to harvest some of the technology out of TSAT, bring that into Advanced EHF, and potentially WGS.

At the same time, we will be still relying, at some level, on commercial satellite communications. The question for us to come back and answer to you is what that mixture looks like and how quickly we can pull into the protected piece of this, some of those technologies we have already invested in in TSAT.

Mr. LARSEN. So, I guess a base, or bottom line on that, or a headline from that is that it may be early to make a decision on whether—on where that potential capability should migrate to, the TSAT capability?

General KEHLER. I think we are—well, what we know is that we will infuse some of that technology into Advanced EHF. The question is—and perhaps WGS as well—the question is how, and in what kind of blocks.

What we do not want to do, sir, is make the mistake that we have made in the past about having requirements that we cannot quite get our arms around at this point. We need to go deliberately. We need to use our "block-build" approach, and we need to pull in those things that make the most sense.

Mr. LARSEN. And I suggest to you that we do not want to help you make those mistakes, as well.

General O'Reilly, the MDEB was constituted in this past year and I think that, was it January 21st of 2009 is when it first really came into—it does not matter—it came into place.

General O'REILLY. Actually, it was July of the previous year, sir.

Mr. LARSEN. July of 2008.

Was MDEB involved, then, in this year's—in the development of the fiscal year 2010 missile defense budget?

General O'REILLY. Yes, sir.

They have reviewed the budget and provided the input to it twice, and I presented to the Missile Defense Executive Board, that was well-attended, the proposals, and then their input went forward to the Secretary of Defense.

Mr. LARSEN. And was this the first time in the history of the agency, the Missile Defense Agency, that the budget was then developed with that additional oversight, as opposed to MDA going directly to SecDef and then to the Office of Management and Budget (OMB), and then to the President, and then to us?

General O'REILLY. Sir, this was the first time we had the benefit of the, not only the process, but also the products that, for example, the combatant commanders, STRATCOM is required in this process to provide a Prioritized Capabilities List, which I responded to.

And then they even evaluated my response and provided a Capability Assessment Report, which had a strong influence on this budget of—they rated us red, yellow, green on responding to their priorities, and that input was also provided to the MDEB.

The products and the subcommittees were all working throughout this process.

Mr. LARSEN. Thank you very much.

My time is up. The point I wanted to make is just that there is—I know we are having this debate about missile defense and I appreciate it as well. But it is really not just a matter of your debate, sorry, your budget showing up to us from the Secretary of Defense.

It sounds like a more robust review, even before it got to that level, than we have seen before. That is what it sounds like to me—the internal review within the Department.

General O'REILLY. Yes, sir.

Mr. LARSEN. Thank you very much.

Ms. TAUSCHER. Thank you, Mr. Larsen.

I am happy to yield five minutes to the gentleman from Rhode Island, Mr. Langevin.

Mr. LANGEVIN. Thank you, Madam Chair.

General Kehler, General O'Reilly, thank you for your testimony here today.

I have a couple of questions. First one, more in a broad sense and how you make your decisions. How robust is your effort in conducting an analysis of alternatives, as other technologies mature, and being able to incorporate them into existing programs?

You know, we spent a lot of money in Defense Advanced Research Projects Agency (DARPA) developing cutting-edge technologies. I am always skeptical of expensive weapons systems and their ability to adapt to new technologies that emerge, you know, for example, the ABL using a chemical laser, and if there were to be advances in solid-state lasers, could you and would you be able to adapt to incorporating that type of technology on ABL, for example, even though you have invested so much time, effort, and money into developing a chemical laser.

So can you talk to me about your robust effort in doing analysis of alternatives? How does that process work?

General O'REILLY. Sir, that is a maturing process that is associated with the establishment of the Missile Defense Executive Board run by the Under Secretary of Defense for Acquisition, Technology and Logistics.

The expectation in that board, though, is that the analysis that was done to support these decisions is on par with the analysis that was done in other milestone decisions. Again, this is a maturing process for the Missile Defense Agency.

A good example would be we are looking at extending the range of the THAAD missile. Before we do that though, we are in a very collaborative analysis of alternatives and assessment by the Army, the Joint Staff, the Missile Defense Agency, all reporting out to the Missile Defense Executive Board.

So that adds a level of scrutiny at that level that had not existed before in a formalized process. Also, I am the acquisition executive for the early stages of development, and although we are exempt from 5,000, the DOD processes for acquisition, I am reviewing the use of a milestone process for my sake, in order to conduct extensive analysis and evaluation of alternatives before we initiate contracts in the way that you are referring to, sir.

And that is for the initial milestones. A full-scale development, I am soliciting the participation of the service acquisition executives that I am going to—that is ultimately going to receive this capability, so that together we are reviewing these programs before we execute large contracts.

We do work with DARPA and we have had exchanges with them and we are investing in solid-state laser on the side as a technology program.

Mr. LANGEVIN. Thank you for your answer, General.

General O'Reilly, I know that some of these things you have talked about in your opening statement and some members have touched on them, but just again for my comfort level, the budget request increases funding for the Aegis BMD and THAAD programs by $900 million, while terminating the Multiple Kill Vehicle, Kinetic Energy Interceptor, and adding the approaches of the second Airborne Laser prototype.

Can you talk a little more about the Department's rationale for the significant increase in funding in these two programs and cutting back on the other three? And also why were these decisions made prior to the completion of the Administration's missile defense policy and strategy review? And finally, does this reflect a shift in focus from long-range threats to more short- and medium-range threats?

General O'REILLY. Sir, the Missile Defense Executive Board process allowed the warfighter a strong voice on what priorities of capabilities they need and what risk assessments are out there. The Joint Staff, or the Joint Requirements Oversight Council (JROC), over a year ago, approved a study that showed that we were deficient in the number of Aegis and THAAD missile systems.

And so that was an endorsed study from the previous two years ago, and so therefore with the scrutiny that that study has had, and the endorsement it has had, we move forward with those procurements because the threat to those forces exists today, and we wanted to, as quickly as possible, respond to both those requirements that were endorsed by the Vice Chiefs of the Services and meet the threat that we saw out there.

The other shift, though, is primarily, we—part of the Missile Defense Executive Board is it does review the threat. And it does review the intelligence and so forth. And we are aiming the research and development, along with the deployment of the most mature systems we have, to respond to the large preponderance of the threat which is in the short and medium ranges.

Mr. LANGEVIN. And the issue of waiting for the completion of the Administration's missile defense policy and strategy review?

General O'REILLY. Sir, there is a lot of decisions that we did not make, such as to keep the GBI line—to terminate that line. We did not. And there is an example of we are maintaining programmatic flexibility awaiting for those decisions, those policy decisions, to be made later this year and announced through the QDR and the Ballistic Missile Defense Review.

So we wanted to be as responsive as we could, as quick as we could, to the combatant commanders' request for missile defense capability—at the same time, allow programmatic flexibility for those policy decisions that will be made later on this year.

Mr. LANGEVIN. Thank you, General.

I yield back.

Ms. TAUSCHER. Thank you, Mr. Langevin.

I think we will go into a second round of questions.

General O'Reilly, the United States and Israel are jointly developing an upper-tier missile defense system to engage potential ballistic missile threats to Israel at longer ranges. Israel's preferred alternative is to develop a new missile, the Arrow–3. However, I

understand that successful development of the Arrow–3 system is considered a high risk.

What are the key risk areas? Are we exploring alternative ways of assisting Israel to meet its upper-tier requirement? And how likely is it that Arrow–3 will be able to meet the schedule of deploying in initial capability by 2014?

General O'REILLY. Ma'am, the design for the Arrow–3 missile system shows it will be an extremely capable missile. It is very advanced. It is a more advanced design than we have ever attempted in the United States with our programs. That is due to the way that the seeker has great flexibility, and it has other propulsion systems. It will be an extremely capable system.

However, associated with that advanced development is the schedule that goes along with that and the timelines in which we saw, we are not in a position to say they cannot achieve those technical accomplishments. And we hope they do, and we are very supportive of that process.

But we saw particularly the schedules in which they were proposing, I had deemed, and I had had independent studies deem, as very high-risk for a missile development program.

So, our assessment is that it is unlikely that they can meet the schedule, which they had laid out to accomplish all of these technical achievements, at this time.

Ms. TAUSCHER. Thank you.

Mr. Turner.

Mr. TURNER. Thank you, Madam Chairman.

It was our understanding that Mr. Rogers from Alabama was going to have an opportunity to speak after the first round, but since we are going to wait for the second——

Ms. TAUSCHER. No one consulted with me on that. If they had consulted me, I would have said that having two——

Mr. TURNER. That is fine.

Ms. TAUSCHER [continuing]. Two different hearings at once would have made it difficult to do that.

Mr. TURNER. That is absolutely fine. It was really a staff communication to us. So we understand, Madam Chairman, that that was not your call. But in order to facilitate his schedule, I am going to yield to him a portion of my time.

Thank you.

Mr. ROGERS. Thank the ranking member.

Generals, thank you both for being here, and thank you for your service.

General O'Reilly, I want to pick up on our conversation from last week about these GBIs. Well, first of all, when you were talking to Mr. Langevin, I thought you said you were delaying the decision on the GBIs until later—the termination of that.

General O'REILLY. Sir, that is the production line. We have not proposed that we would stop the production line or any potential for future buys of GBI.

Mr. ROGERS. That is——

General O'REILLY. What we had stopped was the going beyond 30 missile silos.

Mr. ROGERS. Okay. So then as far as tests are concerned, I know that of the 44 you are going to use 10 for testing. So you are not—

at least on this date—you are not planning to discontinue production so that you will have some future interceptors for tests?

General O'REILLY. Yes, sir.

We are, in fact, in parallel to this effort, going through a test review with the Director of Operational Test and Evaluation and the service Operational Test Agencies. And we are identifying quite a number of tests that we are going to need in the future that will require GBI participations, including salvos of GBIs.

So that—we are completing that work now and that will be another indicator of the number of ultimate GBIs we would need for the purpose of testing.

Mr. ROGERS. Great.

You talked earlier when the ranking member was asking you about the logic for 30 as opposed to 44 being deployed, and you basically said you looked for somebody to tell you why we had 44, and you never had been able to get an answer.

General O'REILLY. Well, sir, it was the best I can tell. I have not seen an analysis, but the best I can tell, it was a judgment based on where the threat would be today driven by how many rogue-nation intercontinental ballistic-type missiles could be launched at one time in this timeframe. And, of course, it was very hard to judge risk or the threat, and that was a judgment done many years ago. But that was the best understanding I have today of how the number got to be 40, at that time.

Mr. ROGERS. Well, I understand your interest in the Ascent-Phase Interceptor, and I like that idea. I just do not understand why we would diminish a level or a layer of our current capability while we are waiting on that, I think exciting, technology to mature.

General O'REILLY. Sir, in the GBI assessment or analysis, we did go back and look at what we know today and what the Intelligence Community can identify as the ability for the threat to launch multiple.

We need a GBI capability. We realize that. And we need to have one that is sustained for decades.

Mr. ROGERS. Right.

General O'REILLY. We realize that, and we have not shut the door to that at all.

In the area of the execution of those other programs, which we terminated, their execution was delivering very late, it was very high-risk. We want that capability, but although boost-phase capability would be ideal, our assessment of the risk of achieving that is very high.

Yet, very close to boost-phase is ascent-phase, and we thought it was much more achievable, and we want to have enough interceptors so that we can respond in volume with a large number of interceptors responding back to those threats.

And so we are trying to explore, and we are pursuing ways, to take our given force structure today and make it more powerful and more of a deterrence to these type of launches.

Mr. ROGERS. How much money is in the budget for that ascent-phase technology development?

General O'REILLY. Sir, if look at what we are strictly going to be investing in, it is focused at about $368 million this year. But it

leverages the interceptor work and over $1.5 billion that is going on in the development of the rest of the system that the ascent-phase adds that first layer of defense.

So, it is going to be working with—it is going to be developed in consonance with that other $1.5 billion. So I did not advertise $1.8 billion in that area because I believe that is not a fair assessment.

But there is $368 million that is directly going to give us this type of capability to use the rest of the system this way.

Mr. ROGERS. Well, thank you very much. I appreciate that.

And I yield back.

Ms. TAUSCHER. Mr. Larsen, do you have any second-round questions for five minutes?

Mr. LARSEN. Not at this time, Madam Chair.

Ms. TAUSCHER. Mr. Lamborn for five minutes?

Mr. LAMBORN. Thank you, Madam Chairman.

General Kehler, how does the $136.4 million increase in Space Situational Awareness funding in the fiscal year 2010 budget reduce the vulnerability of our space assets, and will the increase enable the DOD to share SSA data to prevent accidents like the Iridium collision in February?

General KEHLER. Sir, with the increased importance of space comes some interesting issues, one of which is an increased need for us to have better situational awareness of what is there.

Space becomes more crowded all the time. We look at over 19,000 objects that we actively track on orbit. There are hundreds, certainly, thousands, perhaps even more that are there that we do not see—nuts, bolts, washers, screws, things that have been part of the cost of doing business on orbit. And so it is important for us to increase our situational awareness.

In the 2010 budget, the increases that we have asked for for situational awareness are not because of program overruns. They are not because of difficulties that we are having. We are looking to target that fiscal year 2010 investment at being able to use our existing sensors better. And that means being able to understand the data, collect more data from the existing sensors, put it together better, and put it to better use.

In the meantime, as we are working our way down this road, we are increasing our computing capability today, as well as the number of human beings who are analysts who can look at the data and decide when a collision might occur.

That money is actually being spent right now, today. It is not, by budget standards, it is not a huge amount of money. We expect to have much better capability to predict potential collisions by the end of this year.

We are better today than we were when the collision occurred back in February. We will be better tomorrow than we are today. But that is at using the data that we already have and being able to use it better.

As we go into 2010, we will begin to pull more sensors into that mixture, and I think we will be able to do better sooner not by worrying about new sensors, although there is some of that in that budget. We will put a new sensor on orbit here later this year that will allow us to observe objects on orbit better.

But by and large, this near-term investment is to make our operations center better. They can process the data better, display it better, and give human beings some better understanding of what they need to do, and how they need to go about it.

Mr. LAMBORN. Okay. Thank you.

General O'Reilly, the budget request includes only $51 million for a European capability. Does this low funding level indicate a change of Administration position or lack of support for European missile defense?

General O'REILLY. Sir, it does not. It reflects the legal restraints I have from last year's Authorization and Appropriation Act. Fifty-one million is about the extent I can execute this year without the ratification of the Ballistic Missile Defense Agreements of the Czech Republic and Poland.

We are continuing the two-stage GBI development, which also is part of the European capability and the development and deployment of forward-based radars, which are also part of that architecture.

But I am limited to that amount; that was my estimate as how much I could do without these other constraints being met.

Mr. LAMBORN. Okay. Thank you.

On Tuesday, a *Washington Post* article referenced a study by the EastWest Institute, an independent think tank based in Moscow, New York, and Belgium, that concluded the proposed European missile defense system is "ineffective against the kind of missiles Iran is likely to deploy."

General O'Reilly, you do not agree with that assessment, do you?

General O'REILLY. No, sir, I do not.

Mr. LAMBORN. And why not? [Laughter.]

General O'REILLY. Sir, a lot of the assumptions they use in these type of assessments are not accurate and they do not reflect our true capability—our specifications, what we have demonstrated, also what we know of the threat, for what I have access to in intelligence, it does not correlate to the basic assumptions that they use in that study and others I have seen like that.

Mr. LAMBORN. Thank you.

Madam Chairman, I yield back.

Ms. TAUSCHER. Thank you, Mr. Lamborn.

Mr. Langevin, from Rhode island, for five minutes?

Mr. LANGEVIN. Thank you, Madam Chair.

General O'Reilly, it has come to my attention that MDA has set aside money for THAAD batteries but not radars. I was concerned that the goal of the Administration appealed more to THAAD systems and may be hampered by a limit in the X–band radars and production to accompany the batteries.

What is MDA's plan for dealing with the gap in deployable radars to the new THAAD systems, and when does MDA begin the procurement of the radar to meet the Administration's goals?

General O'REILLY. Sir, we do not have a gap in the radar between the radars and the batteries. This radar is a multifunction radar. It can operate with the THAAD unit for tactical defense, and it can also operate standalone as a forward-based radar for strategic-type threats, long-range, IRBM, ICBM, on its own.

So, what we have procured is enough for the THAAD units today, and additional radars to also produce in that same function, we are developing the software so that these radars can operate in one function or the other, and they are interchangeable.

So, this concern may be the concern that they do not see a radar matched to a particular battery. We did that on purpose so that we have a pool of radars and any of them can support that battery. But we have the seventh radar being delivered this year and we have four THAAD units previously. With this budget, we are proposing additional THAAD units, two more, and with those THAAD units come radars.

Mr. LANGEVIN. Thank you, General.

