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SENATE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON AIRLAND
UNITED STATES SENATE

DEPARTMENT OF DEFENSE

WRITTEN TESTIMONY FOR THE
SENATE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON AIRLAND
UNITED STATES SENATE

SUBJECT: Tactical Aircraft

WITNESS STATEMENT OF: Lt General Christopher C. Bogdan
Program Executive Officer F-35

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Chairman Blumenthal, Ranking Member Wicker, and distinguished Members of the Committee. Thank you for the opportunity to address this committee regarding the F-35 Lightning II.

The F-35 Lightning II is the Department of Defense`s largest acquisition program, and its importance to our national security is immense. The F-35 will form the backbone of U.S. air combat superiority for generations to come. It will replace the legacy tactical fighter fleets of the Air Force, Navy, and Marine Corps with a dominant, multirole, fifth-generation aircraft, capable of projecting U.S. power and deterring potential adversaries. For our international partners and Foreign Military Sales (FMS) customers who are participating in the program, the F-35 will become a linchpin for future coalition operations and will help to close a crucial capability gap that will enhance the strength of our security alliances. The FY15 budget includes $8.3 billion for continued system development, test and procurement of 34 F-35 aircraft.

It is our duty to produce the next generation fighter jet for the United States and our allies, understanding that we live in a resource constrained world. The current F-35 program is focused on completing System Design and Development within the time and funding planned, producing aircraft that are affordable and achieve mission needs, and sustaining fielded aircraft in an effective and economical fashion. This plan, which has been in place since 2012, is already resulting in steady progress; however, I am pressing for faster and stronger performance in the upcoming year. There are 59 F-35s now deployed in operational and training squadrons at five locations and the program has started a slow shift of focus to production and long-term sustainment without losing the

momentum we see in the development and flight test programs. Affordability remains my number one priority. We must use all of our energy finishing development within the time and money we have, we must continue to drive the cost of producing F-35s down, and we must start today to attack the long-term life cycle costs of the F-35 weapon system.

Program Accomplishments in the Last Year

The F-35 program team achieved a number of accomplishments in 2013, including delivery of 35 aircraft; rolling-out of the 100th jet from the production facility in Fort Worth; completion of the Block 3 Critical Design Review; announcing the decision to cease development of an alternate Helmet Mounted Display System (HMDS); and resolving lingering technical design shortfalls to include the F-35C Arresting Hook, Night / Instrument (IMC), Fuel Dump, and Lightning Protection.

F-35s flew 3,917 sorties (including System Development and Demonstration (SDD) and Low Rate Initial Production (LRIP)) for a total of 6,255 hours last year, bringing the total hours flown by F-35s to 11,873. The Program completed the second F-35B Ship-Trial period operations aboard the USS Wasp completing 95 vertical landings and 94 short takeoffs, with 19 night takeoffs. The Program stood up new F-35 squadrons at Edwards Air Force Base, Nellis Air Force Base, and Eglin Air Force Base, made Marine Corps Air Station Beaufort ready for F-35 operations, started up aircraft modification lines at Fleet Readiness Center East and at the Ogden Air Logistics Center, opened the first overseas F-35 final assembly and checkout (FACO) facility in Italy, and qualified 65 pilots and trained 414 maintainers. From a business perspective, the F-35

program successfully closed negotiations and awarded the Lockheed Martin LRIP lots 6 and 7 contracts and modified the SDD contracts. Additionally, the program definitized the Pratt & Whitney LRIP lot 5 contract, and awarded LRIP lot 6, and modified the SDD contract during 2013.

Although sequestration, as well as congressionally directed reductions to the SDD program in FY13, had the potential to either stretch the development program out or reduce the capabilities we can deliver to the warfighter, we were able to mitigate the impacts to the development program and remain on our program plan. The Bipartisan Budget Act of 2013 also allowed us to preserve the number of jets we intend to procure in FY14.

International Partnership

The F-35 program continues to be the Department of Defense's largest cooperative program, with eight Partner countries participating under Memorandums of Understanding for System Development and Demonstration (SDD) and for Production, Sustainment and Follow-on Development (PSFD). The eight partner countries include the United Kingdom, Italy, The Netherlands, Turkey, Canada, Australia, Denmark, and Norway. The partners' senior acquisition leaders met in September 2013 and are meeting again the first week of April 2014; all expressed their continued commitment and support for the program; however, they are all watching closely how the Department of Defense (DoD) deals with our budget cuts and the impact this has on the cost of the program. Conversely, we are also watching our partners as nearly 45% of the next 5 years of production buys are from our partners and FMS customers.

