

HEARING TO RECEIVE TESTIMONY ON TACTICAL AIRCRAFT PROGRAMS IN REVIEW OF THE DEFENSE AUTHORIZATION REQUEST FOR FISCAL YEAR 2013 AND THE FUTURE YEARS DEFENSE PROGRAM

TUESDAY, MAY 8, 2012

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

The subcommittee met, pursuant to notice, at 3:07 p.m. in room SR-232A, Dirksen Senate Office Building, Senator Joseph I. Lieberman (chairman of the subcommittee) presiding.

Committee members present: Senators Lieberman, Blumenthal, and Brown.

Majority staff member present: Creighton Greene, professional staff member.

Minority staff members present: Bryan D. Parker, minority investigative counsel; and Christopher J. Paul, professional staff member.

Staff assistant present: Brian F. Sebold.

Committee members' assistants present: Brian Burton, assistant to Senator Lieberman; Lenwood Landrum, assistant to Senator Sessions; Clyde Taylor IV, assistant to Senator Chambliss; and Charles Prosch, assistant to Senator Brown.

**OPENING STATEMENT OF SENATOR JOSEPH I. LIEBERMAN,
CHAIRMAN**

Senator LIEBERMAN. Good afternoon. The subcommittee meeting will come to order.

I want to extend a welcome and thanks to each of our witnesses for being here today.

On behalf of the committee, I want to thank each of you who represent the men and women of our Armed Forces for the exceptional job as a force all of them and you are doing around the world today. And I want you to know that we keep all those who are serving now in our thoughts and prayers and remember that both they and their families are serving and sacrificing every day.

In some sense, it is actually against this backdrop of wonderful service that we meet today to discuss the present status and future of tactical aviation programs. Every year, we are challenged to make decisions balancing a number of competing demands for resources, including resources for current operations and investment

in future modernization. But ultimately the number one standard has got to be what is best for our troops, what is best for the men and women in uniform.

Central to our discussion today is the F-35 Joint Strike Fighter program. Obviously, we all know it is an important program. It has been central to the long-term modernization plans for the Air Force, Navy, and Marine Corps for more than 15 years now. Any perturbation in the cost schedule and performance of the Joint Strike Fighter program sends shock waves through the Department of Defense and well beyond and, of course, raises questions about whether we can achieve the balance that I just described between the demands of maintaining readiness in the near term and those of modernizing for tomorrow.

We are going to examine a number of issues today but primarily we want to understand—I would like to understand—how the Department has defined a new baseline for the Joint Strike Fighter program since last year, how the services are responding to the additional delays in the Joint Strike Fighter program, and what effects those delays may have on our Armed Forces. We look forward to hearing what the Department has found in various reviews of the Joint Strike Fighter program after the Nunn-McCurdy certification 2 years ago, what actions the Department has taken to ameliorate the problems that it found in the program, and what levels of risk remain in the development and fielding of the program since the Department conducted a technical baseline review and announced additional delays in production since last year's budget request.

The delays in the F-35 program have led to worrisome developments for the future of tactical aviation programs, particularly in terms of having the numbers of aircraft we need to keep from hollowing out our tactical aviation forces. We have been following your progress in trying to mitigate or close those gaps, and I will have some questions about that as well.

For example, the Department of the Navy has been attempting to reduce the strike fighter shortfall to manageable levels. 4 years ago, the Navy was estimating that we would be facing a shortfall in 2017 that optimistically would amount to 125 tactical fighters needed to outfit our 10 aircraft carrier wings and 3 Marine Corps air wings. 3 years ago, based on further analysis, the Navy was estimating that the maximum shortfall could be nearly twice that large or roughly 250 aircraft. Since last year, the Navy's estimate of the problem has been more stable, fortunately. The Navy believes that with certain actions, such as reducing squadron size, conducting service life extensions on some aircraft, and reducing the time aircraft spend in the depots, they could reduce gaps to roughly 50 to 60 aircraft, which is encouraging.

Unfortunately, there has been a similar story regarding the Air Force. Previous Air Force witnesses at our aviation hearings have also projected a potential shortfall of Air Force tactical fighters in excess of 800 aircraft by the year 2025. This year, the Air Force, as a part of the new defense strategy, has planned to reduce fighter force structure. It is not clear to me, at least, to what extent this change in demand for tactical fighters has actually ameliorated the

shortfall that the Air Force has been projecting, but I hope to hear more about that this afternoon.