That was all I had, Madam Chair. I yield back.

Ms. TAUSCHER. Thank you, Mr. Langevin.

Mr. Franks for five minutes.

Mr. FRANKS. Thank you, Madam Chair.

General O'Reilly, earlier you had just mentioned briefly the complexity of the Arrow–3, and this was not really one going to be one of my questions, but I was somewhat fascinated that, potentially, it has the potential to have some paradigm shifts in missile defense capability.

And I understand that there is at least an effort to make sure that that process stays alive to see if they make their knowledge points and it is because the Israelis, as you know, certainly have shown the ability to shock the world, many times.

And I am hoping that we can make sure that if that is to happen again, it can be good for the United States and for Israel. So I am glad to see that there is still an effort there to see how they do with the Arrow–3.

The committee—in fact, you cited the Joint Staff's joint capability, the Joint Capabilities Mix (JCM) study conclusion that twice the number of Aegis and THAAD interceptors are required, and to the budgets, in my judgment, they did that, and I think that is a credit to those who did.

What studies have been done to identify the force-structure requirements for the rest of the missile defense architecture, like for example, you know, GMD or Patriot or radars and other sensors. Have there been other studies that, you know, to identify the force requirements?

General O'REILLY. Sir, over the past year, we have also had great success in establishing Memorandums of Agreements with the Services. And in the case of the Army, I signed one with the Secretary of the Army in January.

Part of that created a board of directors in which would review those exact studies so that we have Army input, we participate with the Army, and we make joint decisions. The programs you mentioned are all Army programs, and that is how we have worked through the Army force development process of their Army staff to determine what are the force structure requirements for the Army.

Mr. FRANKS. And, again, without pressing you too hard here, are there copies that would be available to the committee that would give us some clarification as to what the rationale was in many of those case?

General O'REILLY. Sir, I will have to go back and look at that, but I will go back to the Army and make that request.

[The information referred to can be found in the Appendix on page 119.]

Mr. FRANKS. I would appreciate it, General. Sure would.

Let me then shift gears again. You know, there have been at least one study that has examined alternatives to the proposed missile defense system in Europe, and the independent assessment conducted by the Institute for Defense Analyses (IDA), which was required by the fiscal 2008 budget.

Have you seen any alternatives to the current proposal that are more cost-effective in providing defense of Europe and the U.S. than the existing plan?

General O'REILLY. Sir, we are going through that cost-estimating process right now. There are several alternatives that it, again, it is driven by the assumptions, 30-year life, those type of assumptions.

But the current proposal for an upper-tier defense, which is what was proposed—upper-tier against long-range threats. We have not seen a proposal that is less costly than that.

But we are also evaluating, and the Department is evaluating, the protection of all of NATO, and that is more costly when you bring in other units because you need shorter-range units to protect the southern tier from Iran, which is the focus of this.

But for the upper tier, for the lowest cost of protecting for the upper tier would be the program of record, at this time.

Mr. FRANKS. Well, one of the alternatives that I have seen, you know, would provide protection for Europe, but it would not provide protection for the homeland. And I just want to make sure, you know, that the protection of the United States is still a necessary criteria for the Administration's plans for the European site.

Is that still your understanding?

General O'REILLY. Yes, sir. And there are analyses going on and assessments by the Department as part of the Quadrennial Defense Review that have not been complete yet. But, from that point of view, the requirement I have had, the guidance I have had, is for the protection of the United States and Europe.

Mr. FRANKS. General, I hope you are successful. Thank you, sir.

Ms. TAUSCHER. Mr. Turner.

Mr. TURNER. Thank you, Madam Chairman.

Obviously, a lot of the questions that you are receiving today concern the reduction of the 44 GBIs to 30—is a concern of not only the level of protection that we have but also looking forward and our capabilities to support our industrial base.

There is concern in second- and third-tier suppliers where reports indicate could be without work at the end of this year, which results in the issues of loss of capability and cost for restarting versus cost for maintaining.

You had indicated before the 44, perhaps, was arbitrary. You believe that you have some basis for looking at 30. But one of the issues that has been raised in the numbers that you are going to be reducing the ground-based interceptors to is the issue of sustaining flight testing.

According to the budget request, 10 of the remaining 14 GBIs not deployed will be used for test assets. Assuming two flights per year, and perhaps the salvo test, the expectation is that you would run out of test GBIs before the end of the Future Years Defense Program (FYDP). Once these 10 GBIs are used up, do you see the need for further GMD flight testing? And then the context in which this information has been highlighted is the issue that, currently, for our ICBMs and our Submarine Launched Ballistic Missiles (SLBMs), you say they are two to three times—there are flight tests.

My understanding is that, General Kehler has indicated that before the Senate Armed Service Committee—that you would like to go from three flight tests to four flight tests. The concern is, obviously, is that with the reduction, you are going to run out of the ability to conduct tests of something that, perhaps, if you look at other programs, we will need a continuous sustainment, not just for determining whether or not it operates but whether or not there are upgrades and other types of testing to ensure that it is operational.

If you are going to run out of these, it does seem that there, perhaps, should be an effort to sustain our industrial base, both the second- and third-tier suppliers, so we do not incur a huge cost as we go forward with testing. Have you taken that issue into consideration, and what are your thoughts?

General O'REILLY. Sir, if I can, first is I do not believe I have said the 44 was arbitrary, it was just I have not seen the substantiating data that was used for that. It appears to me to have been a judgment on risk and on an intel assessment of how many threat missiles would be available today, or we would be threatened by, for simultaneous launch.

But, so it was a judgment made on data. It is just that that data is still under assessment, and I know what they said and it is not the case here——

Mr. TURNER. Okay, I guess that is where I accept your correction, however, I guess the concern that everyone has is, well, what is the change? Is the data on which it was based lost to you? I mean, you say you have not seen it. Because what we would like to see is what has changed.

Everyone's understanding of the changes of the environment we are in is an increasing threat, not a decreasing threat. And so that is why everyone is so concerned about your now proposing a decrease. So, in the issue of picking that number, people have concern about what data was used. So, if you do have an ability to look back at that and give us some comparative, we would appreciate it. But your thoughts on the issue of testing, I would appreciate.

General O'REILLY. Yes, sir.

This budget was developed without the benefit of the current test review, which is ongoing, that we have testified to before; Dr. McQueary, myself, and General Nadeau. We are completing that review now. It has an increase in testing over what was previously assumed for the purpose of this budget. Those results will go to the Missile Defense Executive Board, and we will brief that out for judgments made by them in order to inform our proposed budget, 2011, for the next year.

In the meantime, my concern has been, as you have stated, to focus and ensure that we are addressing the obsolescence process—or problems that do occur with any electronic system over time, and we are in a position in which to activate the production lines if they do go cold or extend those production lines for those suppliers through a refurbishment process.

What this budget proposed which did not exist before was a formal process where you have additional missiles, spares, intentional. And you recycle them through fleet as a way of measuring their performance and understanding their aging.

These are also fairly extensively tested missiles in their silos themselves. They were designed that way up front using the latest technology at the time, which was just a few years ago, which is much beyond the type of fleets at which we are compared to often, the older missile systems that do not have the level of built-in tests and they are not monitored in the same way in their environment.

But even with that, we have an annual maintenance program. We have a quarterly program that goes out and looks and measures the performance of each missile. In the past, we have pulled missiles and refurbished them because of the instrumentation which we have in these silos.

So, when we put that together, that is also going to be considered into the ultimate number of GBIs that we need to procure.

Mr. TURNER. Okay. So I do not mischaracterize what you have said, and see if I can get this right, you do believe that there could be increased flight testing requirements in looking at sustainment of the program. You are evaluating that. You are going to be making recommendations as to what that would be, and it might result in a shift in the number of ground-based interceptors that you are going to recommend, which could, in turn, then assist sustaining the industrial base.

General O'REILLY. That is correct, sir, as we finish this review of what is necessary in order to fully characterize the GMD system.

Mr. TURNER. And, excuse me if you said, because I did not catch it, what is your timeframe for that?

General O'REILLY. Sir, we had testified before we would be complete by now. It is a very complex review involving STRATCOM—was added to the process, so we have a warfighter input. We thought that was important.

But our timeframe is June, sir. Next month.

Mr. TURNER. So, you think that the number of ground-based interceptors that—you may have a different number as we move forward with this bill, then, for us.

General O'REILLY. Sir, we will propose it to the Missile Defense Executive Board as the total results that come out of this testing program.

Mr. TURNER. Thank you.

Ms. TAUSCHER. Thank you, Mr. Turner.

I am about to close the hearing, but I just wanted to make one clarification, General O'Reilly, because I think that there is clearly some confusion. Do we not already have a defense against some of the Iranian long-term threat in the Alaska system?

General O'REILLY. Yes, ma'am, we do——

Ms. TAUSCHER. So the idea that we would have no threat, no deterrent, no defense, unless the European site was built is really leading people astray?

General O'REILLY. Ma'am, the European site is focused on protection of what we do not have in Europe today and redundant coverage of the United States, but it is redundant coverage of what we already have.

Ms. TAUSCHER. Thank you.

Well, General Kehler and General O'Reilly, thank you very much for being here, once again. We extend our best wishes to people in your command, both the civilian and the Guard and the Reserve and the folks that are working on active duty, and we appreciate your being here.

You have informed us very well on the number of issues that we have a lot of jurisdiction over, so we thank you very much. And the hearing is adjourned.

[Whereupon, at 4:08 p.m., the subcommittee was adjourned.]

# A P P E N D I X

MAY 21, 2009

## PREPARED STATEMENTS SUBMITTED FOR THE RECORD

MAY 21, 2009

NOT FOR PUBLICATION
UNTIL RELEASED BY THE
HOUSE ARMED SERVICES
COMMITTEE STRATEGIC
FORCES SUBCOMMITTEE

**STATEMENT OF**

**GENERAL C. ROBERT KEHLER**

**COMMANDER, AIR FORCE SPACE COMMAND**

**BEFORE THE**

**HOUSE ARMED SERVICES COMMITTEE**

**STRATEGIC FORCES SUBCOMMITTEE**

**UNITED STATES HOUSE OF REPRESENTATIVES**

**ON**

**MAY 21, 2009**

NOT FOR PUBLICATION
UNTIL RELEASED BY THE
HOUSE ARMED SERVICES
COMMITTEE STRATEGIC
FORCES SUBCOMMITTEE

**Introduction**

Madam Chairwoman, Representative Turner and distinguished members of the subcommittee, it is an honor to appear before you today as an Airman and as the Commander of Air Force Space Command (AFSPC).

I am proud to lead and represent the nearly 40,000 Active Duty, Guard and Reserve Airmen; government civilians; and contractors who assure strategic deterrence and deliver space-based capabilities to United States Strategic Command (USSTRATCOM), Joint Force Commanders, the Services, the Intelligence Community, civil agencies, commercial entities and allies. The men and women of AFSPC serve around the globe from AFSPC Headquarters, Fourteenth Air Force (14 AF), Twentieth Air Force (20 AF), the Space and Missile Systems Center (SMC), the Space Innovation and Development Center (SIDC), and a host of deployed and forward locations.

This has been an exciting and eventful year for AFSPC. Within the Air Force, we witnessed two historic decisions in 2008: the assignment of cyberspace responsibilities to AFSPC and the establishment of Air Force Global Strike Command (AFGSC). While in the midst of implementing these decisions for the nuclear and cyberspace missions, reinvigorating the Air Force's Nuclear Enterprise remains the highest priority for the Air Force and Air Force Space Command.

Our mission is to provide an integrated constellation of space and cyberspace capabilities at the speed of need, and our vision is to be the leading source of emerging and integrated space and cyberspace capabilities. At AFSPC, we look forward to

assuming the lead role for cyberspace within the USAF. Air Force operations in the air, space, and cyberspace domains are mutually-supporting and reciprocally-enabling; the cyberspace domain is inextricably linked to the other domains in which the US military operates. Not only must we protect these domains, we must also properly integrate them with the other operational domains to create Joint warfighting effects significantly greater than the sum of the parts. Our capabilities are woven through Joint operations, weapons networks, and civil and economic activities ranging from missile warning to the position, navigation, and timing (PNT) signals we provide both for military use and as a free, international utility.

Space and cyberspace capabilities shape the American approach to warfare, are embedded in an ever-more effective arsenal of modern weaponry and are threaded throughout the fabric of our warfighting networks. Our space-based capabilities are absolutely vital to the Joint fight. Yesterday's irregular warfare is today's regular warfare; asymmetric warfare is the new norm. Space capabilities contribute across the spectrum of regular and irregular combat and non-combat operations and provide Joint commanders a decisive advantage. Space is no longer just the high ground; it is a critical Joint enabler and force multiplier.

The Airmen of AFSPC provide land-based strategic deterrence through our Intercontinental Ballistic Missile (ICBM) fleet led by 20 AF, conduct space operations and acquisition via 14 AF and SMC, and will soon execute cyberspace operations as part of the future 24 AF. These missions are being accomplished by our space professionals every day at 15 wings and 44 locations spanning the globe. It is my distinct pleasure to outline the strategic way forward for AFSPC and to describe for you

our plan to develop, acquire, employ and execute Air Force space, missile, and cyberspace capabilities in an increasingly complex, dynamic and challenging global environment. The space, nuclear, and cyberspace capabilities acquired with your help and support, and delivered by AFSPC Airmen, will help maintain America's freedom, security, and prosperity.

## The Way Forward

AFSPC activities in 2008 included comprehensive, concerted efforts to deliver space and missile capabilities, develop and care for our Airmen and their families, and encourage collaboration across the space enterprise. In addition, we made significant progress in modernizing our force and made great strides toward improving our acquisition processes with new strategies and actions. AFSPC is proud of its 2008 achievements; achievements that will serve as building blocks towards progress in 2009. AFSPC's strategic way forward will focus on delivering the space, nuclear, and cyberspace capabilities our Joint Force Commanders require today and into the future. To do this, we have outlined five goals that serve to guide our efforts.

### *AFSPC Goal: Guarantee a Safe, Credible, Ready Nuclear Deterrent Force with Perfection as the Standard*

To support the Air Force's priority of "Reinvigorating the Air Force Nuclear Enterprise," AFSPC will guarantee a safe, credible, ready, nuclear deterrent force with perfection as the standard. Nuclear deterrence remains the ultimate backstop of US security, dissuading opponents and assuring allies of America's military commitment to defend our Nation, its allies and friends. Our Nation's security relies heavily on the remarkable attributes of the ICBM force and the dedication and professionalism of those

who proudly secure, maintain, and operate the Minuteman III weapon system. Over the course of 2009-2010, we will meet daily USSTRATCOM operational requirements; invest in sustainment, infrastructure, and our industrial base; continue to restore our nuclear culture; and transition the ICBM force to Air Force Global Strike Command.

In response to feedback and direction from the Secretary of Defense, Air Force Blue Ribbon Panel, Defense Science Board, Admiral Donald Investigation and others, we undertook a comprehensive set of actions to address deficiencies and re-establish excellence across the Air Force nuclear enterprise. Our roadmap, "Reinvigorating the USAF Nuclear Enterprise," is the strategic plan to restore a culture of discipline, establish clear organizational structures, and increase investment in critical operational and sustainment areas. Perfection, precision, and reliability are our performance standards. In recent months, all of our missile wings have undergone rigorous Nuclear Surety Inspections (NSI) to ensure the utmost standards—and all three wings satisfactorily passed their follow-on inspections.

As for the Minuteman III fleet, we are within two years of completing an extensive 10-year sustainment effort. As part of this comprehensive initiative, all three solid propellant motor stages have been removed and re-poured. In addition, the guidance systems and post-boost vehicles have been replaced with current technologies. These upgrades will ensure the Minuteman III is fully operational until at least 2020.

The American people depend on the US Air Force to deliver safe, credible and reliable nuclear deterrence capabilities, and we will do so. Our Airmen perform the nuclear deterrence mission with pride, professionalism, and a solemn commitment to the highest standards.

*AFSPC Goal: Deliver Assured Combat Power to the Joint Fight*

AFSPC will continue to deliver assured combat power to the Joint fight. In addition to the Airmen deployed "in-place" manning ICBM launch control centers and space operations centers around the clock, in 2008 we forward-deployed nearly 4,000 AFSPC Airmen to Operations ENDURING and IRAQI FREEDOM and Joint Task Force-Horn of Africa in support of on-going counterinsurgency operations. As a result, 49 AFSPC Airmen were awarded Bronze Stars while engaged in military operations in the United States Central Command (USCENTCOM) Area of Responsibility (AOR). Today, we have over 1,200 AFSPC Airmen continuously forward-deployed.