In October 2010, Israel signed a letter of offer and acceptance to purchase 19 F-35A aircraft for $2.75 billion, with deliveries scheduled to begin in 2016. In June 2012, Japan signed an agreement to purchase the first four of a planned acquisition of 42 F-35A aircraft for $741M with deliveries scheduled to begin in 2016. The F-35 team developed a proposal to support the Republic of Korea's competitive Request for Proposal for acquisition of its future fighter. Selection is expected by the end of this year and we continue to provide program information to the Republic of Singapore.

There were many “firsts” during the year including the delivery and acceptance of two Netherlands F-35A aircraft, the first Australian and Italian aircraft under contract (LRIP 6), the first Norwegian aircraft under contract (LRIP 7) and the first Netherlands pilot in training.

Development Program Performance

The F-35 development program continues to execute to the baseline approved at the March 2012 Milestone B recertification Defense Acquisition Board. My biggest technical concern in development is still software. Over the past two years, the program has implemented significant changes in how system software is developed, lab tested, flight tested, measured, and controlled. These changes are showing positive effects and I am moderately confident that the program will successfully release the Block 2B and 3I capability as planned in 2015 and 2016, respectively. However, I see more risk to the delivery of Block 3F, our full warfighting, capability by 2017. Block 3F is dependent upon the timely release of Block 2B and 3I, and at present, 3F is tracking approximately four to six months late without taking steps to mitigate that delay.

The F-35 Joint Program Office continues to exercise oversight and management of software development, which has resulted in reduced times to develop and integrate software, reduced errors in the software code developed, and a marked increase in the cooperation and understanding between the prime contractor and the program office. I have directed a Capability Block Plan that is an integrated roadmap that defines the incorporation of capabilities for the F-35 program. Additionally, I have instituted a Block Review Board which places the government in charge of all configuration, capability, and schedule changes to software development. We have also implemented robust systems engineering/technical review process for all development work to provide greater knowledge and defined decision gates to determine if the system configuration under consideration is mature enough to proceed to the next phase. This, coupled with improved automated tools and processes, has resulted in an almost tenfold reduction in software release build time, and we have seen corresponding improvements in configuration management, test automation, and error detection and resolution. However, we still have challenges and the prime contractor and its subs still need to improve both the speed and quality of software development to be able to catch up from previous software delays.

In addition to software challenges, the three F-35 variants are encountering the types of development problems typically experienced on advanced state-of-the-art, high performance aircraft development programs at this stage of maturity, such as reliability and maintainability shortfalls, and beyond first life durability issues. While we still have technical risks on the program, I have confidence that the known technical issues we have will be solved and properly integrated into the F-35 and we will be capable of dealing

with any future technical issues.

Over the past year, the program office successfully characterized the expected performance of the Gen II HMDS to support U.S. Marine Corps Initial Operational Capability (IOC) and defined the technical solutions to be incorporated into the follow-on Gen III HMDS to achieve a fully compliant capability for the warfighter. The improved night vision camera was evaluated in a series of risk reduction flight tests showing significant improvements over the older camera, and we are confident it will be able to meet the warfighter's requirements when integrated into the Gen III helmet. Based upon a thorough technical evaluation, of the Gen II helmet, successful incorporation of technical improvements and a better business deal, the Department elected to end development of the second, alternative helmet. With respect to the better business deal, the program secured a cost guarantee made by the Lockheed Martin/Rockwell Collins/Elbit team resulting in a reduction of 12% from the previous cost for the helmet system. Additionally, deciding to down select to the Gen II and III helmet will avoid future cost of $45 million required to completely mature the alternate helmet. The Gen III HMDS is expected to enter formal F-35 flight test in third quarter 2014.

The program also saw improvements with the redesigned F-35C arresting hook system on our CF-3 aircraft. In January 2014, the F-35 team accomplished 36 for 36 successful roll-in arrestment tests at Lakehurst, NJ. The aircraft is now at Patuxent River where it is continuing its ship suitability testing. Thus far CF-3 accomplished 8 for 8 fly in arrestments while at Patuxent River; however, testing has been delayed for approximately 60 days as we discovered a minor nose gear issue. These tests are expected to lead to a certification of the F-35C for shipboard flight trials, which are

planned to commence fourth quarter 2014.

The program has also made progress on the redesigned fuel dumping seal and port. The F-35 employs a unique fuel dumping port on the underside of the wings in order to maintain its stealthy signature. Early fuel dump testing revealed that fuel was collecting within the wing flaperon cove, which led to significant external fuel wetting and pooling of fuel at the wing/fuselage root. We redesigned the fuel dump port to more efficiently move fuel away from the wing surface and designed a new and improved flaperon seal to minimize fuel collecting in the cove. Fuel dump testing with the redesigned seal and port has been successful and we are incorporating the new design in all three variants.