Last year, the Air Force was also investigating ways to expand the service lives of A-10, F-15, and F-16 aircraft to help mitigate the gap between requirements and aircraft that it foresees. This year, we see that the Air Force wants to retire roughly one-third of the A-10s and conduct a service life extension program on some of the F-16 fleet. And I would like to ask about that too.

We would also like to get an update on the F-22 life support and hypoxia problems, including a brief description of what the Air Force has done about these problems, what it has concluded in its own investigation of these problems, and what action that you are taking or have taken or will take to minimize the risk to F-22 crews. And that takes me back to the beginning, which is to make sure we give our fighting forces the safest, most effective military equipment systems we can.

So we have a lot to cover this afternoon, and I thank the three of you very much for being here.

And I would now call on the ranking member of this committee with whom I have worked very closely and productively across party lines because on this subcommittee or in the committee generally, they really do not exist. Senator Scott Brown of Massachusetts?

[The prepared statement of Senator Lieberman follows:]
[SUBCOMMITTEE INSERT]

STATEMENT OF SENATOR SCOTT P. BROWN

Senator BROWN. Thank you, Mr. Chairman.

I want to thank all of our witnesses as well.

I am not going to reiterate the very relevant and valid points that you made, but I do want to focus on, obviously, the Joint Strike Fighter program and the increases that we have seen since its inception. And as you know, it is slated to receive billions of dollars per year over the next 2 to 3 decades. Quite frankly, that is unprecedented for a single tactical aviation program. So I am concerned, as many others are, about the disconnect between how many F-35 jets the Department has signed on for and the lack of the program's progress in developing and testing and why should we keep purchasing the jets when fail to test them. And as we know all about the overruns and cost problems, I want to make sure we can touch on that a little bit.

And on readiness, we learned the Department estimated that the cost of owning and operating the Joint Strike Fighter could amount to about \$1.1 trillion over its life cycle. And I know they are trying to drive down the costs—the Department is. And that is obviously a good thing.

The F-22 Raptor is obviously something, while capable when it does fly—this jet costs about \$1 billion each year just to operate, and that is unprecedented as well. And I am hopeful that General Wolfenbarger could address that.

And on the F-22, the problems as referenced and you just referenced, Mr. Chairman, the unexplained physiological incidents which caused the Air Force to stop flying for nearly 6 months and pilots who have refused to fly because of questions of safety. And

I am hopeful that, ma'am, you can also address those very real issues.

And on the shortfall for the strike fighter, while your testimony states that the Joint Strike Fighter shortfall for the Navy and Air Force is manageable, the 2013 budget proposes additional cuts to the tactical air forces in the Navy and Marine Corps and Air Force. And the witnesses, I would hope, would comment on these cuts and the effect they will have on the strike fighter shortfall.

And then we all know the big gorilla in the room is sequestration, and we know what the Secretary of Defense has said about it. And I am hopeful that our witnesses can provide us with their assessment of how these cuts would affect our tactical air forces and military strength.

So thank you, Mr. Chairman.

Senator LIEBERMAN. Thank you, Senator Brown.

We will begin with Vice Admiral David Venlet of the U.S. Navy, Program Executive Officer of the F-35 Lightning II program. Thanks very much for being here.

STATEMENT OF VADM DAVID J. VENLET, USN, PROGRAM EXECUTIVE OFFICER, F-35 LIGHTNING II PROGRAM

Admiral VENLET. Thank you, sir. Chairman Lieberman, Ranking Member Brown and distinguished members of the committee, thank you for inviting me to discuss the F-35 Joint Strike Fighter.

My observations and assessments over the past year give me reason to believe the basic aircraft and engine designs are sound and will deliver. Schedule and resource adjustments that have been made to the remaining development program underpin a realistic plan to deliver the required capability.

While there is still risk in the program, it is risk-balanced rather than low risk. I have confidence in the resilience of the plan to absorb expected further learning, discovery, and stay on track.

There has been very good engine and airframe contractor responsiveness and progress in many areas over the last year. STOVL flight tests exceeded plans and expectations and completed a highly successful initial sea trial aboard the USS *Wasp*. In addition to the impressive stability, control, and performance of the STOVL in slow flight and vertical landing, the F-35 has flown to its maximum speed and hardest turn limits. Carrier test pilots are highly complimentary of the carrier version handling characteristics, flying precise carrier approaches at Patuxent River, MD. It is a testimony to the very effective and impressive marriage of engine and airframe.