In an environment that's more uncertain, complex, and changing than ever before, most historic military leaders would not recognize today's irregular warfare landscape. Although our Nation and its interests must still be protected from hostile forces and strategic threats, today's security challenges are more diverse and dispersed. Emerging threats are fleeting, scattered globally, may strike anywhere, anytime, and increasingly take advantage of the space and cyberspace domains. There is a growing reliance from Joint Force Commanders on space-based capabilities to provide vital services across the global commons. Our Airmen are enabling GPS signals to ensure we're putting Joint Direct Attack Munitions on targets from aerial platforms and assuring the reliability of Blue Force Tracking for soldiers on the ground. Warfighters depend on military satellite communications (MILSATCOM) in austere environments for data, imagery, and streaming video feeds from Unmanned Aircraft Systems (UAS). Today, our forces are interconnected, have world-wide cognizance, and strike with greater speed and precision than any military in history providing

overwhelming and decisive results with minimal collateral damage. Our continuous need for global communications, GPS, missile warning, weather forecasting and world-wide intelligence, surveillance, and reconnaissance continues to be met by space systems in the face of evolving warfare.

In 2009-2010, we will continue to improve Space Situational Awareness (SSA), execute the Space Protection Strategy, increase GPS navigational accuracy and signal security, modernize MILSATCOM, assure and exploit new Overhead Persistent Infrared (OPIR) capabilities, and transform the launch enterprise.

*Space Protection Program*

Another history-making "first" occurred in March 2008 when AFSPC and the NRO established the Space Protection Program (SPP). The purpose of this program is to develop an integrated approach to protect critical defense, intelligence, civil, and commercial space systems that support national security.

In response to Congressional direction, AFSPC and the NRO delivered the first Space Protection Strategy to Congress in August 2008. The SPP strategy was approved by the Deputy Secretary of Defense and identified mission critical investments, capability improvements, and critical interdependencies. Complementing the SPP Strategy, AFSPC also finalized a new roadmap for the SSA mission area along with an interim architecture.

*Space Situational Awareness*

In concert with the SPP initiative, AFSPC continued efforts to develop a cost effective strategy to protect space capabilities, while striking the right balance among awareness, hardening, countermeasures, reconstitution, and alternate means. The

Integrated Space Situational Awareness (ISSA) program provides USSTRATCOM, Joint Functional Component Command for Space (JFCC-SPACE) and the Joint community an integrated source of historical, current and predictive space events, threats, and space activities.

In a dramatic display of teamwork and excellence, AFSPC developed the first-ever training procedures and exercises for a real-world intercept mission, Operation BURNT FROST. We ensured personnel at the Joint Space Operations Center (JSpOC) at Vandenberg Air Force Base, CA, were properly trained and our senior leaders possessed accurate and timely location of the target satellite, potential impact locations, and possible environmental effects. During the mission, we provided a glimpse of the future by transforming the legacy "hub and spoke" space surveillance network into a collaborative, net-centric operation providing real-time SSA and sensor-to-sensor hand-offs. Through subsequent orbital tracking and cataloguing efforts, we've determined every bit of debris created from the intercept has since de-orbited.

The importance of SSA continues to grow as the space domain becomes an increasingly contested and crowded environment. Issues common to other domains remain unresolved for space. As a Nation, we have gaps in the operational space domain not found in other domains across the global commons. The Iridium collision with a Russian communication satellite is a recent example highlighting the critical need for advanced Space Situational Awareness.

Commercial and Foreign Entities (CFE) support is one of our top initiatives. The CFE Support Program was created in 2004 to focus on safety of flight in orbit for government, commercial, and foreign satellite operators in the US and around the

world. Under our current pilot program, we are equipped, manned, and resourced to provide Conjunction Assessment (CA) analysis for capabilities critical to national security and homeland defense. An ever-changing space environment continues to become further crowded with increasing amounts of debris and new entrants. This has challenged our capability in the midst of declining resources and greater demand for basic CA and advanced services.

In an effort to improve our capabilities, we are augmenting our CFE resources and communicating the expanded services to the CFE community. AFSPC will expand and automate our processing and analytical capabilities thereby enabling expanded CA services and in the fall of 2009, we will transition our CFE pilot program to USSTRATCOM to continue long-term operations and support from the JSpOC. Our goal remains to provide SSA services to legitimate and trusted CFE users ensuring space flight safety and freedom of action in space.

*Schriever War Game Series*

The recurring AFSPC Schriever Title 10 War Game series has proven insightful in identifying key operational and policy issues. Having just wrapped up our Schriever V War Game in March 2009, we are now reviewing key issues involving space deterrence, capability employment, and national space policy considerations with senior Air Force and other national decision-makers. Schriever V clearly identified areas requiring additional emphasis, policy development, resources and analysis. It also demonstrated the far-reaching importance of space to combat operations, policy execution, and diplomacy. We are now underway with plans for Schriever VI, and we look forward to increased international and industry participation.

*Position, Navigation and Timing*

The Global Positioning System (GPS) continues to provide highly accurate position, navigation and timing signals enabling Joint combat operations around the world. GPS is a free global utility that serves as an enabler for economic transactions influencing the global economy by more than $110 billion annually. Throughout 2008, AFSPC operated the most precise, largest-ever GPS constellation and took its first big step towards deploying GPS III when we awarded a contract in May 2008 to build eight of the Block IIIA satellites. Complementing the space segment, we replaced the unsustainable legacy GPS Master Control Station ground segment with the Architecture Evolution Plan (AEP) and Launch Anomaly and Disposal Operations (LADO) Systems. AEP improves GPS accuracy, provides the capabilitiy to operate the GPS IIF satellites, and affords increased protection of the military's GPS M-code. LADO provides critical launch operations support and on-orbit operations for the GPS constellation. The transition to both the AEP and LADO system was seamless and transparent to users across the globe. In 2008, our acquisition team began developing the Next-Generation Operational Control Segment (OCX). This segment is not only required to launch and sustain GPS IIIA space vehicles on orbit, but is essential to moving the GPS system towards robust, effects-based operations.

At the same time, plans are well underway to launch, deploy and begin operating the first GPS IIF space vehicle by December 2009. These new vehicles will broadcast the first operational L5 signals, thereby providing civilian users an additional, higher powered signal. This signal is protected by internationally recognized safety of life spectrum rules ensuring robust quality of service with minimal interference.

*Military Satellite Communications*

As our MILSATCOM capability continues to grow, so does the age of our fleet. Aged in many cases beyond their design lives, Milstar and the Defense Satellite Communications System-III (DSCS-III) will have to continue to provide critical communications services for the Nation's protected and non-protected military and diplomatic activities while we deploy the next generation of advanced MILSATCOM capabilities.

With the commencement of mission operations over the first Wideband Global SATCOM (WGS) satellite in April 2008, we demonstrated a ten-fold increase in our wideband SATCOM capabilities providing the warfighter increased data, voice, video, and imagery. Additionally, we validated and accepted the geographically separated Backup Satellite Operations Center at Vandenberg Air Force Base. This $2.7 million effort supports Milstar, DSCS, and WGS operations.

Looking towards the future of MILSATCOM, we began preparations to accept the first Advanced Extremely High Frequency (AEHF) communications satellite in 2010. We look forward to the AEHF system as it will increase the protected communications data rate more than five-fold and afford more coverage opportunities than what Milstar provides today. Not only will AEHF provide enhanced national command and control satellite networks for the President, Secretary of Defense, and our Combatant Commanders, it will also ensure warfighters receive critical information such as the air and space tasking orders, operational plans, and time-phased force and deployment data. We transitioned to an innovative $1.25 million operations center and began training Subject Matter Experts (SME) in preparation for our next generation satellite

system. Deployment of WGS and AEHF allows us to close the gaps in the areas of volume, data rates, protected communications, and net-centricity for the warfighter and our Nation's leadership.

*Intelligence, Surveillance, and Reconnaissance*

The Space Based Infrared System (SBIRS) will provide the Nation with critical comprehensive missile warning, missile defense, technical intelligence, and battlespace awareness information well into the 21st Century.

In November 2008, the SBIRS Mission Control System Backup – Highly Elliptical Orbit (HEO) facility and HEO-1 payload were accepted for operational use, followed by USSTRATCOM certification in December 2008. The second HEO payload is now on-orbit and undergoing checkout. The exceptionally high quality of HEO infrared data has led to additional exploitation initiatives providing major long-term benefits to our Joint Force Commanders.

As the SBIRS HEO-1 system was certified for operations and is providing critical data to warfighters, the SBIRS Geosynchronous Earth Orbit (GEO-1) and GEO-2 space vehicles made significant assembly, integration and test progress. We will continue satellite testing and integration and look forward to launch readiness testing in FY10.

The future of OPIR is the Third Generation Infrared Satellite (3GIRS) currently undergoing research and development. In 2009-2010, we will continue down the path of wide field of view technology maturation activities. We have received wide field of view sensor prototypes and are on contract for a scientific experiment on a commercial rideshare mission in 2010.

*Space Control*

As the Air Force enters its 18th year of continuous combat operations in the Persian Gulf, AFSPC continues to provide sustained counterspace capability to USCENTCOM and is in its fifth year of continuous presence in theater with the defensive counterspace system – SILENT SENTRY. The resounding success of the SILENT SENTRY has led to the Rapid Attack Identification Detection and Reporting System (RAIDRS) Block 10 program, which detects and geolocates satellite communications interference via fixed and transportable ground systems.

*Operationally Responsive Space*

The ORS program is also focused on the Joint fight. AFSPC partnered across the space enterprise and responded to three urgent warfighter needs in communications, SSA, and ISR. We addressed the warfighters' requirements through a variety of innovative approaches to include: accelerated delivery of demonstration efforts, explored alternative uses of on-orbit capability, expanded use of commercial assets, and military utility experimentation with a tactical communications satellite. In addition, we began development of ORS Sat-1 to meet a critical USCENTCOM ISR requirement.

*Launch Enterprise Transformation*

Assured access to space is paramount to providing space capabilities to the warfighter. AFSPC continues to deliver 100% space launch mission success -- one mission at a time. Within our launch community, we witnessed the continuation of our winning streak with an unprecedented string of 61 successful national security space launches including the 23rd consecutive successful launch of the Atlas V and Delta IV

Evolved Expendable Launch Vehicles (EELVs). Following a 22-month, $300 million launch site modification effort, the first west coast Atlas V successfully delivered a critical NRO satellite into orbit. We recently launched the GPS IIRM-20 onboard a Delta II in March, as well as the second WGS satellite in April onboard an Atlas V. Additionally, AFSPC supported two world-wide tests of the Ground-based Mid-course Defense long-range missile interceptor system.

In a broader context, AFSPC continues to advance our Space Launch Enterprise Transformation (LET) effort to posture our command for the future of assured access to space. The LET focuses on three initiatives: transformation of launch services acquisition, upgrading the launch range architecture, and fully leveraging Total Force Integration (TFI). While the military launch business has long been recognized as a key contributor to space, we understand the significance of fostering the growth of commercial launch capabilities.

*AFSPC Goal: Forge a Battle-Ready Team by Attracting, Developing and Retaining America's Best*

To support the Air Force's priority of "Developing and Caring for Airmen and Their Families," AFSPC is forging a battle-ready team by attracting, developing and retaining America's best. During 2009-2010, we will improve training and professional development programs, establish viable career pathways, and guarantee quality of life programs for our members and their dependents. We are taking the necessary steps to care for our Airmen and their families. While we undertake comprehensive organizational realignment, AFSPC is working hard to ensure a seamless transition of the land-based nuclear deterrent to Air Force Global Strike Command and to establish

processes for deliberate development of nuclear expertise among our ICBM professionals. At the same time, we're preparing for the integration of the cyberspace mission by carefully crafting a professional development program that guarantees appropriate education, training and skill sets for this unique and challenging mission area and its synergies with our space professionals.

*Developing Airmen*

AFSPC further defined space and missile training as well as professional qualification and development relationships with Air Education and Training Command allowing us to focus on our Organize, Train and Equip (OT&E) activities. Contributing to our educational efforts, the National Security Space Institute (NSSI) continued to enhance its reputation as the center for top-quality space education and training for students of all ranks across the Department of Defense and related government agencies. In 2008, the NSSI taught 77 courses to over 1,500 students. We also established an ICBM Advanced Course at the NSSI providing two weeks of mission-focused education for the operations, maintenance, security and helicopter personnel who operate, sustain and secure our ICBM force. Furthermore, we institutionalized attendance at the Air Force Nuclear Weapons Center's Nuclear Management Fundamentals Course for all inbound commanders who will serve at our nuclear units, and we are developing a focused ICBM Weapons Instructor Course (WIC) at the USAF Weapons School (USAFWS) at Nellis Air Force Base, NV.

*Families and Quality of Life*

AFSPC recognizes the critical roles our families play as integral members of the Air Force team. In AFSPC, we extended the Air Force's wingman culture to our families

to help nurture success on the home front. AFSPC aggressively improved the quality of life where Airmen work and live by awarding $143 million in 2008 for a host of revitalization initiatives to include family housing, a dormitory, and child development center. In addition, American Recovery and Reinvestment Act stimulus funds of $145.5 million are being invested across the command for modernization of base infrastructure and military construction (MILCON). For 2009, we have $31.5 million in MILCON projects for dorm renovation, facilities construction, and other key projects across the Command.

*AFSPC Goal: Modernize and Sustain AFSPC's Enduring Missions and Mature Emerging Missions*

To support the Air Force's priority of "Modernizing Our Air and Space Inventories, Organizations and Training," AFSPC will modernize and sustain AFSPC's enduring missions and mature emerging missions. Throughout 2009-2010, we will transition cyberspace capabilities to AFSPC and stand-up a new operational Numbered Air Force (NAF). We will also finalize a basing location and establish cyberspace training and acquisition processes through which we will present cyber forces to the Joint Force Commanders.

In 2008, AFSPC increased the depth and breadth of Air Reserve Component (ARC) support to AFSPC missions. AFSPC's first-ever Total Force Integration (TFI) Strategy was developed to fully leverage the unique strengths of the ARC in both existing and emerging missions. New TFI partnerships are underway across the launch, SSA, space control, and cyberspace operational mission sets. In April 2008, we activated the 310th Space Wing at Schriever Air Force Base, CO, as the Air Force's

first-ever reserve space wing. In addition, we activated the 380th Space Control Squadron at Peterson Air Force Base, CO, as the Reserve Associate Unit for the RAIDRS mission.

*AFSPC Goal: Reengineer Acquisition to Deliver Capability at the Speed of Need*

To support the Air Force's priority of "Acquisition Excellence," AFSPC will reengineer acquisition to deliver capability at the "speed of need." During 2009-2010, we will continue working a "back to basics" philosophy and block-build approach, fund to the most probable cost, increase our acquisition work force, improve relations with industry, and control requirements. Our Space and Missile Systems Center will deliver five major new systems and mission capabilities in the next six to twenty-four months for SBIRS, AEHF, WGS, GPS IIF, and the Space-Based Space Surveillance (SBSS) system. The GPS III and OCX programs are on the right vectors for success, and we are improving our space development expertise, processes and culture.

In today's world of rapid technological advancement and proliferation, we cannot afford to do business as usual when it comes to delivering space capabilities. The nature of warfare, as influenced by the information age, has changed dramatically in terms of symmetry, ambiguity, time, distance, and boundaries. This environment requires a paradigm shift necessary to deploy space capabilities at the "speed of need" while still executing efficient acquisition practices.

## Conclusion

Defending the United States of America and its allies and friends is a continuous mission that requires the utmost planning and execution. As technology advances, so do the means that can be employed by those who threaten our way of life. AFSPC

seeks to perfect the most formidable, capable and remarkable military space, missile and cyberspace force the world has ever known. This will allow warfighting commands to meet the challenge of protecting the American people, their livelihoods and interests with precision at the moment of need. With the continued support of the Congress, AFSPC is postured to maintain a crucial leadership role as we realize our vision to be the leading source of emerging and integrated space and cyberspace capabilities.

**Unclassified Statement of**

# Lieutenant General Patrick J. O'Reilly

# Director, Missile Defense Agency

***Before the***

# House Armed Services Committee

## Subcommittee on Strategic Forces

***Regarding the***

# Fiscal Year 2010 Missile Defense Programs

# Thursday, May 21, 2009

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

**Lieutenant General Patrick J. O'Reilly, USA**
**Director, Missile Defense Agency**
**Before the**
**House Armed Services Committee**
**Strategic Forces Subcommittee**
**May 21, 2009**

Good afternoon, Madam Chairman, distinguished Members of the Committee. It is an honor to testify before you today on the proposed Fiscal Year (FY) 2010 budget for the Department of Defense's missile defense program.