We have also seen significant progress in our ability to fly at night and Instrument Meteorological Conditions (IMC). The Navy granted clearance and conducted the first night flights on the F-35B (VMFA-121) in December 2013. Subsequently, in January 2014, the Navy granted night/IMC clearance for the F-35C. The Air Force also granted night/IMC clearance for the F-35A in January 2014, although initially weather restricted to a ceiling greater than 600 feet and visibility greater than two nautical miles. In March 2014, the Air Force lifted the restrictions following additional simulator evaluations, allowing the F-35 aircraft to fly to weather minimums posted by the airfields.

All LRIP lot 6 and later aircraft will be delivered with night / IMC capability. LRIP lot 5 aircraft require an improved landing/taxi light prior to operating in night/IMC. LRIP lot 4 aircraft require a planned aircraft software update as well as improved wingtip and landing/taxi lights. All possible software updates have been accomplished, and the lighting upgrades are in progress. LRIP lot 3 and earlier aircraft require the Block 2B

upgrade planned to begin in late 2014 to gain night/IMC capability.

We currently have 11 F-35As, 6 F-35Bs, and 1 F-35C fleet aircraft configured and certified for night/IMC. The remaining LRIP lots 4 and 5 fleet aircraft are either in process or awaiting the wingtip and landing/taxi light modifications for night/IMC. The program has also made progress on lightning protection. In 2009, fuel system simulator testing revealed deficiencies in the On Board Inert Gas Generation System's (OBIGGS) ability to maintain the necessary tank inerting to protect the aircraft from lightning strikes. The program completely redesigned the OBIGGS and performed a F-35B ground test that verified inerting distribution in the tanks. Ground and flight tests are planned for second quarter 2014 where we expect to evaluate fuel system performance and prevention of nuisance alerts. A unique opportunity occurred with the availability of the Netherlands F-35A aircraft; our team took advantage of the aircraft to test for lightning electrical transient stress to aircraft subsystems in the Fall of 2013. The aircraft was subjected to 865 simulated low level "lightning strikes," and we are happy to report that the aircraft received no damage, all subsystems worked appropriately, and the aircraft's reaction to the lightning strikes closely matched engineering models. Aircraft that have OBIGGS inerting and subsystems that can function with lightning electrical transients are expected to allow the removal of the lightning flight restrictions by the beginning of 2015.

In September 2013, during F-35B full-scale durability testing we experienced a significant bulkhead crack at 9,056 Equivalent Flight Hours (EFH), which is 1,056 beyond its first lifetime. In August 2013, just after completing 9,000 EFH, a planned inspection of the F-35B full scale durability test article verified the existence of two small

cracks along the Fuselage Section (FS) 496 Bulkhead. The decision was made to move forward with the testing and to inspect the bulkhead at shorter intervals in order to observe if and how the crack would propagate. In September 2013, strain gauge data prompted an early inspection of the bulkhead which uncovered that the cracks had propagated and severed the bulkhead at the lower arch. The durability testing was stopped and a root cause investigation was conducted. The goal of durability testing is to apply cyclic loads to the airframe to simulate fleet usage. Durability testing is conducted early in the development of any new aircraft to avoid costly sustainment issues later in the life of the aircraft. We require 8,000 EFH of aircraft service verified by testing of two lifetimes (16,000 EFH). However, to aid in life extension assessment, we plan to test each variant up to 3 times its expected operational life (24,000 EFH). Our engineering teams executed a joint root cause investigation to define the required modifications to the bulkhead for incorporation into production and retrofit of the fleet. This effort is part of the normal program concurrency process to ensure full life capability and we budgeted for these types of durability test findings in production via concurrency modeling. The full-life design solution for the bulkhead has been defined and is scheduled for production line induction not later than LRIP lot 9 aircraft deliveries in 2017. We are also working with Lockheed Martin to incorporate a speedier retrofit solution to be incorporated into 10 LRIP lot 8 B-Model aircraft that are currently on the production line.

There was no immediate airworthiness concern for fielded and test aircraft because of the high hours accrued on this test article at the time of discovery. It will not impact the U.S. Marine Corps ability to meet IOC in 2015. Additionally, due to the differences between the bulkhead forging materials of the F-35B (Aluminum) and the F-

35A/C (Titanium), we have yet to see the same cracking with the A and C models at the equivalent flight hours.

Reliability and Maintainability (R&M) remains an area for needed improvement. The fleet has not performed to the R&M levels we expect at this point in the program as fielded aircraft are well below our projected growth curves. To address these issues I am executing a multi-phase R&M improvement process. First, I have stood up a fully funded rigorous R&M program that will establish R&M performance goals, take specific actions to achieve these goals, and hold the enterprise accountable for meeting them. We have a good amount of fleet data at this point to include parts systems and procedures that drive up costs, maintenance, as well as reduce readiness and aircraft availability. We are analyzing this data to make actionable decisions, such as redesigning parts, improving repair times, and streamlining and improving maintenance procedures. Finally, I am accelerating aircraft retrofits and modifications to more rapidly improve readiness and to measure these R&M improvements.