Software development, coupled with flight test execution, will remain the major focus of program execution in the coming year and through the completion of the development program.

I have observed performance by industry on software that gives me some concern about delivering full capability within the current schedule without improvement in performance. I will continue to closely examine progress and seek the changes needed to gain the required performance. I have a solid program baseline. It ensures the program has the resources, tools, and processes in place to make proactive, disciplined decisions regarding the development and delivery of incremental capabilities to the F-35 fleet. However,

industry must understand that this new schedule, with all of the margin and realism, will not execute itself. A rededication to the characteristics of systems engineering fundamentals is crucial, and I continue to speak bluntly to industry on this issue.

Concurrency is a transient issue that the program is dealing with right now but which will lessen over time. I recognize the Department of Defense would prefer to not be in this highly concurrent program situation. It is now my responsibility to navigate through this and deliver the most capable aircraft at the best price.

I believe the procurement strategy for LRIP 6 and 7 will allow the Department of Defense to control production quantity based on the performance of the development program. It is important that Lockheed Martin performs dependably and sustains confidence that the F-35 is a stable and capable platform.

As in any complex development program, there are challenges, but I believe the enhanced capability of the JSF will provide the backbone of U.S. air combat superiority for years to come. The program's management over the past year has put in place the right fundamentals and realistic plans using sound systems engineering processes. And I am monitoring tracking performance with detailed metrics.

Technical and cost issues certainly exist. The helmet system has three critical characteristics that need to demonstrate fixes. The carrier hook system, EW antenna quality, buffet loads in flight all are being worked. There are leading program issues that occupy my focus for 2012, the critical and significant few that, if successfully advanced, will bring beneficial tailwind for the entire program and genuine value for the Department and our partner nations. These leading issues are: one, software development performance and its dependable delivery of capability; two, concurrency change incorporation improvement and delivery of affordable full-life jets; three, production quality, and its ultimate result on affordable price for the United States and our allies; four, continued sustainment estimate cost reduction.

All of these have a common fundamental that will advance the external result in performance and keep reality clearly in view. Systems-based analysis and corrective action with a specific eye on impacts to early fleet training operations will be required in steady and committed execution throughout the industry team, primes, and suppliers. Rigorous management control by the Joint Program Office, supported by the service systems commands, will be applied with the development, dial-on production, and focus on affordable delivery capability, our only meaningful external result.

I look forward to your questions, sir.

[The prepared statement of Admiral Venlet follows:]

Senator LIEBERMAN. Thank you, Admiral. It is a good beginning.

General Wolfenbarger, thanks so much for being here. Military Deputy, Office of the assistant Secretary of the Air Force for Acquisition. I just would be remiss if I did not say for the record that you are also about to become an historic figure, which is very exciting and well-deserved. Upon your pending promotion, as you well know, you will become the first woman Air Force officer to wear four stars. So congratulations.

General WOLFENBARGER. Thank you very much, sir.

Senator LIEBERMAN. Please proceed.

**STATEMENT OF LT. GEN. JANET C. WOLFENBARGER, USAF,
MILITARY DEPUTY, OFFICE OF THE ASSISTANT SECRETARY
OF THE AIR FORCE FOR ACQUISITION**

General WOLFENBARGER. Chairman Lieberman, Ranking Member Brown, distinguished member of the subcommittee, thank you for the opportunity to provide you with an update on the Air Force's tactical aviation programs.

Today, the Air Force is fully engaged in operations across the globe, participating in joint overseas contingency operations, and providing support to the combatant commanders to enable them to successfully execute their missions.

Our fiscal year 2013 budget request aligns with these standing operational requirements and with the future needs of the Air Force as we shift implementation of the new national security strategy.

I understand your focus today is on the Air Force investment plans to ensure that our tactical aviation capabilities are adequate for executing the national military strategy with an acceptable level of risk. Our rapidly aging aircraft fleet drives the urgent need to balance procurement of new inventory with sustainment of our current fleet. I look forward to discussing how the Air Force has matched our requirements with available resources in order to execute the National military strategy.