We are proposing approximately $7.8 billion for missile defense in FY 2010 in response to Secretary Gates's budget guidance and to allow for programmatic flexibility to respond to the Quadrennial Defense Review and the congressionally mandated Ballistic Missile Defense Review. As Secretary Gates announced on April 6, this budget was the result of "a holistic assessment of capabilities, requirements, risks and needs" for the purpose of meeting the Secretary's vision to "institutionalize and enhance our capabilities to enhance the wars we are in today and the scenarios we are most likely to face in the years ahead while at the same time providing a hedge against other risks and contingencies." Specifically, "we will restructure the program to focus on the rogue state and theater missile threat." Due to the previous accomplishments of the Ground-based Midcourse Defense (GMD) program, the technical risk that our current inventory of operationally ready Ground-Based Interceptors (GBIs) is sufficient to destroy the number of rogue nation inter-continental ballistic missile (ICBM) threat missiles that could be launched at any one time today, or over the next decade, is low. However, the

technical risk that the inventory of our theater missile defenses can be overwhelmed by the large number of theater class threat missiles and launchers is considerably higher. Furthermore, the previous program's ability to develop future capability to destroy missiles in the highly advantageous early phases of flight will not be operationally available until the later years of the next decade. Thus, to better protect our forces and those of our Allies in theater from ballistic missile attack, we propose to add $700M to field more of our most capable theater missile defense systems, specifically the Terminal High Altitude Area Defense (THAAD) system and Standard Missile (SM)-3 programs. We also propose to add $200M over three years to fund the conversion of 6 additional Aegis ships to provide ballistic missile defense capabilities. Finally, we propose to invest $368 million in FY 2010 for the development and deployment of capabilities to cost-effectively intercept missiles in their ascent phase of flight during the first half of the next decade.

Secretary Gates also emphasized that we were stopping programs with technologies not reasonably available to affordably meet cost or schedule goals. We will not increase the number of current ground-based interceptors beyond the 26 silos in Alaska and four operational silos at Vandenberg Air Force Base. But we will continue to robustly fund continued research and development to improve the capability we already have to defend against long-range rogue missile threats. We will cancel the second Airborne Laser (ABL) prototype aircraft, but we will keep the existing aircraft and shift the program to research and development (R&D) effort to address affordability and technology issues while assessing the program's proposed

operational role. We will terminate the Multiple Kill Vehicle (MKV) program because it is not a necessary capability to defeat rogue threats, and its significant technical challenges and long development timeline warrants review of other capabilities to provide a more near-term hedge against future threats. We will also terminate the Kinetic Energy Interceptor (KEI) program since its capability is also inconsistent with the missile defense mission to counter rogue nation threats and for cost growth, schedule delays, and its lack of technology maturity. It is our intention to enhance the cost and operationally effectiveness of our missile defense architectures by increasing our near-term ability to engage missiles in all phases of flight.

The Missile Defense Agency (MDA), Joint Staff, Combatant Commanders, and Armed Services have intensified collaboration on developing missile defense capabilities. As a result, a great deal has been learned about our Ballistic Missile Defense System (BMDS) technology, doctrine, and tactics. As announced by Secretary Gates, and in response to the war fighter's specific needs, we are making the BMDS more affordable and effective by: 1) reshaping our program to enhance protection of our deployed forces, allies and friends against existing threats, 2) maintaining a ground-based midcourse capability to defeat a limited long-range rogue state attack or accidental launch against the United States, and 3) preparing to leverage emerging Ascent Phase Intercept (API) technologies to hedge against threat growth and realize the greatest potential for reducing cost and increasing operational effectiveness of missile defense. This rationale is based in part on a Defense

Science Board 2002 Summer Study, which emphasized the benefits of ascent phase intercepts. The study also noted that the technological and operational challenges of intercepting threat missiles in the ascent phase (the phase after powered flight, but prior to apogee) and significantly less challenging than boost phase intercepts.[1] API would allow us to intercept early in the battle space and optimize our ability to execute a shoot-look-shoot tactic to defeat a threat before countermeasures are deployed, minimize the potential impact of debris, and reduce the number of interceptors required to defeat a raid of threat missiles. Additionally, by destroying missiles early, we do not have to incur the costs of maintaining a significant number of expensive interceptors to destroy advanced countermeasures in a later phase of a threat missile's flight.

With this budget we also will continue to execute to the fullest extent of the law the upper tier European Capability program to counter long-range attacks from Iran, deferring radar and interceptor deployments until policy reviews are complete. We also intend to achieve efficiencies by eliminating redundancy and increasing the centralized management of missile defense acquisition programs.

We will execute a rigorous test program to build the confidence of U.S. and allied stakeholders in the BMDS, bolster deterrence against their use; and send a powerful message to potential adversaries looking to acquire ballistic missiles. Thus, testing figures prominently in our proposed budget for FY 2010.

---

[1] Office of the Secretary of Defense, *Defense Science Board 2002 Summer Study on Missile Defense: Phase I and II*, classified SECRET/NOFORN (above extracts are unclassified), December 2002, pp. 42, 49-51.

Furthermore, we are collaborating with the Services' Operational Test Agencies (OTA) with the support of the Director of Operational Test and Evaluation (DOT&E) to restructure our test program to improve confidence in the missile defense capabilities under development and ensure the capabilities transferred to the war fighter are operationally effective, suitable, and survivable.

Finally, the FY08 NDAA required MDA to submit its budget using four appropriations: RDT&E, Procurement, O&M and MILCON. The FY10 component of our recent budget submission includes three of these appropriations, and we satisfy the requirement for the fourth appropriation (O&M) by FY 2012. In developing PB10, we considered several candidates for O&M funding, including the Sea-Based X-band radar (SBX), and reviewed this list with OSD Comptroller. OSD Comptroller determined that all of these candidates were still developmental assets and did not satisfy the criteria for O&M beginning in FY 2010. The Comptroller did agree that THAAD would meet their criteria beginning in FY 2012.

**Accomplishments and Challenges**

During FY 2008 and FY 2009, the Missile Defense Agency (MDA) achieved many accomplishments, including: the execution of successful Aegis Standard Missile (SM)-3 Block IA and SM-2 Block IV interceptor salvo flight tests and delivery of 28 additional SM-3 Block IA interceptors (including deliveries to Japan); a Ground-based Midcourse Defense (GMD) intercept test utilizing the entire

sensor and command and control suite deployed in the Pacific; emplacement of two GBIs and refurbishment of two GBIs at Fort Greely, Alaska; deployment of a AN/TPY-2 radar to Israel; the execution of an experiment involving the closest data collection to date of a boosting missile from a satellite; the safe destruction of a malfunctioning U.S. satellite; repeated demonstration of the atmospheric laser beam compensation during Airborne Laser (ABL) flights; delivery of the first THAAD unit for testing; and three THAAD intercepts, including the launching of a salvo of two THAAD interceptors using operational firing doctrine. Earlier this month, we also successfully placed in orbit the Space Tracking and Surveillance System (STSS) Advanced Technology Risk Reduction satellite to serve as a pathfinder for next-generation space sensor technology.

However, in addition to our successes, we also faced challenges developing the BMDS. During FY 2008 and FY 2009 to date, we experienced 8 significant flight test delays, 4 target failures out of 18 target launches, and one interceptor failure in flight. These and other contributing factors have resulted in $264 million of cost growth. Further, we have incurred over $252 million in unplanned costs and 25 weeks of schedule revisions due to unplanned operational deployments of our systems under development. In response to those challenges, we have worked with our leadership and stakeholders to enhance our management oversight, strengthen our relationship with the war fighter community, and improve BMDS acquisition and test planning. We have adopted a series of initiatives to improve acquisition and oversight of the contracts we will award over the next 18 months. We are also

institutionalizing MDA and Service roles and responsibilities for elements of the BMDS that the Deputy Secretary of Defense has designated a lead Service.

**Threat**

The proliferation of ballistic missiles of all ranges continues. I defer to the Intelligence Community for more detailed estimates, but current trends indicate that proliferation of ballistic missile systems, using advanced liquid- or solid-propellant propulsion technologies, are becoming more mobile, survivable, reliable, accurate and capable of striking targets over longer distances. The proliferation of ballistic missiles is increasing the number of anti-access weapons available to potential regional adversaries. These weapons could be used to reduce military options available to Combatant Commanders and decrease the survivability of regional military assets. Iran has grown its short- and medium-range missile inventories, while improving the lethality, deployability, and effectiveness of existing systems with new propellants, more accurate guidance systems, and sub-munition payloads. With the successful launch of the Safir Space Launch Vehicle on February 2, 2009, Iran demonstrated technologies that are directly applicable to the development of ICBMs. North Korea deploys a No Dong ballistic missile capable of reaching Japan and South Korea and U.S. bases throughout the region, and continues to develop a new intermediate-range ballistic missile (IRBM) capable of reaching Guam and the Aleutian Islands. Despite the failure to place an object in orbit on April 5, 2009, North Korea successfully demonstrated the same staging and separation

technologies required to launch a two-stage Taepo-Dong 2 ICBM capable of reaching much of the United States. An additional concern is North Korea's and Iran's repeated demonstrations of salvo launches, indicating large ballistic missile attack raid sizes must be considered in developing the BMDS capability. Syria continues to field updated short-range ballistic missile (SRBM) systems and acquire Scud-related equipment and materials from North Korea and Iran. In sum, there has been an increase of over 1,200 additional ballistic missiles over the past 5 years, bringing the total of ballistic missiles outside the U.S., NATO, Russia and China to over 5,900 (with SRBMs making up 93% of this total and MRBMs making up 6%), with hundreds of launchers and missiles within the range of our deployed forces today (with SRBM launchers making up 91% of this total and MRBM launchers making up 9%).

**Missile Defense Approach and Strategy**

The mission of the Missile Defense Agency is to develop defenses to protect the U.S. homeland, deployed forces, Allies and friends against ballistic missiles of all ranges and in all phases of flight. The FY 2010 budget submission reflects a greater emphasis to defense of U.S. forces, allies, and friends from regional threats. Given the unique characteristics of short-, medium-, intermediate-, and intercontinental ballistic missiles, no one missile defense interceptor or sensor system can effectively counter all ballistic missile threats. War fighters are not only faced with the challenge of intercepting relatively small objects at great distances

and very high velocities, but they may have to counter large raid sizes involving combinations of SRBMs, medium-range ballistic missiles (MRBMs), IRBMs, and ICBMs and, in the future, countermeasures associated with sophisticated ballistic missile attacks.

While countermeasures can be developed to degrade the performance of autonomous missile interceptor systems, it is much more difficult to develop countermeasures that degrade fundamentally different missile defense interceptor systems operating together in different phases of a ballistic missile's flight. Thus, the most operationally effective missile defense architecture is a layering of endo-atmospheric and exo-atmospheric missile interceptor systems with ground and space sensors connected and managed by a robust Command and Control, Battle Management and Communication (C2BMC) infrastructure. Moreover, the most cost-effective missile defense architecture is one that emphasizes early intercepts during a threat missile's ascent phase of flight before countermeasures can be deployed and before the remainder of the BMDS architecture is required to track and kill a threat reentry vehicle and associated objects.

**Missile Defense Interceptor Development**

The SRBM defense capabilities of the BMDS consist of the Patriot Advanced Capability-3 (PAC-3), THAAD, and the Aegis SM-2 Block IV and a portion of the SM-3 Block IA missile battle space with associated fire control software. PAC-3 uses hit-to-kill technologies to intercept SRBMs in the

atmosphere in the terminal phase of flight. MDA transitioned PAC-3 to the U.S. Army in March 2003, and although we continue to exercise configuration management, provide sustaining engineering, and retain architectural responsibility, MDA does not manage the upgrades to PAC-3 such as the Missile System Enhancement (MSE).

*Terminal High Altitude Area Defense (THAAD).* THAAD is a near-term transportable capability that will enhance the ability of Combatant Commanders to wage theater wars by intercepting SRBM and MRBM threats using hit-to-kill technologies. THAAD consists of interceptors, command and control, and a THAAD-configured AN/TPY-2 radar software. The THAAD missile is uniquely designed to intercept targets both inside and outside the Earth's atmosphere, making the use of countermeasures against THAAD in their terminal phase difficult. For FY 2010, we are requesting $420 million for THAAD procurement. The full funding policy using procurement funds has been applied to the THAAD procurements beginning in FY 2010. We also are requesting $665 million of Research, Development, Test & Evaluation (RDT&E) funding for THAAD. We will deliver 24 THAAD interceptors in FY 2010 for batteries 1 and 2 using RDT&E funds and, in response to war fighter requests to bolster defenses against rogue state threats to our forces and allies, increase the production rate from three to four interceptors per month using procurement funds. We also propose to invest in communication hardware and software to enhance THAAD integration

into the BMDS, enhance testing and modeling and simulation, and conduct risk reduction development for increasing the range of THAAD interceptors.

THAAD's test record is 6 intercepts out of 6 attempts against SRBMs. Early in FY 2008, soldiers of the U.S. Army's 6th Air Defense Brigade conducted THAAD's demonstration of autonomously intercepting a short-range "Scud-type" unitary target just outside the atmosphere. In June 2008 THAAD intercepted a separating SRBM target. On March 18, 2009, we launched a salvo of two THAAD interceptors based on a cue from an Aegis BMD ship to intercept a separating target high in the earth's atmosphere. Not only did the primary interceptor hit the target, but the second THAAD interceptor also hit the largest remaining piece of target debris seconds later.

In FY 2008, THAAD participated in six war games and exercises with Combatant Commanders to train soldiers and help develop tactics, techniques and procedures. THAAD's involvement with C2BMC, PAC-3 and Aegis in MDA ground tests for theater and strategic missile defense engagements provided data to support BMDS capability assessments.

Through Foreign Military Sales, the United Arab Emirates Government requested 3 THAAD batteries and one additional radar to maximize availability. This will represent a potential $6.9 billion FMS sale for the U.S. Government, which would greatly enhance deterrence in the region. Additionally, other Gulf Cooperation Council countries have requested performance and cost data for THAAD.

Despite THAAD's significant successes, the program continues to address production qualification issues of several remaining missile components, including a critical ordnance initiation safety device. Successful qualification of this component by the end of FY 2009 is necessary to gain Army approval for fielding in FY 2010.

*Aegis BMD.* Aegis Ballistic Missile Defense (BMD) cruisers and destroyers integrated with SM-3 hit-to-kill interceptors and SM-2 terminal interceptors provides a unique mobile capability that may be surged to a region to protect deployed forces and allies against SRBMs and MRBMs. In FY 2010, we are requesting $169 million for Aegis BMD procurement. We will deliver 26 SM-3 Block IAs in FY 2010. Like THAAD, additional funding ($60 million) is included for Aegis BMD to move towards meeting the full funding policy for the procurement of each lot of missiles. We are also requesting $1.691 billion for FY 2010 for RDT&E to develop enhanced theater-defense capabilities, hardware and software development and ship upgrades, fielding of the initial Aegis BMD regional/theater defensive capabilities, Aegis BMD sustainment, near-term sea-based terminal development and initial development of a land-based SM-3 interceptor.

In FY 2008, Aegis BMD began significant upgrades to the BMD Signal Processor in the Aegis BMD weapon system and delivered 20 SM-3 Block IA interceptors (not including nine SM-3s delivered to Japan). We also updated software (BMD 3.6) on eight U.S. destroyers, bringing the total number of U.S.

Aegis BMD-capable ships ready on station at the end of 2008 to 18, a year ahead of the original schedule. MDA also installed engagement software (3.6) on the Japanese Destroyer Kongo and began installation of the more advanced fire control software (4.0.1) in the U.S.S. Lake Erie. Aegis weapons system software build 4.0.1 will allow Aegis to launch SM-3 missiles sooner than the organic Aegis Spy-1 radar allows by leveraging external BMDS sensors. We plan to continue software development for potential installation on all Aegis BMD ships during the next decade to enable the deployment of the more capable SM-3 Block IB interceptor and, eventually, the long-range SM-3 Block IIA interceptor currently being developed with our Japanese partners.

Early in FY 2008, we demonstrated Aegis ability to simultaneously engage two short-range unitary ballistic missile targets using SM-3 Block IA interceptors. In FY 2008, we also completed an end-to-end Multiple Element Integration & Test for the 3.6.1 software and deployed the first Aegis BMD ship (U.S.S. Ramage) on the East Coast. In December 2007, we conducted the first intercept of a ballistic missile with an allied navy ship. Using the SM-3 Block IA, the upgraded Japanese Destroyer successfully intercepted the medium-range separating target in space. This test also marked a major milestone in the growing missile defense cooperative relationship between Japan and the United States. In a subsequent test in November 2008, the Japanese Maritime Self Defense Force performed another successful interceptor launch and fly-out, but a few seconds prior to intercept, the kill vehicle's guidance control motor failed resulting in a test

failure. The failure investigation of the SM-3 Block IA continues with a confirmatory flight test this summer.