I have also stood up a Cost War Room whose mission is to champion affordability initiatives to reduce the operation and sustainment costs of the fleet. This Cost War Room is comprised of representatives from prime contractors and their suppliers, under the direction of Program Office personnel, and is systematically looking at all the cost drivers that make up the F-35 operations and sustainment costs with the intent of taking specific actions that will reduce long-term costs. We are also nearing completion of a Second Business Case Analysis and a Level of Repair Analysis to assist the leadership in making future sustainment decisions as we begin to create the global sustainment posture.

The Autonomic Logistics Information System (ALIS) provides maintenance,

operations planning, reliability, logistics, and training information to support sustainment of F-35 aircraft. We have fundamentally changed the manner in which we are developing and fielding ALIS. Before, we treated ALIS as a piece of support equipment. The enterprise now deals with ALIS as if it is a "weapons system" and a critical part of the F-35 program. We have added a new systems engineering process that includes periodic design reviews, a new leadership structure, improved lab infrastructure and testing to include warfighter involvement, and a more structured software delivery plan to include metrics. We have seen some solid improvements since these changes last year as the program has delivered better and faster incremental fixes, including our recent software update that was fielded in February. I have also put into place a plan for a complete end-to-end test that includes information assurance testing to ensure the aircraft and ALIS can operate together seamlessly with a great level of "cyber security."

We have also started the design of a deployable version of ALIS to support the warfighters. The requirements were finalized and a Critical Design Review was held in February 2014. The first phase of deployable ALIS will be delivered in April 2015 to support the U.S. Marine Corps IOC, while a second version, which will include additional Air Force requirements, is scheduled by be delivered by fourth quarter 2016.

From January 2011 to August 2012, the DoD Inspector General (IG) conducted an audit of the F-35 ALIS. The DoD IG provided the program with a set of recommendations, which we either concurred or partially concurred with, and are in various stages of implementation. For example, in the information systems security area, the employment of U.S. Air Force systems and processes to track the Certification and Accreditation posture, in addition our early engagement strategy with Services certifying

officials, continues to improve the overall Certification and Accreditation process. Furthermore, the tracking of foreign developed software, independent software test actions, and the supplement to the System Threat Assessment Report, expected by June 2014, will help us inform ALIS specific threat actions and decisions. Although we have not implemented the recommendation to separate ALIS as a Major Automated Information System program, as I previously mentioned, the enterprise now deals with ALIS as if it is a "weapons system" and a critical part of the F-35 program. I believe separating ALIS from the Air System, three years before the end of development activities, will introduce significant integration, implementation, and management risks with undesirable effects to the program budget, schedule, and Air System performance.

In 2013, the F-35 SDD Flight Test program exceeded the number of planned flights, but fell slightly behind in overall test point accomplishments. The Integrated Test Force (ITF) achieved 1,168 test flights of 1,153 planned, slightly exceeding the total flights in 2012. The ITF also executed 9,032 test points, which was roughly 3.5% shy of what was planned. FY14 is a very critical and challenging year for flight test and we must improve test aircraft availability and reduce the amount of refly, regression and "growth" test points if we are to stay on track.

Pratt & Whitney SDD F135 engines have completed a total of 29,986 operating hours, 15,963 hours on flight-test engines, and a total of 5,565 hours of flying time on all three variants of F-35 aircraft. Pratt & Whitney is currently supporting flight test on all three variants at three locations. During FY13, the engine successfully demonstrated stall-free high angle of attack operations and successfully completed all engine air start testing.

The F135 engine did experience a significant test failure on 23 December 2013. An F-35B ground test engine suffered a failure of its 1st stage fan integrally bladed rotor (IBR, also known as a "blisk") while doing ground accelerated mission durability testing. This failure occurred on the highest time test engine in the F135 fleet with 2,192 operating hours; roughly 75% of the engine's required life. (By comparison, the high time SDD flight test engine has 622 flight hours and the high time operational engine has less than 250 flight hours). While the root cause of this failure is still under investigation, safety assessments have determined that the fleet can be safely operated by inspecting the 1st fan stage rotor at regular intervals until a new rotor is installed. A cost reduction redesign of this 1st stage rotor was already in progress before the test failures; consequently, lessons learned from the root cause analysis will be incorporated into the new redesign. We expect the production break in of the redesign in the late 2016 timeframe, with a retrofit of engines beginning in 2017. While the fan module that contains this IBR can be removed and replaced in the field, replacement of the IBR itself within the module is a depot level task.