In light of recent media attention regarding the F-22 and its life support system, I would like to briefly address what the Air Force is doing to protect the health and safety of Air Force pilots, as well as the importance of the F-22 to our Nation's capabilities. Our pilot safety is of utmost concern and a top priority. Our Air Combat Command-led Life Support System Task Force has joined with experts from across Government, academia, and the scientific community to work on root cause analysis until this issue has been completely resolved.

In the meantime, we have initiated 17 life support enhancements to the F-22 as direct risk mitigation steps. Many of these enhancements are already fielded, including a modification to the emergency oxygen activation handle and an air crew blood oxygen sensor. All these mitigation steps help reduce safety risks and permit F-22 operations that deliver unique stealth and range capabilities ideal for countering advanced integrated air defenses in known trouble spots around the world.

I would like to thank the subcommittee for the invitation to testify today and for your continued support of the Air Force.

I would like to request that my written statement be submitted for the record and look forward to your questions.

[The prepared statement of General Wolfenbarger follows:]

Senator LIEBERMAN. Thanks, General. Without objection, your statement and the others of the other witnesses will be included in the record in full.

Vice Admiral Skinner, thanks for being here. Principal Military Deputy, Office of the Assistant Secretary of the Navy for Research, Development, and Acquisition. Welcome.

STATEMENT OF VADM WALTER M. SKINNER, USN, PRINCIPAL MILITARY DEPUTY, OFFICE OF THE ASSISTANT SECRETARY OF THE NAVY FOR RESEARCH, DEVELOPMENT, AND ACQUISITION

Admiral SKINNER. Thank you. Chairman Lieberman, Ranking Member Brown, distinguished members of the subcommittee, it is my honor to appear before you today to discuss the Department of the Navy's tactical aviation procurement programs.

The fiscal environment and the Budget Control Act of 2011 required hard choices to be made. In response, the Department of the Navy deferred procurement of F-35s, P-8s, E-2Ds, F-18 Es and Fs and MV-22s and terminated the MRMUAS program and JAGM investment in this President's budget request. We are facing challenges: the budget reductions necessitated by the Budget Control Act and aging aircraft inventory and significant threats. During these austere times, we must persist in modernizing and recapitalizing our naval aviation forces and increase our capability through force multipliers such as the Navy integrated fire control counter air and using should cost/will cost processes to bring more affordable systems to our warfighters.

Affordability will be our business focus over this FDYP so we can continue to deliver the capabilities to meet the warfighters needs. With your assistance, we are leveraging our buying power with the successful multiyear procurements on the F-18, B-22, and H-60, and together we are saving the taxpayers over \$1.5 billion.

Last year, we commemorated our historical past as naval aviation celebrated its centennial. This year, Marine Corps aviation will do the same. New history has also been written over this past year when we conducted F-35 shipboard operations aboard the USS *Wasp* and flew the first F-35 Charlie formation flights at Patuxent River and deployed the first E/A-18 Growler expeditionary squadrons to Iraq and then redeployed the squadron on short notice to support Operation Odyssey Dawn. We commenced E-2D Advanced Hawkeye initial operational test and evaluation, and we delivered the first P-8 Poseidon and the 500th Super Hornet Growler on cost and on schedule. And the Naval Air Systems Command hired 155 wounded warriors into the acquisition workforce.

We also continue to actively manage our TACAIR inventory. The first Hornet will be inducted into our service life extension program later this year, and both SLEP and future aircraft procurements must continue on schedule to mitigate the strike fighter shortfall through 2028. The Navy will transition three Navy F-18 Charlie squadrons to F-18Es, and the Marine Corps will reduce their force structure by four squadrons and delay the retirement of the AV-8B Harrier until 2030.

Thank you and we welcome your questions on the Department of the Navy's tactical aviation procurement programs.

[The prepared statement of Admiral Skinner follows:]

Senator LIEBERMAN. Thanks very much, Admiral.

I will say to the clear that we will have 7-minute rounds for each of the Senator's questions, and I would ask that we would be notified when we hit that 7 minutes.

General Wolfenbarger, let me just ask a few follow-up questions on the F-22 problems in part for the record but, obviously, because

I am interested. Describe what some of the problems have been from the pilots' point of view with the life support systems and hypoxia.

General WOLFENBARGER. Sir, we have had about 14 incidents of hypoxia-like symptoms prior to standing down the fleet, and that lasted about 4 months. We then began to fly again, and we have had 11 incidents since. And so each individual is different in terms of their own unique symptoms, but there is generally disorientation, perhaps some dizziness, a feeling of nausea in some cases.