The U.S. Navy and MDA are also collaborating on plans for a near-term sea-based terminal defensive capability to enhance the Combatant Commander's ability to protect seaborne forces and complement other regionally deployed missile defense assets. MDA is upgrading the Aegis BMD weapon system, and the Navy is upgrading the SM-2 Block IV missile with plans to eventually deploy approximately 70 interceptors to provide a near-term terminal engagement capability on Aegis BMD ships that began in 2008. Additionally, in June 2008 we intercepted a short-range target in the terminal phase of flight using a dual salvo SM-2 Block IV with modified Aegis ship software. Unlike the SM-3 interceptors, which use hit-to-kill technologies to collide with a target, the SM-2 missiles for the near-term sea-based terminal defense capability use an explosive charge in very close proximity to the target to destroy the threat missile. We continue to develop with the Navy an advanced sea-based terminal defense solution for more effectively countering short-range ballistic missiles.

The SM-3 Block IB missile with Aegis 4.0.1 BMD fire control software is being developed to counter SRBMs, MRBMs, and IRBMs. The SM-3 Block IB will have greater reliability, producibility and performance against more advanced threats and clutter during end-game. The first controlled test flight of the SM-3 IB is scheduled for FY 2010.

We are continuing our work with Japan to substantially increase Standard Missile-3 range and lethality by developing a 21-inch diameter SM–3 Block IIA interceptor. We are working to add this capability to the BMDS in the next decade after we complete the necessary testing with Japan as a hedge against the possibility we may see a proliferation in longer range threats over the next decade. This effort is one of the largest and most complex cooperative projects ever undertaken between Japan and the United States.

*Ground-based Midcourse Defense.* We are requesting $983 million in RDT&E for GMD to provide protection of the United States against the limited number of rogue state and accidental launches of IRBMs and ICBMs. In FY 2010, we will maintain this long-range defense capability with missile fields at Fort Greely, AK, and Vandenberg Air Force Base (VAFB), CA, where we will emplace 26 and 4 Ground-Based Interceptors (GBIs), respectively. We will also continue to buy eight additional GBIs for testing, two for test spares and four for operational spares. Thirty operational GBIs will provide the United States with a substantial inventory of operational interceptors considering the limited number of ICBM launch complexes in North Korea and Iran and the long development time required for additional launch complexes. However, we will robustly fund continued research and development to capitalize on the inherent capacity to improve the capability we already have to defend against long-range rogue missile threats. We will continue rigorous ground testing and conduct at least one intercept flight test using a three-stage GBI in FY 2010 and continue the

development and testing of two-stage GBIs to expand the defensive battlespace to protect the United States. We also increased funding for GMD models and simulations, upgrades to increase the robustness and reliability of GMD communications, upgrades to the command and launch systems, and for security, infrastructure and sustainment for operations at Ft. Greely and VAFB. The FY 2010 budget conveys a commitment to procure the complete buy of 44 GBIs on contract, of which some will go to the replacement and refurbishment of the 14 oldest interceptors to improve the operational readiness of the fleet and extend the U.S. production capacity to 2013, which will allow us to meet our commitment to the European Capability, respond to test results, and implement future policy or fleet lifecycle management decisions. The GBIs and GMD silo system were designed to minimize the need to test complete missiles in flight testing. Decisions considering all the above will determine in combination with a maintenance and refurbishment program the ultimate size of the GBI fleet prior to final production deliveries in 2013.

Due to problems associated with a non-tactical telemetry data encryption electronic card encountered in February 2008, we did not conduct GMD flight test 5 (FTG-05) until early FY 2009. During that flight test, the GMD system intercepted an IRBM warhead within an operational architecture of sensors deployed in the Pacific region. We also intended to test the GMD exo-atmospheric kill vehicle (EKV) against simple countermeasures, but the inter-stage panels on the target failed to eject when commanded, and the

countermeasures did not deploy. This was our last test using this particular target configuration, and we have added simple countermeasures to the next GBI test. During FTG-05 we also verified that Aegis BMD performed as expected and conducted a simulated engagement of this IRBM target.

We recently completed the construction of a second GMD missile field at Fort Greely and a new multi-function test and operational silo and an additional In-Flight Interceptor Communication System Data Terminal (IDT) at VAFB. Additionally, we are upgrading the security infrastructure and completing the construction of a new power plant and power distribution system at Fort Greely. In FY 2008, we refurbished two existing GBIs, delivered two upgraded EKVs and emplaced two new interceptors early in FY 2009. One of our emplaced GBIs was removed in mid-year 2008 in order to provide a backup flight test interceptor for future flight tests. Unfortunately, we also experienced issues with unexpected health and status indicators of several GBIs in their silos that warranted removal to perform unscheduled maintenance and missile refurbishment. Two of our emplaced GBIs have upgraded EKVs to address obsolescence issues, but will not be declared operational until their EKV configuration flies later this year. Once operational GBIs are emplaced in all 30 silos, we will begin replacing the oldest emplaced GBIs with the newest interceptors from the 44 total produced to maintain a high state of operational readiness in their latest configuration.

**Missile Defense Sensor and C2BMC Development**

Continuously available, transportable, and mobile BMDS sensors provide real-time detection and tracking data to the system and the war fighter through command, control, battle management and communications (C2BMC). We are requesting $637 million for sensors in FY 2010. Major programmatic content in our request includes $45 million for contractor logistics support and another $73 million for additional operations support for the AN/TPY-2 X-band radars deployed in Japan and Israel. We are also requesting $340 million for C2BMC in FY 2010. Most of the request is allocated to the continued upgrading of C2BMC hardware and software to employ the sensor management and communication for our initial defense capabilities and develop the C2BMC planning and architecture to make API a near-term capability.

The BMDS relies on space-based (Defense Support Program, space-based infrared satellites and, in the future, an operational Space Tracking and Surveillance System (STSS) constellation), sea-based mobile (Aegis BMD ships and Sea-Based X-band), and ground-based (Cobra Dane, Upgraded Early Warning Radar (UEWR), AN/TPY-2 and European Midcourse Radars) sensors to provide detection, tracking, classification and hit assessment information. The United States Air Force currently operates the UEWR at Beale Air Force Base, California and the Cobra Dane radar at Shemya, Alaska. The Royal Air Force operates the UEWR at Fylingdales Moor in the United Kingdom and, this year, we plan to

complete system upgrades to the UEWR at Thule, Greenland using funds appropriated for FY 2009.

In July 2008 we conducted a major integrated sensor and C2BMC test (FTX-03) involving the simultaneous observation of an IRBM launched from Kodiak, Alaska using five operational BMDS sensors— the Air Force early warning satellite system, the forward-based X-band AN/TPY-2 radar near Juneau, Alaska, the UEWR at Beale, Aegis SPY-1 radar (USS Benfold), and the Sea-Based X-band radar (SBX) radar in the Pacific Ocean. We were able to conduct simultaneous processing of data from multiple sources, correlate this data into a single threat track, and develop an engagement solution for GBI to achieve the simulated intercept. War fighters conducted the associated radar, fire control, and simulated launcher operations. This same sensor and C2BMC architecture supported the intercept of an IRBM target by a GBI in FTG-05.

MDA is developing a C2BMC system that integrates the BMDS elements into a layered defense system. Key to C2BMC integration of the GMD, THAAD, Aegis and Sensor elements into an effective BMDS is the centralized development of 7 common missile defense functions called the BMDS "Unifying Missile Defense Functions" (UMDF). The following UMDF will allow Combatant Commanders to automatically and manually optimize sensor coverage and interceptor inventory to defend against all ranges of ballistic missile threats.

*Communications* (terrestrial and satellite) connects and supports the Unified Missile Defense Functions and ensures that the Combatant Commander can

effectively execute his defensive mission. MDA will continue to maintain interface controls with C2BMC, but we will complete transition of management of the terrestrial long-distance communications to the Defense Information Systems Agency (DISA) and the satellite communications ground stations to the Services in 2011.

*Sensor Registration* improves the overall accuracy of the network of sensors to support the C2BMC formation of the system track by ensuring the BMDS understands the relative position of every sensor in the network. Thus, sensor registration enables the integration of different sensor measurements in ballistic missile engagements.

*Correlation and System Track* functions create a single track of an object using multiple BMD sensors. Since many ballistic missile threats fly over great distances, the BMD system relies on the correlation of multiple (land, sea, and space) sensors to form a common track picture and complete the target information handover to the weapon system kill vehicle. In 2007 and 2008 we developed requirements, assessed performance, executed hardware-in-the-loop demonstrations, and conducted live test events with Aegis simulated intercepts where system tracks were passed from the AN/TPY-2 through the C2BMC, and C2BMC provided Link 16 tracks to Aegis BMD ships. These demonstrations provided valuable data supporting the fielding of the AN/TPY-2 with C2BMC in Israel and data integration with the Arrow Weapon System for operational use in 2008.

*System Discrimination* is the BMDS function that determines whether objects resulting from a threat missile launch are lethal or non-lethal using inputs from multiple sensors. Different sensors, depending on location and capability, provide different features about objects associated with a ballistic missile attack. The resulting discrimination information is more accurate than input from any one sensor over a threat missile's trajectory.

*Battle Management* uses system tracks composed of correlated and discrimination data to identify sensor and weapon system taskings that enable the Combatant Commander to most efficiently implement weapon engagement plans. Fundamentally, engagement coordination combines all elements of UMDF to prioritize and assign threat tracks to specific interceptor systems to implement operational objectives such as minimizing interceptor use, focusing on protecting a prioritized list of defended assets, or ensuring the highest probability of success. In 2008, C2BMC demonstrated aspects of engagement coordination by controlling AN/TPY-2 in support of the Arrow Weapon System. In FTG-05, the External Sensors Lab (ESL) generated a boost phase state vector, sent it to C2BMC; C2BMC then generated a precision cue message from the ESL data and sent the cue to the AN/TPY-2. The cue was recorded at the radar for post mission analysis. In 2008, THAAD and Patriot demonstrated peer-to-peer engagement coordination in an integrated ground test (GTI-03) by providing in real time the engagement status of each weapon system's ability to engage missiles in accordance with the rules of engagement.

*Hit and Kill Assessment* uses all available sensor observations of the intercept to confirm a successful hit-to-kill engagement, assess payload type, or identify surviving objects rapidly enough to enable additional intercept attempts by the BMDS if possible.

**Missile Defense Technology Development**

A robust advanced missile defense technology development program is part of our strategy to hedge against future threat uncertainties. MDA is intensifying its focus on enabling the capability to intercept a threat missile early in its flight, prior to its apogee. A missile defense architecture that emphasizes an early intercept capability places a premium on persistent surveillance of threat missile launches in specific regions of interest. Likewise, the emerging architecture will emphasize the forward positioning of mobile and transportable flexible missile defense assets, which would include sensors for early detection, a highly responsive and reliable C2BMC infrastructure, and energetic and agile weapons.

For FY 2010, we are requesting $180 million for the Space Tracking and Surveillance System (STSS) to demonstrate the technology to track threat objects from space by using two STSS demonstration satellites to be launched this summer. Sensors on STSS satellites could provide fire control quality tracking data for engagements of threat reentry vehicles and, when combined with radar data, will provide improved threat object discrimination. Following launch of the STSS, we will enter into a six-month on-orbit check-out period, after which we

plan to use both targets of opportunity and dedicated targets to demonstrate STSS capabilities. Knowledge point-based lessons learned from these demonstrations will guide our decisions on the development of an affordable, continuously available operational precision track space sensor constellation.

The Near Field Infrared Experiment (NFIRE) satellite launched in April 2007 continues to operate in good health. We conducted NFIRE test mission 2B in September 2008 to collect first-of-a-kind high resolution plume and hard body data of a boosting missile at approximately 8 km range from a boosting missile. In this test, we collected multiple frames of data in multiple wavebands, which will help anchor plume to hard body handover algorithms for boost phase intercept applications. We continue to collect data on other targets of opportunity. We also demonstrated very high capacity laser communications on board the NFIRE satellites.

Our boost phase intercept technologies include the Airborne Laser (ABL) and Net Centric Airborne Defense Element (NCADE) technology programs. We are requesting $187 million for FY 2010 to further develop these technologies. In FY 2008 we verified ABL can acquire, track, and perform atmospheric compensation in flight against a non-cooperative target and completed installation of the high power laser on the aircraft. We achieved first light through the Beam Control/Fire Control and successfully fired the complete high energy laser weapon system from the aircraft on the ground in November 2008. While we will cancel the planning for Tail #2 aircraft, we will maintain Tail #1 and continue ABL

research and development to address many of the program's affordability, technical, and operational challenges. We are focusing the ABL program on achieving repeated shoot-downs of missiles in their boost phase in FY 2010. We are requesting funding for two lethal shoot-downs in the first half of FY 2010, retaining critical skills needed for optics and fire control, and continuing test flights. We are also prepared to de-commission the Tail #1 aircraft if the shoot-downs are unsuccessful. We addressed an optics contamination issue which delayed the return to flight, but we currently flying a fully integrated ABL today and are on track for a shoot-down of a ballistic missile later in 2009.

In 2008 we also demonstrated the NCADE, a promising air-launch missile defense concept that uses a modified AIM-9X seeker to intercept a boosting missile target. Plume-to-hard body aim point transition was completed, and sensors on-board an F-15 aircraft successfully detected, acquired, and tracked three stages of a boosting missile target. We are requesting $3.5 million for FY 2010 for continued work on NCADE technologies and to study the concept further.

**Terminated Program Activities**

We are terminating two technology programs, the Multiple Kill Vehicle (MKV) program and the Kinetic Energy Interceptor (KEI) program, which do not match our strategy of focusing on near-term, rogue state, and theater missile threats. We are reviewing both programs to assess their contribution to follow-on

Ascent Phase Intercept and other R&D efforts to contribute to our "hedge" against future threats. The MKV technology program was established for integration onto midcourse interceptors to address complex countermeasures by identifying and destroying all lethal objects in a cluster using a single interceptor. Instead, we are now assessing the feasibility of destroying threat missiles early in flight before countermeasures can be deployed as a hedge against advanced future threats. The KEI mission was to counter advanced missile defense threats and is inconsistent with the Secretary of Defense's FY10 budget guidance to focus missile defense development on rogue and theater missile threats. The original KEI mission grew from a boost phase only mission to a boost and mid-course mission. The development schedule grew from 5 1/2 years to 12 to 14 years (depending on spirals), program cost grew from $4.6B to $8.9B, and the missile average unit production cost grew from $25M to over $50M per interceptor. Technical issues delayed the first booster flight test date (established in 2007) by over a year and we assess the probability of this flight test occurring this year as very unlikely. Affordability and government requirements growth, not contractor performance, was the main contributor to KEI's execution problems. Given the above and that 15% of the $8.9B worth of work on contract till 2018 has been accomplished, the KEI program was terminated. However, the contractor has indicated they can complete their flight test by the end of September 2009 in a manner that accommodates our legal liabilities for program termination, and we will assess

their proposal. If their proposal is valid, we will modify the stop work to allow the flight test in September.

**BMDS Contingency Deployments**

Due to the limited integrated missile defense capability fielded today, developmental elements of the BMDS have been deployed on a contingency basis at the request of Combatant Commanders and the Joint Staff. USSTRATCOM provides the requesting Combatant Commander an assessment of the capabilities and limitations of the requested capabilities based on test information collected at the time of the Combatant Commander's request. Contingency deployments directed by the Joint Staff usually require MDA to alter affected development programs' budget execution plans and schedules. An example is the unplanned deployment of the AN/TPY-2 X-band radar to Israel in August 2008 to bolster Israel's regional ballistic missile defense capabilities at a cost of over $80 million. Additionally, we spent analytical and test resources supporting the Department's plans to provide options for dealing with any contingency associated with the recent launch of a Space Launch Vehicle from North Korea.

The February 2008 satellite-shoot down is another example of how the Department has leveraged MDA's expertise and products to respond to contingencies. We demonstrated the system's flexibility and MDA's technical skills in supporting the real-world contingency operation by rapidly modifying BMDS components to provide a unique capability to the Navy to shoot down a specific

U.S. satellite in a decaying orbit containing toxic fuel. The SM-3 missiles, radars, and system software had to be quickly modified to enable the intercept, which also required integration of off-board tracking data from our sensor network. Using the modified SM-3 and Aegis Weapon System, the Navy successfully destroyed the satellite some 250 kilometers above the earth's surface by hitting the dangerous hydrazine fuel tank within centimeters of a specific aimpoint to ensure we destroyed the fuel tank. After this mission, we removed these temporary modifications, returning Aegis Weapon System to its operational configuration. While successful, the time and level of technical expertise it took to plan and orchestrate this mission, the split-second fragility of the once-per-day shot opportunities, and the relatively low altitude of the satellite's decaying orbit make clear the BMDS to not be an operational anti-satellite capability. The impact to the Aegis BMD program was a 3-month delay at a cost of $112 million to MDA. While the funding was subsequently reimbursed to MDA, the schedule delays were not recoverable.