The F-35 fleet experienced two fleet-wide groundings in January and February 2013 due to issues with the F135 engines. The first incident occurred in January 2013. An F-35B was forced to abort a takeoff for what would later be understood to be an improperly crimped fueldraulic hose in the F135 engine. The F-35B fleet was grounded for 19 days, but was returned to flight after confirming the integrity of all similar hoses in the engines. The program office put in place activities to better monitor and improve the quality of the hoses being provided for the engine, and continues to track this closely. The second incident grounded all variants of the F-35 for approximately seven days and

resulted from a crack discovered in the 3rd stage engine turbine blade. The engine in question had been flying at the highest heat and most significant stresses of any of the jets in the test and operational fleets, which contributed to this crack. After confirming the source of the crack, the fleet was inspected and returned to flight. Engineering work continues to assess the long-term implications of this turbine blade crack on the life of the F-35 engine, and the incident continues to be successfully managed in the fleet by monitoring the life usage of the turbine. Through incorporation of new quality inspection criteria during production all new engines are now being delivered with full life 3rd stage turbine blades.

To ensure Lockheed Martin and their suppliers keep focus on improving key areas of risk, the Defense Acquisition Executive has approved a plan that links improvement in the areas of software, ALIS, and R&M to the delivery of aircraft and the future ramp up of production. In particular, additional progress must be demonstrated before awarding a contract for higher production rates: 1. Software Builds for block 2B, 3i, and 3F, which is essential to achieving the desired combat capability of the F-35; 2. Reliability, which is not growing at an acceptable rate; 3. ALIS, which requires focused attention to meet schedule of performance metrics; 4. Closure of previously identified design issues through testing. Further, I have worked with the Navy and Air Force Acquisition Executives to ensure that the Acquisition Planning for LRIP lot 9 includes strong, event-based performance criteria while incentivizing Lockheed Martin and Pratt & Whitney to achieve the priorities I have just listed.

With regards to the Dual Capable Aircraft (DCA), we are continuing to execute a risk reduction strategy to prepare for DCA integration during Block 4 Follow-on

Development. Our risk reduction efforts include developing a detailed planning schedule for B61 integration on the aircraft, maturing the nuclear architecture design, refining the cost estimate, Nuclear Certification Requirements planning, and the initial Concept of Operations (CONOPS) documentation. All F-35 DCA Risk Reduction benchmarks will be complete by Summer 2015. DCA integration begins as part of Follow-on Development, comprised of Block 4A (2016-2022) and Block 4B (2018-2024). All software development, flight test, and nuclear certification activities will be conducted across Block 4A/4B development, resulting in an F-35 design certification in 2024. The Air Force will lead an operational certification process following design certification that is expected to be completed no earlier than 2025.

Production Program Performance

Costs for production aircraft continue to come down for each successive lot put on contract. The average aircraft unit cost for an LRIP lot 6 aircraft is 3.8% lower than LRIP lot 5 aircraft. An LRIP lot 7 aircraft has an average unit cost approximately 4.2% lower than LRIP lot 6 aircraft. I expect these trends to continue for many future production lots. Production efficiencies as well as economies of scale are both critical in the overall affordability of the F-35 program. In 2013, efforts were taken to improve affordability, with more cost sharing between the Government and Contractors with respect to cost reduction initiatives. This along with other cost reduction initiatives and economies of scale should result in the price of an F-35A, including an engine and profit, between $80M and $85M in 2019 in 2019 dollars. The other F-35 models have proportionally similar cost reduction goals.

In 2013, Lockheed Martin delivered 35 aircraft compared to 30 deliveries in 2012. This was despite the challenges posed by F-35B flight operations being shut down for a month due to an issue with the fuel-draulics hose as well as not being able to conduct any acceptance flight operations in the month of August due to the Fort Worth Joint Reserve Base runway being repaved. Deliveries included the last LRIP lot 4 aircraft and 10 of 32 LRIP lot 5 aircraft.

Production has been fairly stable and predictable. As of 2 March 2014, the overall production factory performance was tracking closely to the post Lockheed Martin stake plan with factory assembly performance 6 days behind plan. Production flight line performance improved from 57 days behind plan to 39 days behind plan. Efforts are continuing to further improve production flight line performance to ensure stable delivery of F-35s as we ramp up production. The Program continues to see improvements in design stability, parts availability, workforce stability, and shop floor discipline. The Joint Program Office, in partnership with the Defense Contract Management Agency (DCMA), continues to closely monitor progress and challenge the contractor and supply chain for greater quality improvements.

In 2013, Lockheed Martin, DCMA and the Joint Program Office jointly developed a corrective action plan in response to Lockheed Martin disclosures on specialty metals non-compliance. The supplier compliance assessment was completed in August 2013 and Lockheed Martin initiated ongoing surveillance activities to ensure future compliance.

Significant international supplier milestones were also achieved in 2013. Final Assembly and Check-Out (FACO) operations commenced in Cameri, Italy at Alenia

Aermacchi's co-production site in July. The first Italian FACO produced F-35 is now in the final assembly phase. In December 2013, Turkish Aerospace Industries, Inc. delivered its first co-production F-35 center fuselage, which was successfully mated with a forward fuselage component in February 2014 at the prime contractor's Forth Worth facility.