Sir, if you will allow me, I can tell you a little bit of additional detail of what has gone on.

Senator LIEBERMAN. Yes, why do you not do that, please? So, obviously, there are symptoms experienced in air in the plane.

General WOLFENBARGER. Yes, sir.

Senator LIEBERMAN. And have the pilots been left with symptoms after they leave the aircraft?

General WOLFENBARGER. At times, yes, sir, and when they land, they are highly encouraged first—on the first onset of a sense that something does not feel right, that there is any doubt in their mind at all, they have been counseled to return to base and to immediately report the incident, at which point they are screened, taken various samples, and sent to the medical experts so that we can collect the data associated with these incidents when they do occur.

Senator LIEBERMAN. Have any of the pilots been left with lasting disabilities as a result of these problems?

General WOLFENBARGER. No, sir, not to my knowledge.

Senator LIEBERMAN. Why do you not proceed then with the additional information you were going to offer?

General WOLFENBARGER. Sir, over the last few years in operation of the F-22, we actually, as we started to realize we were having these incidents, have had a number of safety investigations that we have undertaken. And then most recently, we had asked our scientific advisory board to do a very in-depth study. Through all of that work, we have yet to determine what the root cause is of that hypoxia-like reaction.

We have, however, in each one of those investigations collected a body of recommendations and risk mitigation types of activities that we could undertake. So as we went through the process of standing down the fleet and did as much data collection as we could do on the ground to facilitate that analysis, and as we began to contemplate the need to return to fly, we really do—this is our only fifth generation aircraft in our inventory.

Senator LIEBERMAN. Yes. That is what is so critical.

General WOLFENBARGER. Our combatant commanders are requesting it to be deployed, if for nothing else, the deterrence value of that asset. And as we stood down, we realized that our pilots were beginning to be impacted in terms of their proficiency not being in the cockpit and being in the air.

We went through five rigorous steps in determining we were ready to return to fly.

We started off by doing a full fleet inspection. We did a comprehensive first one-time inspection and then we have continued to inspect since to determine if there were any indicators that there are issues with the life support system.

We trained the crews, so we educated them on everything that we knew up to that point. We also shared with them the Con Ops that we ask them to operate to, which is, again if you have any doubt, any sense that there is something not right with you or with your airplane, that you are highly encouraged—there is no penalty for returning to base and informing the leadership that there has been an incident.

We then took several steps to protect the crews. So I mentioned that there are 17 things that we have either fielded or have underway or have ahead of us. As I mentioned, the existing system in the airplane is an emergency oxygen system. We had some feedback from the pilots that reaching for the handle was difficult to do with some of the cold weather gear, particularly up in the Alaska arena. And so we took steps. And in fact, that mitigation has already been fielded, as well as asking each one of our crew members, our pilots to wear pulse oximeters on their finger as they fly so that they can monitor their own oxygen levels and when it reaches a point at which they would be concerned, then that is an indication that they need to return to base. There are several others. There are 17 in total.

And then we began to collect the data as we return to fly, and we have been analyzing the data ever since.

We are determined to get to root cause. We have all of the best minds on this that we can find, and that is across the Department of Defense. Certainly we have had Navy participation in this effort. We have had NASA participation. We have had academia and industry experts as well trying to core to what the root cause is. We started with, I think on the order of, hundreds of potential root causes as we went through the failure analysis, the failure tree analysis. We have cored to two primary trees, limbs in that tree. Either it is an issue with a contaminant getting into the system or it is an issue with not having enough oxygen coming to our pilots. And there are a number of different things that we are reviewing for each of those different categories of root causes.

We have some recent data that we are starting to believe that we are coming to closure on that root cause. We are realizing that we operate this aircraft differently than we operate any of our other fighter aircraft. We fly at a higher altitude. We execute maneuvers that are high G at that high altitude, and we are on that oxygen system at those high altitudes for periods of time.

Senator LIEBERMAN. So that may be part of the problem.

General WOLFENBARGER. That is what we are coring to, sir. I am not ready to say yet that we are ready to declare root cause. But we do feel that we, through all of those mitigation activities and through the training of the air crews, believe that we are safe to fly with the stipulation, again, that when an air crew member feels as though there is an issue, they know exactly what to do.

Senator LIEBERMAN. I just want to clarify. You said that since the fleet went up in the air again, we have had 11 more cases. I presume that is a very small percentage of the missions flown.