**U.S.-Israeli Cooperative Programs**

We are requesting $120 million in FY 2010 for U.S.-Israeli cooperative missile defense efforts. The United States and Israel have cooperated on missile defense for over twenty years. Collaboration has grown from early feasibility studies to the development and employment of the Arrow Weapon System, a fully-operational missile defense architecture that is interoperable with U.S. BMDS elements. New joint programs have advanced this cooperation: U.S. and

Israeli industrial co-production of Arrow interceptors; the joint Short Range Ballistic Missile Defense Program's David's Sling Weapon System; and an initiative to provide Israel an upper-tier defense system.

The upcoming year will include several significant events that will demonstrate combined U.S. and Israeli missile defense capabilities. Israel conducted the first intercept test of the enhanced and co-produced Arrow-2 in April 2009, successfully acquiring, tracking, and intercepting a separating target. AN/TPY-2 and C2BMC sent cueing data on the target to the Arrow Weapon System. The Juniper Cobra exercise between European Command (EUCOM) and the Israeli Defense Forces to be held later in 2009 will be the fifth and most complex exercise yet designed. U.S. BMDS elements such as the AN/TPY-2, THAAD and Aegis BMD will participate in these exercises to demonstrate the interoperability and develop operational tactics, techniques and procedures associated with this coalition architecture.

MDA and Israel are also jointly developing the David's Sling Weapon System to defend against shorter range threats, to include some ranges that the PAC-3 system cannot engage. The first booster fly-out was successfully conducted in February 2009, with additional interceptor fly-outs scheduled later this year. The first intercept test is scheduled to occur in 2010. Additionally, MDA is coordinating with the U.S. Services to identify opportunities for U.S. utilization of the David's Sling Stunner interceptor.

Finally, the United States and Israel have initiated development of an upper-tier component to the Israeli Missile Defense architecture. An Analysis of Alternatives of a land-based SM-3 and a new Arrow 3 missile indicated that the Arrow 3 alternative may have a reduced 30 year life cycle cost and potentially better performance to meet Israel's requirements, but was also deemed to have very high schedule and technical risk to meet the Israeli proposed need date. We have proposed FY 2010 funding for the Israeli upper tier project that is consistent with historically authorized and appropriated funding levels and are coordinating an agreement that contains knowledge points to measure progress and joint U.S.-Israeli management responsibility. To mitigate the Arrow 3 development schedule risk, we are ensuring that the development of a land-based variant of the proven Aegis SM-3 missile is available to meet Israel's upper tier requirements.

**European IRBM and ICBM Defense Capability**

We remain committed to working with our NATO partners to address the growing threat from ballistic missiles. In the summit declaration issued on April 4, 2009, all NATO Heads of State and Government reaffirmed the conclusions of the Bucharest Summit, that "(b)allistic missile proliferation poses an increasing threat to Allies' forces, territory, and populations. Missile defence forms part of a broader response to counter this threat." As part of this response, NATO agreed that "a future United States' contribution of important architectural elements could enhance NATO elaboration of this Alliance effort." The Department has previously

proposed to field sensors, interceptors, communications, and the C2BMC infrastructure needed to improve protection of the United States and, for the first time, with the United Kingdom and Denmark, extend upper-tier, ICBM and IRBM, defense coverage to all European NATO allies vulnerable to long-range ballistic missile attack from the Middle East. The NATO Active Layer Theater Missile Defense (ALTBMD) program will develop the lower-tier, MRBM and SRBM, defense necessary for complete defense of NATO against all missiles of all ranges launched from the Middle East. The previously proposed upper-tier European Capability focuses on relocation of the upgraded midcourse X-band radar, currently located at the Kwajalein test site, to the Czech Republic and the establishment of a midcourse interceptor field in Poland, pending ratification of signed missile defense agreements with both governments. We have signed a BMD Agreement and a supplemental Status of Forces Agreement with the Czech Republic. We have signed a BMD Agreement with Poland and continue to negotiate a supplemental Status of Forces Agreement. Whether Poland or the Czech Republic will ratify these agreements remains unclear. In the meantime, we will continue to work closely with both nations and NATO, and we will continue to assess potential missile defense architectures for optimum effectiveness. To accommodate the discussions and the architecture assessment we have deferred the fielding of 10 GBIs at European Interceptor Site in Poland and the European Midcourse Radar in the Czech Republic to beyond FY 2010. We will continue planning and design activities as allowed under the FY 2009 National Defense Authorization Act to

preserve our opportunity to move forward with the start of Military Construction and site activation activities at both European Capability sites.

**International Cooperative BMD Activities**

The global proliferation of MRBMs and IRBMs warrants an international coalition approach to deter further acquisition of these offensive missiles and employ an operationally effective missile defense significantly contributes to that deterrence. Therefore, under the guidance of Office of the Secretary of Defense, MDA works closely with Combatant Commanders, the U.S. Department of State, and other government agencies to support their missions and goals. As a result, MDA has significant cooperative missile defense technology development efforts, including six "framework" agreements, signed by the Secretary of Defense, to facilitate BMD cooperative research with Japan, the United Kingdom, Australia, Denmark, Italy, and, most recently, the Czech Republic. Cooperative activities are under consideration with several other nations.

With the purchase of Aegis BMD and PAC-3 assets, Japan is fielding a multilayered system that is capable of being interoperable with the U.S. system. Japan's C2BMC (JADGE) system will integrate Japanese BMD sensors and interceptors and will be capable of exchanging information with U.S. missile defenses, including the forward-based X-band radar at Shariki and U.S. Aegis BMD ships in the region. The X-band radar at Shariki provides precise early detection

and tracking to increase the probability we will destroy any lethal target launched by North Korea.

MDA's C2BMC will continue leading the integration of the BMDS with NATO command and control. In November 2008 and January 2009, we completed initial tests confirming integration between the NATO Active Layered Theater BMD program office and our C2BMC.

MDA continues to support Administration efforts to propose transparency and confidence-building measures, technology development programs, and missile defense architectures to collaborate with the Russian government. Additionally, we have invited Russian representatives to view our test flights, which they have attended in the past, and participate in our annual Multinational Missile Defense Conference. I visited the Russian radar at Gabala, Azerbaijan, and personally assessed its valued contribution to U.S. and NATO missile defense efforts. Furthermore, we have been able to identify several potential areas of cooperative technology development such as sensor netting, propulsion, and high energy lasers, collaborative testing, and information-sharing initiatives such as the Joint Data Exchange Center. These areas of cooperation are under review by the Department of Defense.

**Enhancing Oversight of MDA and Collaboration with the Services and War Fighters**

As our missile defense development processes have matured, the Department has taken several significant steps to enhance accountability for MDA decision making and oversight by senior Department of Defense officials in collaboration with Combatant Commands and the Services. First, the Deputy Secretary of Defense established the Missile Defense Executive Board (MDEB), chaired by the Under Secretary of Defense for Acquisition, Technology and Logistics (AT&L) and comprised of the following members: Assistant Secretary of State for International Security and Nonproliferation; Under Secretary of Defense for Policy; Under Secretary of Defense for Intelligence; Vice Chairman, Joint Chiefs of Staff; Commander, U.S. Strategic Command; Director of Operational Test & Evaluation (DOT&E); Director of Defense Research & Engineering; Vice Chief of Naval Operations; Assistant Secretary of the Army for Acquisition, Logistics and Technology; Deputy Under Secretary of the Air Force for Space Programs; Director of Program Analysis & Evaluation; and Director, Missile Defense Agency. The MDEB meets bi-monthly to review program progress, inform missile defense budget decisions, conduct missile defense development portfolio trades, and provide guidance to MDA.

In September 2008, the Deputy Secretary of Defense established "business rules" that outline the transition and transfer of missile defense capabilities between the Missile Defense Agency and the Services. These rules designate that

"transition" of an element of the BMDS begins when the Deputy Secretary of Defense designates a "lead Service" to ultimately receive that capability through formal transfer. MDA is responsible for the development, manufacturing and testing for the lifecycle of BMDS elements, and the Services are responsible for developing the doctrine, organizations, training, logistics, personnel and facilities to effectively field and operate the element sub-systems of the BMDS. Once the MDEB concurs that transfer criteria, approved by the Deputy Secretary of Defense, have been met, the physical accountability and control of missile defense units, operations and support, and infrastructure responsibilities transfer to the lead Service. Research, development, manufacturing, and testing activities remain the responsibility of MDA after a BMDS element capability has been transferred to a lead Service. Accordingly, "hybrid" program offices, consisting of organizations reporting to either MDA or the lead Services will be formed to execute this division of responsibilities once a lead Service has been designated for a BMDS element.

In support of the MDEB as the COCOM advocate for missile defense, USSTRATCOM, in collaboration with the other Combatant Commands, Joint Staff, and the Services, assesses and prioritizes the development of future missile defense capabilities. As previously stated, USSTRATCOM also performs Military Utility Assessments (MUAs) to determine the capabilities and limitations of our systems under development when they are considered for contingency deployments by the Combatant Commanders.

Meeting the challenges of countering the proliferation of ballistic missiles requires the participation of assets in all our Services, thus developing and deploying the BMDS are inherently joint endeavors. The Deputy Secretary of Defense's transition and transfer business rules define the roles and responsibilities of developing and fielding missile defense capabilities. Accordingly, the Services and MDA have begun developing Memorandums of Agreements (MOAs) to define the management and interrelationship of MDA's research, development, testing and manufacturing responsibilities and align them with the Services' Title 10 Operations and Support responsibilities. The Secretary of the Army and I signed an "overarching" Army/MDA Transition and Transfer MOA on January 21, 2009, and drafts of the Navy and Air Force MOAs are being coordinated by their respective staffs. A key aspect of the MDA/Service MOAs is the establishment of MDA/Service Boards of Directors to collaboratively review cooperative development, resolve issues associated with the development and fielding of the Service designated BMDS elements, and raise unresolved issues to the MDEB.

**Improving Acquisition of the BMDS**

As the development of missile defenses matures, the Department is reviewing MDA's exemptions and waivers from standard acquisition practices to align MDA's management processes with the Services receiving this capability. As I continue as the Acquisition Executive for the initial phases of missile defense concept through

initial production and test, I am proposing milestone review and baseline reporting processes that are closely aligned with DoDI 5000.

*Enhancing System Engineering.* The key to the effective and efficient management of the acquisition of a large, technically complex enterprise, such as the missile defense program, is the establishment of management baselines resulting from a disciplined systems engineering process. MDA manages its programs via resource, schedule, operational, technical, contract and test baselines. To strengthen the systems engineering process to create, manage and implement those baselines, MDA designated a senior executive position (designated the "Director for Engineering") to establish engineering policy, ensure the disciplined practice of systems engineering fundamentals, and develop the systems engineering competencies of the missile defense workforce. The Director for Engineering oversees the career development of an engineering cadre that focuses on leveraging national expertise to assist MDA program managers in the cost, schedule, performance, and risk trades inherent in the development of executable baselines. Additionally, we created engineering "Knowledge Centers" (for Interceptor, C2BMC, Sensor, and Space application disciplines), staffed by highly qualified senior engineers from Federally Funded Research and Development Centers (FFRDCs), academia, Government Laboratories, and industry, to mentor and foster the practical application of missile defense engineering competencies and technical problem-solving skills across the MDA workforce. Finally, to ensure the future health of MDA's engineering workforce, we have dramatically increased the

number of recent engineering school graduates inducted into our two-year Career Development Program from 6 to 60 students per semester in order to sustain a population of over 200 entry level government engineers being mentored as they enter the MDA workforce.

*Technology Maturity Assessments.* To ensure the risk of technology insertion is well understood prior to advanced system development, we set specific knowledge points when sufficient data or knowledge is obtained from discrete events (typically the completion of a major test campaign) to make decisions on the readiness of development efforts to continue on their current plans. This approach enables us to assign Technology Readiness Levels (TRLs) that support programmatic decisions based upon the proven maturity of a technology under consideration.

*Developmental Testing.* While the benefit of early operational input to the development of missile defense systems is clear, premature entry into operational development and testing (i.e., before the design and configuration has been stabilized and basic technical concepts have been validated) risks expensive repetition of non-recurring engineering and operational development. To mitigate this risk, MDA is transitioning from "architecture-based" test objectives to "technical parameter-based" objectives identified early in a program to anchor models and simulations (M&S). These M&S will estimate performance characteristics and cost-effectively demonstrate the impact of technical risk mitigation prior to committing to full acquisition development of a capability.

*Independent Cost Assessments.* MDA and the Services are establishing agreements to collaboratively develop high fidelity cost estimates, and we have invited the OSD Cost Analysis Improvement Group (CAIG) to independently assess the assumptions, product description, cost estimating relationships, and methodologies as cost estimates are developed. These cost estimates will be the basis of system engineering trades and programmatic decisions at all levels.

*Working with Combatant Commanders.* In accordance with the 2008 Unified Command Plan, USSTRATCOM systematically assesses and establishes the priorities for developing and fielding BMDS capabilities. This biannual Warfighter Involvement Process (WIP) involves all Combatant Commands and the Services and produces a Prioritized Capability List (PCL) of desired missile defense capabilities. Although this product is developed once every two years, the MDEB and the Joint Staff (J-8) review BMDS development priorities and progress on a frequent basis. Working with OSD, government laboratories, and industry, MDA responds to the PCL with an assessment (called the Achievable Capabilities List) of the technical and schedule risks and programmatic feasibility of delivering the requested capabilities in the timeframe specified. USSTRATCOM, as a member of MDA's program control board that manages the configuration of MDA's programmatic and operational baselines, then rates the degree to which the ACL satisfies the PCL in the Capability Assessment Report (CAR). The CAR forms the rationale and justification for MDA's annual budget submission.

USSTRATCOM used MDA's 2008 ACL and other studies, war games and exercises to develop the CAR delivered in April 2009, which covers the timeframes through 2015. The CAR connects Combatant Command priorities with actual MDA development activities and allows for an assessment of overall missile defense development trends. This process ensures a comprehensive and accurate description of the Combatant Commander's needs and the responsiveness of OSD and MDA to meeting those needs. In no case did the war fighter assess that progress toward achieving desired capabilities is unsatisfactory.

*Cost, Schedule and Performance Trades*. Missile defense cost, schedule and performance trade-offs, below the level of the Deputy Secretary of Defense, are executed at the MDEB. MDA uses Earned Value Management (EVM) in collaboration with the Defense Contract Command (and validated by joint MDA/DCMA Integrated Baseline Reviews), to ensure contractor cost, schedule and performance execution is rigorously implemented to rapidly identify program execution issues to expedite resolution. Additionally, knowledge points and definitive test assessments complement EVM to provide early insight into program progress. Execution issues, opportunities, and scope, specification and schedule trades are proposed to the MDEB on an as-needed basis to ensure senior DoD officials program expectations are met.

*Preliminary Design Review*. It is MDA policy to structure contracts using a framework of incremental knowledge points that provide insight into the achievement of meeting contract objectives. Evaluations of these knowledge

points are conducted at Critical Design Reviews and Preliminary Design Reviews. Knowledge points form the basis for entrance criteria for Preliminary Design Reviews (PDRs), where we assess to what extent technologies are mature enough for achieving BMDS-required capabilities. PDRs ultimately support critical investment decisions.

*Life-Cycle Competition.* MDA is standardizing contracting methodologies to remove impediments to the program's life-cycle competitive contracting through a construct that: 1) ensures appropriate government rights to use contractor intellectual property and ensures the use of government-funded intellectual property; 2) ensures all government-funded infrastructure is transferable and fully documented; and 3) prohibits exclusive teaming arrangements where appropriate, ensuring the use of only highly qualified suppliers. Every opportunity to foster open competition will be pursued for all phases of missile defense programs.

*Baselines.* We recognize the need to incorporate the tenets of DoD 5000 to ensure programs are affordable, justified by the war fighter, and demonstrate acceptable risk through a milestone review process overseen by the MDEB. Also, we are segregating the management of our technology and development programs. Under my authority as the missile defense acquisition authority prior to initial production, potential programs that may provide technological or material solutions we need will undergo a milestone "A" decision to determine if they should become a program. These technology-based programs will be managed by knowledge points and incubated until maturity, at which time we will be able to

make a milestone "B" decision as to whether they should be converted to a development program. We will be establishing baselines for our development programs.

*Organizational Conflict of Interest.* MDA strives to prevent Organizational Conflict of Interest (OCI) by rigorously applying prohibition of contracting for inherently governmental functions in the transition to new consolidated services contracts, prohibiting developmental contractors from participating in the requirements process, and tightening oversight of potential organizational conflicts involving our system engineers and support contractors. In compliance with Secretary of Defense direction, we are looking for opportunities to transition support contractors to government positions, thus reducing OCI concerns.