Pratt & Whitney has delivered 134 engines and 46 lift fans to date. For 2013, Pratt & Whitney's delivery rate was stable, increasing from 4 engines per month in 2012 to 4.3 in 2013. LRIP lot 6 engines are currently slightly ahead of contract delivery dates. However, far too often engine deliveries are interrupted by technical issues and manufacturing quality escapes resulting in product holds and material deficiencies that increase overall risk to meeting future production goals. My production and quality teams continue to work closely with Pratt & Whitney to resolve the systemic issues which result in these product holds.

With another year of demonstrated improvements in production, I have confidence in the program's ability to produce high quality F-35s and our ability to eventually ramp up production.

Concurrency

The DoD established the F-35 program in 2001 with a planned amount of concurrency that attempted to balance cost, risk, and the need for tactical aircraft modernization. That strategy introduced the risk that aircraft built in early production lots would require post-delivery modifications due to discoveries made during qualification, flight, and ground tests, or as a result of engineering analysis. These

concurrency modifications must also “cut in” to the production line which can have substantial cost and schedule effects. As we complete more and more testing, the risks and impact of concurrency should progressively decline. By the end of 2015, mission and vehicle qualification testing will be near completion, second-life fatigue testing will be complete for all variants, and flight test will have completed 80% of the design loads envelope. At this future point in the development program many of the technical risks that drive concurrency changes and costs should be discovered.

Over the past year, the F-35 concurrency cost estimate has remained stable at approximately 3% - 5% of recurring flyaway costs. The F-35 program will continue to work with Lockheed Martin to refine their estimates based on the known technical issues and potential technical issues that are forecasted for the remainder of SDD. We will also review and update the government concurrency estimate on a periodic basis as the program progresses through the remainder of SDD.

The F-35 Joint Program Office has worked collaboratively with Lockheed Martin to implement a joint concurrency management and execution system. This system has successfully reduced the length of time required to implement a change into the production line (19 months to approximately 13 months), thereby reducing the number of aircraft needing future modification and corresponding costs. Contract strategies are also in place to reduce concurrency costs to the Government. The LRIP lots 5, 6, and 7 contracts have a 50/50 cost sharing mechanism with no fee for concurrency changes known prior to the production contract award that will not be incorporated until after aircraft delivery. The F-35 Joint Program Office intends to include this same mechanism in the LRIP lot 8 contract currently being negotiated. This cost sharing approach is

intended to continue to motivate Lockheed Martin to incorporate concurrency changes as quickly as possible on the aircraft production line and minimize the need for conducting retrofit activities. Eventually, the government will move to a contracting strategy that places all risks and liability for concurrency changes to the contractors.

Operations and Sustainment Performance

The program continues to address the various issues arising from operating an aircraft still in development and providing the operators improved technical data and solutions to emerging issues. Overall, the reliability of the weapon system is still well below our predictions but is slowly improving and the prime contractors, Lockheed Martin and Pratt & Whitney are gradually resolving issues with spares and repair cycle times.

In 2013, the F-35 program continued pilot and maintenance training for F-35A and F-35B aircraft and started pilot and maintainer training for the F-35C with the Navy, Air Force and Marine Corps each having their own training squadron. As of today, we have completed transition training for 92 pilots and 1,059 maintainers. In addition, we initiated pilot and maintainer training for another one of our international partners, The Netherlands. In cooperation with the Joint Operational Test Team and Air Force Air Education and Training Command, the program successfully completed the Ready for Training Operational Utility Evaluation (OUE) which found that the training system is "sufficient to meet the relatively low student training sortie demand of the syllabus" for the training of experienced pilots.

In 2014, the program will complete the "stand up" of Luke Air Force Base and Marine Corps Air Station Beaufort to expand pilot training capacity and prepare for U.S.-based pilot training for our international partners and FMS customers. Additionally, aircraft will transfer to Edwards Air force Base to begin preparations for Block 2B Operational Test.

Concurrently we will focus on completing the design, procurement, and installation of modifications to allow the U.S. Marine Corps to achieve IOC by July 2015. We will also do this for the modifications needed for Operational Testing that starts spin up in January 2015. It is these modifications which are now on the critical path to U.S. Marine Corps IOC and Operational Test (OT); any delay in these aircraft modification programs will directly delay the start of these two important milestones. To accelerate these modifications, the program has activated modification lines at Marine Corps Air Stations Cherry Point and Yuma as well as Ogden Air Logistics Complex, and has developed a comprehensive aircraft modification program that is performing a value stream analysis and lean process to ensure the F-35 modifications are in place for IOCs and OT testing. Additionally, we were successful in standing up depot component repair activities at Ogden and Warner-Robins Air Logistics Complexes over the past year.