General WOLFENBARGER. .1 percent, yes, sir.

Senator LIEBERMAN. Did you say less than 1 percent?

General WOLFENBARGER. .1, yes, sir.

Senator LIEBERMAN. .1 percent.

General WOLFENBARGER. Yes, sir.

Senator LIEBERMAN. But still, I presume that our goal is zero.

General WOLFENBARGER. Yes, sir, absolutely.

Senator LIEBERMAN. So I appreciate the effort that you put into this.

Are the manufacturers of the life support systems involved in all this work?

General WOLFENBARGER. Yes, sir, absolutely.

Senator LIEBERMAN. I presume it is critical to fly at the altitudes that the plane is being flown at. So if that is the problem, what might the solution be?

General WOLFENBARGER. I think we have got to finish that root cause analysis, sir, and get to what those mitigations would be to completely eliminate.

I would tell you that we have found in the work that we have done that these hypoxia-like incidents with an OBOG type of a system, on-board oxygen generation system, are not unique to the F-22. There are other fleets that we have experienced hypoxia-like incidents in as well. And we are incorporating feedback from all of those other communities as well as we core to what the root cause might be and certainly sharing what we discover so that we can perhaps—

Senator LIEBERMAN. Yes. I presume that there is no common characteristics, physical characteristics, in the pilots that have experienced this. I mean, I know they are all in good shape, but have you checked for that as well?

General WOLFENBARGER. Yes, sir. That is part of that data collection that is ongoing, and I have not heard—although I will tell you that our Air Combat Command is running this task force that is doing all of that data collection and analysis. And so I would need to, if you are interested, come over and sponsor a full-blown briefing on that.

Senator LIEBERMAN. Yes, I would be interested in having that happen.

My time is up, but for now, I want to thank you. Obviously, it is an unfortunate situation. That is the last thing that you want and the Air Force wants. So I appreciate the very thorough response. Obviously, I hope and I am confident that you will stay on it until you figure out what is wrong so we make sure that no other pilots experience this. Thanks very much.

Senator Brown.

Senator BROWN. Thank you, Mr. Chairman. Good questions.

Ma'am, first of all, congratulations as well. I know we met privately and I know you are going to be overseeing the bases that are in Massachusetts. So I look forward to having a long and productive relationship with you.

I want to commend you for taking the necessary steps to find the cause of this very serious problem. I guess I am left with the question: Is the F-22 safe to fly?

General WOLFENBARGER. Yes, sir, we feel it is. Through having taken all of those risk mitigation activities and through that, education and training of the air crews, the Air Force's position is that it is safe to fly. That does not mean that we are done with all of the activity to get to that root cause and to fix it.

Senator BROWN. And I know the 22 pilots who raise safety concerns and decline to fly on that basis. Will you ensure that retaliation against them is not going to be part of what is happening in the future for these—

General WOLFENBARGER. Absolutely, sir. So there is clearly the whistleblower protection, the statute that protects those folks.

Senator BROWN. Do you consider them whistleblowers?

General WOLFENBARGER. Yes, sir, we do. And they are fully protected, and our Chief and our Secretary have made that understood in our Air Force.

Senator BROWN. So do you know if the Air Force or the Virginia Air National Guard are considering taking any administrative or disciplinary actions to the pilots that came forward in the 60 Minutes piece? Are they also protected?

General WOLFENBARGER. It is, sir, a little out of my lane, but I would tell you that my understanding is that the Chief and the Secretary and the Air Force have issued direction that these individuals are protected and that no negative action be taken.

Senator BROWN. How about you, Admiral? Do you think the program is still stable in your view? F-35.

Admiral VENLET. Yes, sir, Senator. I believe that in response to your opening remarks, the description of what has gone on in the last 2 years in the briefings we have presented and the questions that have been asked, there have been a lot of changes and adjustments to the program, but I would cast the last 2 years as a very detailed 2-year adjustment to the program.

There was one change to the test program that began in the spring of 2010 when the breach to the Nunn-McCurdy thresholds was declared, and it was concluded when the Under Secretary of Defense approved our new baseline which took us 2 years to get. I believe it was a necessary amount of time. We added money. We added time to the schedule. So there has been one adjustment to the test program, and I believe we have a schedule and a budget that says we should deliver the full capability.

Senator BROWN. As required in last year's defense bill language, will the 12 and 13 jets be procured under a fixed-price contract?