*Acquisition Excellence.* Implementation of a functional management construct (where the MDA acquisition workforce is assigned to functional areas rather than projects) has resulted in greater focus on our human capital development at the enterprise workforce level. Our functional managers maintain a broad focus on career development and education of acquisition professionals rather than a narrow focus on enhancing skills for current job performance. This often involves transferring personnel between assignments every few years to challenge them with new opportunities, education, and give them a greater acquisition experience base over their careers. In the functional acquisition area alone, over twenty very senior program managers or acquisition career field specialists have been moved between programs, bringing with them expertise, knowledge and a fresh focus. We seek to

reward excellence with greater opportunities for career development and greater responsibilities.

*Contract Management and Oversight.* MDA has expanded our partnership with the Defense Contracting Management Agency (DCMA). For example, we have recently requested that DCMA provide: an independent review of the cost growth in our GMD intercept flight tests; an assessment of our supply chain vendor viability and compliance with best industry practices; a certification in preparation for contract re-competition activities; and an independent assessment of GMD EKV failures (including a validation that a EKV recently submitted to extensive over-testing is viable and ready for use). Finally, we are assessing how we can benefit from DCMA's risk management best practices.

**MDA Contract Cost Overruns**

In a March 2009 report, the Government Accountability Office (GAO) noted that 11 of 14 MDA contractors overran their FY 2008 budgeted costs by $152 million, or 3.7 percent. STSS accounted for more than 50 percent of the $152 million FY 2008 overrun. Technical issues caused most of the overruns seen with STSS. The GAO report also noted that Aegis BMD (SM-3 interceptor deliveries), the GMD prime, and MKV (engagement management algorithm development) performed their FY 2008 scope of work under budget. Since current BMDS contracts were initiated, we have had 31 contract realignments, adding nearly $14 billion to the value of the contracts. MDA realigns contracts as

required to accurately reflect contract changes, technical redirection, contractor internal replanning, and the impacts of program funding changes. Our contractors' Earned Value Management (EVM) Systems require them to update the Integrated Master Schedule and related Performance Measurement Baseline (PMB) in a timely manner to reflect an accurately planned program after programmatic decisions have been made. This helps to ensure cost metrics are realistic and used to understand cost trends, causes, and impacts, which in turn helps to ensure continuous management and minimization of cost growth.

As of December 2008, MDA had a $37 billion contract budget base allocated to current MDA prime contracts, initiated between 1996 and 2009. With 71 percent of that contract work having been completed, we are estimating a total overrun of $2.1 billion or about 6 percent. We will continue to conduct a rigorous Integrated Baseline Review process with our contractors to help ensure we have executable programs and use EVM to effectively manage cost, schedule, and technical performance. Our cost overruns have been accommodated and addressed within the overall FY 2008 and FY 2009 MDA budget.

*MDA and Mission Assurance.* During the 1990s and early part of this decade, we painfully learned that missile defense systems have very little tolerance for quality control errors, as we experienced a number of flight test failures. Out of necessity, MDA nurtured a culture of mission assurance within the Agency and within the missile defense industry. Today, quality control and mission assurance remain the Agency's highest priority. The Agency performs routine mission

assurance evaluations and has permanent Mission Assurance Representatives at several sites.

I am concerned with lapses in quality management involving several of our industry partners that have impacted system element cost, schedule, and performance. There have been frequent schedule slips on the STSS program, some resulting in significant delays, due to quality issues caused by lack of discipline and detail in the procedures. Similarly, we have recently suffered over 50 days of manufacturing delays due to a lack of discipline during EKV assembly and testing. There are many other examples over the past year. We are working closely with DCMA to hold our industry partners accountable and sufficiently improve contractor execution of quality control in their manufacturing facilities.

**Improving BMD Test Planning**

We are requesting $967 million in FY 2010 for test and targets compared to the $912 million appropriated for FY 2009. Our commitment is to prove, through comprehensive testing, that the ballistic missile defense system works. Evaluating the BMDS is likely one of the most challenging test endeavors ever attempted by the Department of Defense. Ideally, comprehensive and rigorous testing is enabled by a stable configuration of the system being tested; a clearly defined threat; a consistent and mature operational doctrine; sufficient resources to repeat tests under the most stressing conditions; and a well-defined set of criteria of acceptable performance. Unfortunately, none of these situations applies to the BMDS. The

hardware and software configurations of the BMDS frequently change since the system elements are still under development. There are many significant uncertainties surrounding the nature and specifics of the ballistic missile defense threat. Moreover, the operational doctrine for simultaneous theater, regional, and homeland defense is immature. Finally, costs range between $40 million to over $200 million per BMDS flight test, making the repetition of a complex flight tests cost-prohibitive.

In light of these challenges, the BMDS performance evaluation strategy is to develop models and simulations of the BMDS and compare their predictions to empirical data collected through comprehensive flight and ground testing to validate their accuracy, rather than physically testing all combinations of BMDS configurations, engagement conditions, and target phenomena. We are changing from an architecture-based goal approach to a parameters-based test-objectives approach. The focus of the on-going BMDS test review has been to determine how to validate our models and simulations so that our war fighting commanders have confidence in the predicted performance of the BMDS, especially when those commanders consider employing the BMDS in ways other than originally planned or against threats unknown at this time.

In Phase I of the test review, MDA and the multi-Service Operational Test Agency (OTA) Team studied the BMDS models and simulations and determined the variables (key factors) most sensitive to the predicted results. The OTAs and MDA then combined sets of key factors with test conditions that provide the

greatest insight into the BMDS models' predictive capability, when compared to test results, and called them Critical Engagement Conditions (CECs). However, there are many cases where the only practical way to measure, rather than simulate, performance is by ground or flight testing under operationally realistic conditions. OTAs and MDA call these tests Empirical Measurement Events (EMEs). Much of the data needed for the OTA Critical Operational Issues (COIs), such as survivability, reliability, performance in extreme natural environments, and supportability, can only be collected through the conduct of EMEs. MDA then combined the CECs, EMEs, and COIs into test objectives. Phase I identified the need to collect data for 101 CECs and EMEs in order to accredit the BMDS models and simulations and facilitate comprehensive operational assessments.

In Phase II, the OTAs and MDA combined these critical test objectives and selected 144 test scenarios, including 56 flight tests involving 37 tests where threat targets are intercepted. These test objectives not only address data necessary to validate the models of individual missile defense interceptor systems, but also demonstrate the performance of the BMDS working as an integrated system. The OTAs and MDA prioritized the resulting test scenarios according to the need to determine BMDS capabilities and limitations and the Combatant Commanders' urgency of need for a specific missile defense capability.

In Phase III, the OTAs and MDA will determine the funding and infrastructure necessary to implement the test campaigns identified in the second

phase. A key cost driver will be the ability to establish an inventory of reliable target configurations that will satisfy test objectives over a variety of BMDS flight tests.

At the conclusion of the three-phase test plan review, the OTAs and MDA will produce, with full involvement by DOT&E and STRATCOM JFCC-IMD, an Integrated Master Test Plan (IMTP) that is event-oriented and extends until the collection of all identified data is completed to ensure adequate test investments.

*Flight Test Cancellations.* Missile defense ground tests, flight tests and exercises represent a complex, interdependent orchestration of instrumentation, ranges, targets, interceptors, sensors, and war fighters. MDA testers routinely encounter many factors that may disrupt the planned test schedule, including range conflicts, target and interceptor hardware and software failures during flight test preparations, and real-world events. Constant re-scheduling and deconfliction add to the complexity of MDA test program management.

Members of Congress have expressed concern over the Agency's restructuring of GMD FTG-04 (scheduled for the second quarter of FY 2008), a flight test that had already been slipped to accommodate the re-test of FTG-03, which was declared a "no test" in May 2008 because of a target failure. In April 2008, the GMD program office identified quality issues on a unit used for flight data encryption on the EKV to be flown in FTG-04.

After investigation to determine the cause and the development of a corrective action plan, the GMD Program Office determined the test interceptor would not be ready for the test until December 2008. As a result, MDA delayed the

intercept portion of this flight test mission in order to address and correct the quality issue, and we restructured the mission from an intercept test to a non-intercept test, designated FTX-03, to demonstrate BMDS multi-sensor fusion functionality with a simulated GBI intercept. While the test successfully achieved a number of test objectives, the STARS/GROW target did not reach the intended simulated intercept point due to the failure of the adapter fairing panels to deploy, which precluded achieving some test objectives. As previously mentioned, we conducted an intercept test in December 2008.

I want to assure you that MDA is focused on conducting meaningful ballistic missile testing that rigorously demonstrates the capabilities of the BMDS. Executing our testing program in accordance with our testing schedule as established in the Integrated Master Test Plan is one of our highest priorities. Due to the increasing complexity of our test program, we may encounter technical issues in the future that may necessitate a delay in testing. When these issues become apparent, you have my personal commitment that MDA will consult with USD/AT&L, DOT&E and the Operational Test Agencies before deciding to delay or cancel a ballistic missile defense test.

Finally, in order to ensure our government and industry teams are not incentivized to avoid operationally realistic testing, I have directed we stop the practice of using award fee associated with flight test results. Instead, we will incentivize quality control in the manufacture of our hardware and software.

**Ballistic Missile Targets**

The Missile Defense Agency is fundamentally overhauling the target acquisition program to: 1) match the pace and increasing complexity of BMDS testing; 2) shorten the lead-time to contract, build, and deliver targets; 3) improve target program management; 4) improve target reliability; 5) reduce and control target program costs; and, 6) represent BMDS responses to dynamic intelligence and assure threat realism through a combination of flight test targets that represent basic target characteristics, ground tests, hardware-in-the-loop, simulations, and Foreign Material Acquisitions to provide high-fidelity representations.

In FY 2008 and FY 2009 to date, we launched 18 targets with four failures. Unfortunately, those failures had significant negative impacts on demonstrating key capabilities for both GMD and THAAD. We had two failures of the STARS target, which we will no longer be launching. Another failure was a foreign made target, and we have determined root cause and corrected that problem for the most recent THAAD test.

Target failures impacting our test schedules have driven us to adopt a new approach to acquiring targets. First, we have issued a Request for Information from industry to identify all potential sources of targets. After an assessment, we will determine if a competitive acquisition strategy would improve target cost, schedule, and performance issues. Second, we are standardizing target requirements based on intelligence data to emphasize the fundamental characteristics of each of the four target classes (SRBM, MRBM, IRBM, and

ICBM). This will allow the Agency to economically purchase greater quantities of basic threat representative targets. Third, to mitigate the likelihood that target failures will have a severe impact on our flight tests and development programs, we are implementing a "rolling spare" concept by building a target contingency inventory.

We began the "Flexible Target Family" (FTF) program in December 2003 to develop a single set of targets with common components that can be tailored to simulate known or potential short-, medium-, or long-range threats. Emphasis on common components and inventory buys down lead times for new missions and facilitates the quick tailoring of missions when needed.

Unfortunately, the FTF program has not met cost and schedule expectations to date. High costs and changes in target requirements led to the discontinuation of all variants except the 72-inch-diameter LV-2. Late production qualifications and environmental impact concerns has delayed the initial launch of the first long-range (72-inch) target until fourth quarter FY 2009. The 72-inch target, which is based on the newer Trident C4 motor, completed qualification testing in December 2008 in extremely rigorous environments.

Funding improvements also will help increase the quantity of targets available for testing. We have adopted a common cost model to help adjust out-year funding requirements with improved accuracy. With the FY 2009 Defense Appropriations Act, we transferred target funding from other program elements to

a Test and Targets Program Element and were provided an additional $32 million for FTF to initiate an inventory build up of critical long-lead hardware items.

**MDA Personnel/BRAC**

The 2005 Defense Base Realignment and Closure (BRAC) Commission approved recommendations directing the realignment of several MDA functions from the National Capital Region (NCR) to government facilities at Fort Belvoir, Virginia, and the Redstone Arsenal in Huntsville, Alabama. Specifically, a Headquarters Command Center (HQCC) for MDA will be located at Fort Belvoir, while most other MDA mission and mission support activities originally in the NCR will be realigned to Redstone Arsenal.

In support of these realignments, MDA has awarded contracts to construct two new facilities: a $38.5 million Headquarters Command Center (HQCC) at Fort Belvoir, and a $221 million addition to the Von Braun Complex at Redstone Arsenal. Construction of the HQCC will begin this spring, with expected completion and occupancy in Fall 2010. The HQCC will accommodate 292 positions. Construction of the Von Braun III project is already underway. The Von Braun III facility is being constructed in two phases – with the first phase being readied for occupancy in the summer of 2010, and the second phase scheduled for completion and occupancy in the summer of 2011. The transfer of government and contractor positions from the NCR is in progress. MDA has already transitioned approximately 1,300 of the planned 2,248 positions to Huntsville / Redstone

Arsenal. We are currently reassessing our facility needs in Huntsville given the anticipated expansion of our government acquisition workforce and the Secretary of Defense's PB10 guidance.

**Conclusion**

Proven missile defenses can enhance protection by dissuading potential adversaries from acquiring them, deterring against their use, and defending against a ballistic missile attack. Proven missile defense assets can contribute to strategic non-proliferation and counter-proliferation objectives by undercutting the value of offensive ballistic missiles and dissuading foreign investment in them. Deployed missile defenses can bolster deterrence and give confidence to our allies and friends by reducing opportunities for adversarial intimidation or coercion and creating uncertainty in the minds of the potential adversaries of the effectiveness of an attack on U.S. or allied retaliatory military power. A robust research and development program focused on API can provide a significant "hedge" against advanced threats. If hostilities break out, missile defenses can limit damage to U.S. and allied critical infrastructure, population centers, and military capabilities for responsive operations.

The FY 2010 missile defense budget was the result of a comprehensive assessment of available and reasonably achievable capabilities, war fighter requirements, and development risks. It also provides a hedge against future uncertainty. With the $7.8 billion requested, MDA will implement a program

strategy to improve the effectiveness and efficiency of developing the BMDS. While we are addressing challenges, our record of 16 of 18 successful intercept attempts over the past three years sends a clear message to potential adversaries considering the acquisition of ballistic missiles. But more work is needed to improve our oversight, collaboration with Combat Commanders and the Services, test planning, and program execution.

Missile defense is expensive, but the cost of mission failure can also be very high – the system must be affordable and effective. Integration of stand-alone missile defense systems into an integrated BMDS helps us achieve cost and operational efficiencies by improving protection with increased defended area and performance without incurring additional force structure costs. The Department is proposing a balanced program to develop, rigorously test, and field an integrated BMDS architecture to counter existing regional threats, maintain our limited ICBM defense, develop new technologies to address future risks, and become more operationally and cost-effective as we prepare to protect against the more uncertain threats of the future.

I greatly appreciate your support as we address issues associated with the BMDS, and I look forward to answering your questions.

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

MAY 21, 2009

## RESPONSE TO QUESTION SUBMITTED BY MR. TURNER

General O'REILLY. In FY 2010, we will maintain the Ground-based Midcourse Defense (GMD) long-range defense capability with missile fields at Fort Greely, AK (FGA), and Vandenberg Air Force Base (VAFB), CA, where we will emplace 26 and 4 Ground-Based Interceptors (GBIs), respectively. While the number of missile silos will remain at 26 at FGA, we will transition to newer silos to improve operational readiness. Thirty highly ready, operational GBIs will provide the United States with a sufficient number of operational interceptors, considering the limited number of ICBM launch complexes in North Korea and Iran and the long development time required for construction of additional ones. Additional GBIs, beyond the 30 emplaced in silos, will be necessary for maintaining and refreshing an operational fleet of GBIs through testing, upgrades and refurbishment. In FY 2010, we also propose to fund enhancements to GMD models and simulations, upgrades to increase the robustness and reliability of GMD communications; upgrades to command and launch systems; and security, infrastructure, and sustainment operations at FGA and VAFB.

In addition to the budget request for GMD, there are other significant midcourse defense development activities in our proposed FY 2010 budget intended to enhance GMD's contribution to the BMDS. Approximately $650M beyond the BMD Midcourse Defense program element will benefit and enhance the operation of our long-range defenses, namely, test planning and execution and target development ($160.6 million); development and operation of the Sea-Based X–Band radar ($174.6 million); software development, system engineering, and External Sensors Lab work for the AN/TPY–2 X–Band radar ($201 million); operation of the Upgraded Early Warning Radars ($28 million); modeling and simulations ($51.3 million); and work on the Single Simulation Framework ($36 million).

Continued research and development will improve the capability we already have to defend against long-range rogue missile threats. We will also continue rigorous ground testing as well as the development and testing of two-stage GBIs to expand the defensive battle space, better protect the United States, and potentially develop a European Capability.