Reducing F-35 Sustainment costs and beginning the transition to a future global support and posture will be a key focus of 2014. We will begin to put in place the strategy to stand up our Regional Sustainment Capabilities in Europe and the Pacific and continue building our CONUS sustainment capabilities. Our Phase 2 Business Case Analysis, which is nearly completed, will be used to inform us on what the most effective and efficient Regional Sustainment construct should look like. Part of this global posture

will be the transition to performance based contracts to achieve Service, Partner, and FMS Customer readiness requirements. These early contracts will also allow me to assess the performance of the current interim Product Support Integrators' (PSIs) (Lockheed Martin and Pratt & Whitney) to assume this role on a more permanent basis.

The long-term sustainment costs of the program continue to be a key focus. My team and I are committed to providing the best-value support solution for all participants. We are undertaking a number of integrated efforts to drive down the cost of operating and sustaining the F-35 weapons system. In October 2013, the F-35 Joint Program Office stood up a Cost War Room whose mission it is to improve affordability in all aspects of the F-35 operations and sustainment costs. They are currently working on 48 opportunities to drive down or remove costs from the program. Linked to this Cost War Room effort is a strategy to define the most cost effective repair enterprise for the Services and Partners. This effort is underway with a Level of Repair Analysis on key components to determine what the optimum repair structure should look like.

The program has also instituted a robust R&M program that is systematically identifying cost and time drivers while continuing to contractually institute tighter repair turnaround times for suppliers to drive down repair times. As an integrated element of the R&M program, we have also stood up a Readiness Cell that is focusing on analyzing program metrics to improve aircraft availability. The Readiness Cell's mission is to identify opportunities to enable F-35 availability to greater than 60% by 2015 across all three variants. Some of the initiatives that the Readiness Cell is pursuing include: improving contracting practices to avoid gaps in line-replaceable component repair and

spares replenishment, and optimizing maintainer processes and procedures to reduce the amount of aircraft downtime between sorties.

The combination of our R&M program, our O&S Cost War Room, our Readiness Cell, our Level of Repair Analysis, and our Business Case Analysis is to produce a mutually beneficial sustainment enterprise that operates, manages and supports the global system with relevant metrics and incentives, while meeting warfighter-defined readiness and cost objectives. We still have much work to do to achieve this vision and it is one of my highest priorities.

Airframe and Propulsion Contract Actions

The program achieved a major milestone with the concurrent definitization/award of the LRIP lot 6 and 7 airframe contracts in September 2013. These contracts marked significant improvement in negotiation span time when compared to previous LRIP contracts. We need this trend to continue to ensure that our budgets, expenditures, contracting actions, and program actions are all synchronized. The Fixed Price Incentive Fee (FPIF) contract with Lockheed Martin for LRIP lot 6 is valued at $4.4 billion and procures 36 aircraft (18 F-35A, 6 F-35B, and 7 F-35C for the U.S. Services plus 5 F-35A for Participant nations) and ancillary equipment. The FPIF contract with Lockheed Martin for LRIP lot 7 is valued at $3.9 billion and procures 35 aircraft (19 F-35A, 6 F-35B, and 4 F-35C for the U.S. Services plus 5 F-35A and 1 F-35B for Participant nations) and ancillary equipment. The parties reached a fair, well-reasoned settlement that caps the government's liability. The negotiated price of the contract and all cost overruns are the responsibility of Lockheed Martin. In addition, we continue to share concurrency risk

with Lockheed Martin. The terms of the contract include a "cost-sharing/no fee" arrangement whereby the Government and Lockheed Martin share equally (50/50) in these concurrency costs with no fee for the known concurrency change retrofits.

The program definitized the LRIP lot 5 FPIF engine contract in April 2013 at a value of $1B for 32 engines and spares, as well as associated sustainment support/products. The final negotiated modification to the LRIP lot 6 FPIF engine contract was awarded in October 2013 bringing the total value to $1.1B for 36 engines and spares. Both contracts reflect a 0/100 overrun shareline with the contractor assuming all cost overrun risk and capping the government's liability at the negotiated value of the contract, another first for the engine program.

Proposal evaluation is underway for the lot 8 (FY14) airframe and lot 7 (FY13) and lot 8 (FY14) engine procurements. We believe we can have a final contract award for all of these procurements by the end of second quarter CY 2014. By negotiating the lots 7 and 8 engine procurements together, the program is striving to get out of the business of Undefinitized Contract Actions and attempting to align contracting actions with our budget and the actual production of aircraft and engines. Today we effectively have fixed price contracts in terms of cost overruns because the government has zero liability for cost overruns above the negotiated price of the aircraft and engines.

In the future, the program intends on moving towards fixed-price, multi-year contracts for both the aircraft and the engines. The F-35 Program will ensure that these future U.S. aircraft and engine procurements comply with Section 143 of the National Defense Authorization Act (NDAA) for FY12, which provides: "…[t]he Secretary of Defense shall ensure each of the following: (1) That the contract is a fixed-price contract.

(2) That the contract requires the contractor to assume full responsibility for costs under the contract above the target cost specified in the contract." We will also ensure that the requirements to enter multi-year procurements are met. In the meantime, we are encouraging Lockheed Martin and Pratt & Whitney to seek long-term agreements with their suppliers to stabilize the supply base and reduce overall procurement costs.

An effective Earned Value Management System (EVMS) is critical to monitoring performance and controlling costs. In 2007, a DCMA review found the Lockheed Martin Aeronautics (LM Aero) EVMS to be noncompliant with EVM guidelines. Although both DCMA and LM Aero engaged in a focused effort to bring the LM Aero EVMS into compliance, appropriate corrections were not completed and DCMA decertified the LM Aero EVMS in 2010. LM Aero created its EVMS Corrective Action Plan (CAP) during 2012 and DCMA re-certified the LM Aero EVMS in November 2013. In accordance with DoD Federal Acquisition Regulations, the DCMA had imposed a 5% withhold against Progress Payments for new F-35 contracts, starting with LRIP lot 5 as a result of the disapproved status of LM Aero's EVMS. Following recertification of LM Aero's EVMS, DCMA released the withhold, which amounted to $160 million, and authorized LM Aero to bill for the previously withheld amounts.

In October 2013, DCMA disapproved of Pratt & Whitney's EVMS used for F135 engines after finding deficiencies in their EVMS system. This action was expected based on Pratt & Whitney's incomplete response to Corrective Action Requests submitted by DCMA to Pratt & Whitney earlier in 2013 on contracts for F135 engines used in F-35 aircraft. DCMA found 16 significant deficiencies that affect four EVMS Guidelines. In accordance with the DoD Federal Acquisition Regulations, 5% of each request for

payment is withheld until all significant deficiencies are corrected. As of the end of February the withhold amount totaled $25.7 million. The F-35 Joint Program Office is working closely with DCMA to ensure Pratt & Whitney is in compliance with corrective actions.

2013 DOT&E Report

As you are most likely well aware, the Director, Operational Test and Evaluation (DOT&E) performed an independent assessment of the F-35 Program. This was conducted with the F-35 Program Office's full cooperation and unfettered access to information on the F-35 Program. Although the report is factually accurate, I do not believe it tells the full story as not enough credit is given for progress that has been made in reducing risk on this program. There were no surprise findings in the report, in fact, we agree and are taking action on 8 of the 9 recommendations in the report. The one recommendation that the F-35 enterprise has chosen not to pursue has to do with the fuel-draulic shut off system. An extensive cost/benefit analysis showed that the addition of the Polyalphaolefin (PAO) shut-off valve increases the F-35 survivability by less than 1% while adding additional development, production, reliability, and operating costs. The combination of stealth, data fusion, advanced sensors, advanced countermeasures, and electronic attack greatly reduce the chances of the aircraft being hit by enemy fire. Additionally, the F-35 Joint Program Office does not agree with DOT&E's assessment that mission systems software delays and Block 2B flight test growth will result in a 13-month delay in the 2B Fleet Release date. Block 2B software is currently undergoing flight test and security and verification testing with little to no schedule delays. The

program has established a process to track and manage software capability increments and to track execution of software builds to plan, including development, integration, flight test, and rework.

Conclusion

I believe the F-35 is headed in the right direction. The previous PEO developed a solid program baseline and it is now my team's job to successfully execute that plan. I believe the basic aircraft design is sound and we can deliver on our commitments to you, the taxpayers and warfighters. While there is still risk in the program, I have confidence in that we now have in place a robust management and leadership enterprise that can handle any future setbacks or discoveries and stay on track, so long as the program remains properly resourced.

Software development still remains our number one technical risk and a key focus area. We also must concentrate on standing up the global support posture, improve R&M, and drive costs out of the program. The changes implemented by the combined government/contractor team have improved this outlook, but more work still needs to be done. We will need excellent performance and continued support by all elements of the enterprise, including industry, the Congress, the Services, our partners, and my program office.

As in any complex development program there are challenges, but I believe the enhanced capability of the F-35 will provide the backbone of the U.S. combat air superiority for generations to come. The technological capabilities of the aircraft are sound. The program's leadership team is rising to the challenges of managing this

complex system with integrity, discipline, transparency and accountability. Our progress continues at a slow but steady pace. I intend on completing this program within the budget, schedule, and resources I have been given. I ask that you hold me, my team, our stakeholders, and contractors accountable over the coming years to ensure that we develop and deliver the warfighting capability this country and our partners need and expect.

Thank you again for this opportunity to discuss the F-35 Lightning II Program. I look forward to answering any questions you have.