While the emerging results of the MDA test restructure study will influence the final number of GBIs procured, the FY 2010 budget conveys a commitment to complete the procurement of 44 GBIs already on contract, some of which will go to the replacement and refurbishment of the 14 oldest interceptors in order to improve operational readiness of the fleet and extend GBI production capability. Completion of this procurement allows us to retain an active production capability which could be used to meet potential requirements for the European Capability, respond to test results, and implement future policy and fleet lifecycle management decisions. Moreover, similar to Air Force and Navy practices for Minuteman and Trident missiles, we intend to propose procurement of additional GBIs beyond the 44 already delivered or on contract for long-term follow-on operational test and evaluation.

Although we will limit the number of operational silos to those required to support the 26 interceptors at Fort Greely, we are reviewing the construction of Missile Field #2 to determine the most cost-effective approach to maintaining the highest level of missile silo reliability for future decades of GBI operations.

Additionally, we are upgrading the security infrastructure and completing the construction of a new power plant and power distribution system at Fort Greely. Once operational GBIs are emplaced in all 30 silos, we will begin replacing the oldest emplaced GBIs with the newest interceptors from the total produced to maintain a high state of operational readiness in their latest configuration. [See page 17.]

---

## RESPONSE TO QUESTION SUBMITTED BY MR. FRANKS

General O'REILLY. The Services develop force structure requirements in partnership with the Missile Defense Agency (MDA). MDA provides the technical and analytical information on Ballistic Missile Defense (BMD) systems to the Services so that they may determine the BMD force structure required to meet their operational demands. Once developed, the Services pass requirements to USSTRATCOM for

prioritization and then to MDA/Service Boards of Directors (BoD) and the Missile Defense Executive Board, in turn, for adjudication.

MDA has assisted the Army, as Lead Service, in the development of force structure requirements for the Terminal High Altitude Area Defense (THAAD) system, the AN/TPY–2 Radar (Forward-Based Mode), Ground-based Midcourse Defense (GMD) interceptors and fire control, and most recently, European BMD capability.

European Capability

Army and MDA have conducted numerous site visits in Poland. MDA and the Army have developed plans for the construction of European Interceptor Site facilities and the Army has developed force structure estimates required to operate and maintain those facilities. The European Operational Concept, published by MDA in April 2009, describes the operation of the European component within the Ballistic Missile Defense System. The Army will leverage this document when developing the Doctrine, Organization, Training, Leadership Personnel and Facilities required for BMD capability. European Capability force structure planning is on-going. However, force structure resourcing will only occur pending ratification of agreements with Poland and when directed to execute the program.

AN/TPY–2

The initial deployment of AN/TPY–2 (Forward-Based Mode) radar at Shariki, Japan in Jul 2006 under national emergency underscored the need to resource AN/TPY–2 units. MDA has provided Space and Missile Defense Command with AN/TPY–2 concepts, operational description, functions, and tasks to support detailed analysis for the design and development of force structure required for AN/TPY–2 units. The Army has conducted a force design update and resourced Table of Organization and Equipment for four AN/TPY–2 Radars. The Joint Requirements Oversight Council reviews ballistic missile radar capabilities and placement options to provide improved surveillance and impact point prediction support in support of Combatant Command (COCOM) requirements. Decisions for radar deployment follow COCOM procedures and the Joint Staff's Global Force Management Process.

Terminal High Altitude Area Defense (THAAD) 21-inch Business Case Analysis

MDA, in collaboration with the Army, is developing a Business Case Analysis (BCA) analysis for the development of a 21-inch interceptor. The Army is working on a companion study which examines the impact of an enhanced, improved capability of a 21-inch interceptor on currently planned Army force structure. Both studies are expected to be presented at the next MDA/Army BoD for PB12 consideration.

Joint Capability Mix Study

The Joint Capability Mix (JCM) II study was conducted by the Joint Staff J8 JIAMDO in collaboration with MDA and the Services. The JCM II has recommended the acquisition of additional inventory for THAAD, Aegis, AN/TPY–2 Radar and European Mid-course Radar. The Joint Requirements Oversight Council has endorsed the recommendation. The Missile Defense Executive Board and the Deputy's Advisory Working Group have approved resources for the acquisition of these components.

Ballistic Missile Defense Review

The Ballistic Missile Defense Review, currently being conducted by the Office of the Secretary of Defense and the Joint Staff, is analyzing key aspects of missile defense policy, force structure, sufficiency, and funding. The review is scheduled for completion in January 2010.

Upgraded Early Warning Radars

Air Force is the Lead Service for the Upgraded Early Warning Radars. Force structure (manpower and funding) requirements for those components are found in the Transition and Transfer Annexes, co-authored by Air Force and MDA and approved by the MDA/Air Force BoD.

Aegis BMD

In addition to the Joint Capability Mix II requirements that call out SM–3 quantities, Aegis Ballistic Missile Defense (BMD) has documented formal requirements from several Combatant Commanders that call for Aegis BMD ship presence in various regions. The requirement exceeds what can be supported by the number of planned Aegis BMD ships. These requirements are being addressed in PR11.

Additional Studies

The Missile Defense Executive Board Operational Forces Standing Committee has directed review of other technology initiatives with force structure implications. These studies are listed below. If technology is proven, these capabilities would become the basis for future Service force structure reviews.

- Land-Based SM–3 Architecture
- Early Intercept
- Air-Launched Hit-to-Kill Initiative [See page 36.]

## QUESTIONS SUBMITTED BY MEMBERS POST HEARING

MAY 21, 2009

## QUESTIONS SUBMITTED BY MR. TURNER

Mr. TURNER. The FY 2010 budget request includes a total of $9.3 billion in missile defense funding, approximately $1.5 billion below the FY 2009 funded level. A significant number of programs were eliminated such as MKV and KEI; some were significantly reduced such as GMD. Can you provide the committee with the analysis data the Department used to recommend these total programmatic changes?

General O'REILLY. In direct response to the warfighter's expressed needs, we are reshaping our program of work to bolster transportable regional defense capabilities to provide more robust protection of our deployed forces, allies and friends against existing threats.

In accordance with Unified Command Plan 08, United States Strategic Command (USSTRATCOM) is responsible for synchronizing planning for missile defense. In coordination with the other combatant commands and the Services, USSTRATCOM uses its Warfighter Involvement Process (WIP) to develop and produce a biannual list of desired ballistic missile defense capabilities, the Prioritized Capability List (PCL). MDA responds to the PCL with an assessment, called the Achievable Capabilities List (ACL), of the technical and schedule risks and programmatic feasibility of delivering the requested capabilities in the timeframe specified. As a member of MDA's program control board which manages the configuration of MDA's programmatic and operational baselines, USSTRATCOM assesses the degree to which the ACL satisfies the PCL. This assessment is called the Capability Assessment Report (CAR). The CAR provides the foundation, justification, and rationale for MDA's annual budget submission. Although the PCL is produced every two years, the Operational Forces Standing Committee (OFSC) and the Missile Defense Executive Board (MDEB) review BMDS development priorities and progress on a bimonthly basis. These programmatic changes are in concert with expressed warfighter ballistic missile defense capability needs.

More specifically, the Department chose to terminate the Multiple Kill Vehicle (MKV) program because it was not considered affordable at this time given its technical challenges, our need to re-look at requirements, and our need to re-allocate resources to accommodate an increased focus on theater capabilities. The MKV technology program was established for integration on to midcourse interceptors to address complex countermeasures by identifying and destroying all lethal objects in a cluster using a single interceptor. Because this technology is still in the early stages of development and considerable questions remain about its feasibility, we decided to focus resources instead on technologies that are designed to defeat advanced countermeasures of launched missiles in their ascent phase—after the boost phase and before the threat missile reaches its apogee.

The Department terminated the Kinetic Energy Interceptor (KEI) program because it is incompatible with the Department's direction to counter rogue nation and theater threats and it is not the most cost or operationally effective hedge to countering future ballistic missile threats. KEI's boost phase intercept mission was ideal for countering long-range, advanced, strategic threats, but current and emerging medium- and intermediate-range threats over the next decade will be more effectively countered early in their flight (during a threat missile's ascent phase) by utilizing near-term interceptors and leveraging the Missile Defense Agency's emerging BMDS sensor and command and control network. The deployment of other interceptor systems will be much sooner than KEI's planned deployment. The deployment of other interceptor systems also avoids the significant operational and platform integration issues associated with deploying a new, large KEI class interceptor on mobile platforms. KEI was not deemed affordable due to the cost growth of program and a program delay from the original five years to today's fourteen-year development schedule. In addition, delays due to technical problems indicated a lack of technology maturity of the KEI interceptor.

Regarding the Ground-Based Missile Defense (GMD) Program, the GMD planned program for FY10 has a balanced program for sustainment of the current operational capability while continuing development for future capability. The GMD program plans include funding for key element goals in advancing the GMD system to stay well ahead of the threat capabilities of rogue nations. Specifically, verifying ca-

pability and improving confidence in the fielded system, continued ground/flight testing and fielding of thirty operational GBIs. Thirty highly ready, operational GBIs will provide the United States with a sufficient number of operational interceptors, considering the limited number of ICBM launch complexes in North Korea and Iran and the long development time required for construction of additional ones.

While the emerging results of the MDA test restructure study will influence the final number of GBIs procured, the FY 2010 budget conveys a commitment to complete the procurement of 44 GBIs already on contract, some of which will go to the replacement and refurbishment of the 14 oldest interceptors in order to improve operational readiness of the fleet and extend GBI production capability. Completion of this procurement allows us to retain an active production capability which could be used to meet potential requirements for the European Capability, respond to test results, and implement future policy and fleet lifecycle management decisions. Moreover, similar to Air Force and Navy practices for Minuteman and Trident missiles, we intend to propose procurement of additional GBIs beyond the 44 already delivered or on contract for long-term follow-on operational test and evaluation.

Mr. TURNER. Your Department made significant programmatic decisions regarding U.S.- and European-based missile defense programs prior to the completion of the Administration's QDR. Can you please explain why? Did the applicable combatant commanders including NORTHCOM, STRATCOM, and EUCOM play a role in this decision-making process?

General O'REILLY. The original schedule for Ballistic Missile Defense (BMD) in Europe projected a 2013 capability; however, delays in obtaining Host Nation Ratification and restrictions imposed by Section 233 of the FY09 National Defense Authorization Act (NDAA) have resulted in revisions to the program schedule and funding obligation plans. The European Component program reflects compliance with FY09 NDAA requirements and continues to focus on two-stage interceptor development and test, pending the outcome of the QDR, in order to maintain the European Component of the BMDS as a viable missile defense option.

USSTRATCOM and the Joint Staff represent the warfighter community within the Operational Forces Standing Committee and the Missile Defense Executive Board in reviewing BMDS development priorities and progress on a bimonthly basis. These stated programmatic changes are in concert with expressed warfighter ballistic missile defense capability needs.

---

## QUESTIONS SUBMITTED BY MR. LAMBORN

Mr. LAMBORN. In a memo to the Commander of Strategic Command in February you wrote, "Space-based intelligence, surveillance and reconnaissance (ISR) systems today provide many advantages to U.S. forces in combat. However, these systems were not designed specifically to support battlefield operations as their primary mission, yet their services have become essential to warfighting capabilities." Further, you noted that we need the capability to deliver an effects-based, tactically focused, ISR capability that is responsive to the warfighter. You specifically cite the need to determine how we can provide combatant commanders the ability to directly task space-based assets and downlink data in theater. These capabilities would provide commanders the ability to plan and direct space-based sensors with confidence and flexibility. In addition, receiving, processing, and disseminating quality data in operationally relevant timeframes would greatly enhance combat decision-making.

Are you aware that commercial satellite data providers can immediately bolster the combatant commanders' access to high-quality imagery and products through direct tasking and downlink and other rapid tactical access methods?

General KEHLER. Yes, we are definitely aware of the many forward-leaning advances and capabilities offered by the commercial space sector. One of the key drivers for today's active use of commercial satellites was the operational demand for digital imagery during DESERT STORM. As a result, current Eagle Vision (EV) commercial systems have responded to the U.S. military's need for rapid, tactical access to broad area and multispectral overhead imagery. From a military perspective, our partnership with commercial space is a key element in the way-ahead vision for maintaining information superiority across the broad spectrum of military operations.

Mr. LAMBORN. In a memo to the Commander of Strategic Command in February you wrote, "Space-based intelligence, surveillance and reconnaissance (ISR) systems today provide many advantages to U.S. forces in combat. However, these systems were not designed specifically to support battlefield operations as their primary mission, yet their services have become essential to warfighting capabilities." Further, you noted that we need the capability to deliver an effects-based, tactically focused,

ISR capability that is responsive to the warfighter. You specifically cite the need to determine how we can provide combatant commanders the ability to directly task space-based assets and downlink data in theater. These capabilities would provide commanders the ability to plan and direct space-based sensors with confidence and flexibility. In addition, receiving, processing, and disseminating quality data in operationally relevant timeframes would greatly enhance combat decision-making.

Do you plan to leverage this critical capability that is currently available and if so, please provide details?

General KEHLER. We continue to explore a variety of commercial satellite options and are presently leveraging this important supporting capability. For example, the Eagle Vision system is a commercial architecture designed to provide theater commanders and combat units with rapid imagery products for mission planning. It is currently deployed and is both tasking and receiving commercial space imagery from a variety of platforms. Also of note, in the recent Schriever V Wargame in March 2009, we explored more effective ways for the United States to operate with commercial providers and coalition partners to assure space and information superiority. As a part of this evaluation, we organized an Industry Cell to operate in conjunction with the other government groups to more effectively integrate commercial products. While certain legal and foreign affiliation issues must still be considered, we continue to evaluate the feasibility of these private sector capabilities and, through currently fielded systems and future exercises, better understand the important contribution that commercial imagery plays in today's fight.

Mr. LAMBORN. General Kehler, Air Force Space Command (AFSPC) is responsible for the Space Surveillance Network (SSN) tasked with monitoring approximately 15,000 objects in the orbital threat environment. These objects are compounded by additional breakups, and the entire debris field must be tracked to prevent catastrophic collisions in space. In addition, the Haystack antenna at Millstone Hill is being deactivated for hardware upgrade, which degrades our SSN capability. Would AFSPC realize enhanced Space Situational Awareness by leveraging the existing network of MDA sensors through multi-mission sensor utilization?

General KEHLER. AFSPC recognizes the potential contributions of the MDA sensors network and continues to assess the value they could bring to Space Situational Awareness (SSA). Within the Command, we have a strategic approach toward achieving our Nation's SSA objectives which includes, as our number one priority, to "integrate and leverage information from a variety of existing assets and sources—use current information in new ways." In fact a number of our sensors already perform important roles for missile warning, missile defense or space surveillance depending on the scenario. Back in July 2008, when we completed our National Interim SSA Architecture, we identified SSA capabilities that MDA sensors could contribute toward and included them in the architecture. Since that time, we have been involved in activities to find the best approach for data exchange between the two communities through a net-centric, service-oriented architecture. Finally, we are working with our mission partners to analyze the individual sensors' and networks' capabilities and their specific value to the mission along with any necessary agreements that would have to be put into place, funding sources, and concepts of operations changes.

Mr. LAMBORN. General O'Reilly, I understand that the sensors deployed in the Ballistic Missile Defense System (BMDS) collect information on orbital space objects. This information must be assessed for possible threat, and upon resolution, discarded as non-threatening. Assuming that the necessary modifications are implemented with no degradation of the primary Ballistic Missile Defense mission, would the MDA support enhanced information sharing with the space community through multi-mission sensor utilization?

General O'REILLY. While these activities demonstrate the inherent capabilities of the X–Band radars to support the Space Situational Awareness (SSA) mission, full integration of these radars into the SSA mission will require development and testing of real-time software and connectivity into the Space Surveillance Network (SSN). Additionally, such use would need to be coordinated with the respective Combatant Commanders and appropriate tactics, techniques, and procedures developed.

SSA is a difficult problem requiring a network of sensors worldwide. The Cobra Dane Upgrade (CDU) and the Upgraded Early Warning Radars (UEWRs) are currently connected to the SSN, provide multi-mission capability, and have been contributing to the SSA mission for over 20 years. Additional MDA ground and sea-based radars can potentially support the SSA mission from their operational and test locations, supporting launch characterization, reducing track coverage gaps, and increasing capacity. Several of the X–Band radars have demonstrated their ability to support the mission in the past:

- The AN/TPY–2 radar has participated in the USSTRATCOM-sponsored Extended Space Sensors Architecture (ESSA) Advanced Capability Technology Demonstration (ACTD)
  - As part of this demonstration, the AN/TPY–2 radar at the Pacific Missile Range Facility supported characterization of the TACSAT–3 launch on May 19, 2009
- The Ground-Based Radar Prototype (GBR–P) has demonstrated an offline capability to perform long-range satellite tracking and imaging and orbital debris tracking
- During Operation Burnt Frost, multiple AN/TPY–2 radars and the SBX all provided tracks of the USA 193 satellite as well as high-resolution data of its destruction. Also, the CDU and the UEWRs provided pre-event characterization and post-intercept debris tracking.

○