Admiral VENLET. Yes, sir, absolutely they will.

Senator BROWN. And so the contractor would be responsible for all costs that go above the target costs specified in the contract?

Admiral VENLET. Yes, sir, beginning with our lot 6 in 2012, absolutely.

Senator BROWN. And we still have no idea when the operational jets will be delivered to any of the services. Is that a fair statement?

Admiral VENLET. Sir, at Eglin Air Force Base, which is the initial training base, there are six Air Force CTOLs and they commenced flight ops there in April.

Senator BROWN. They commenced? They are flying?

Admiral VENLET. Yes, sir, they are.

Senator BROWN. I did not know if you said "commenced" or "commence" in the future.

So how is that going?

Admiral VENLET. They have over 30 flights. It is a growing time of maturity for the airplane, and we are collecting good information. They are very pleased.

Senator BROWN. So what type of information do you think you will need to establish the initial operation capability dates for the Navy's carrier variant and the Marine Corps' short takeoff vertical lift variant?

Admiral VENLET. Yes, sir. After we completed the baseline for the test program, what is going on now is the detailed planning for the operational test. And the Air Force has described the completion of the initial operational test is desired for them to declare IOC. I will present a test and evaluation master plan to the Under Secretary this fall with that detailed planning in it.

All three services understand when Block 3 capability will be delivered. We have got three blocks: initial training, initial warfighting. Block 3 is the full capability. That will finish development testing in 2016 and be released to the fleet in 2017. So the services see our confidence in that schedule. They are very pleased with the performance of the program last year in 2011, but they would say, Dave, you know, we would like you to be more than a 1-year wonder. Let us string a couple years of good performance together, get that operational testing plan done, and then we will declare IOC after that.

Senator BROWN. And, Admiral Skinner, can you provide an update on the arresting hook challenge that has delayed the delivery of the Navy variant and how much rework will it require and how much will it cost? And is the contractor or the taxpayer left footing the bill on that?

Admiral SKINNER. Senator, it is true that when we did the initial field carrier arrestment testing, that we did not engage the hook with the cross deck pendant. It has happened to other aircraft besides the F-35.

The engineering team in the JPO supported by the Naval Air Systems Command experts in the area have gone through the initial fault trees for that occurrence. They are still in the analysis phase for that. They are supposed to bring those findings forward at a preliminary design review at the end of next month, at which time we will be able to ascertain the follow-on, the scope of the fix, and how much the fix will cost, and if there will be a schedule penalty associated with implementation of that fix.

Senator BROWN. So that will include who is responsible and how much it will cost and who is paying for it?

Admiral SKINNER. Yes, sir.

Senator BROWN. Okay.

And, ma'am, once again back to you. On the adaptive engine technology development, why is this important for the Air Force to continue with the program? And I understand it has the potential to reduce our energy dependence. I am wondering if that is an accurate statement. And do you believe it is important to maintain our industry's competitive edge in the aircraft industry?

General WOLFENBARGER. Yes, sir, absolutely. That is why we wanted to press on with that program. It is a follow-on program to the ADVENT program which is looking at the next generation of turbine engine technology. It is intended to be a competitive ac-

quisition. So we are opening up the opportunity to all of our industry partners to participate in that source selection. And the intention is to certainly protect the industrial base in this vital area for this Nation, but to also get after—reduce specific fuel consumption, as you noted. A 25 percent reduction is what the goal is with this new technology.

It is purely technology maturation. It is not the start of an EMD program, an engineering, manufacturing, and development program. So the intent is to mature the technology so that we are ready should there be an engine program in the future that requires that technology.

Senator BROWN. Thank you.

And, Admiral Skinner, I just have one final question. I know the Navy has been forced to extend the lives of the F-18s. It still faces, however, a tactical aircraft shortfall with respect to the need. Has the service life extension program kept the tactical aircraft shortfall within manageable numbers for you?

Admiral SKINNER. Senator, we manage our tactical aircraft shortfall, or strike fighter shortfall, within the Navy via an inventory forecasting tool. One component of it, which is a SLEP, which is an additional demand, you know, a supply side. So we are looking at a couple of things in order to ensure the strike fighter shortfall stays below manageable levels. One is the procurement of additional 50 Super Hornets that we had last year in last year's budget. The addition of 150 SLEP'ed aircraft will also contribute to that, and then there is a myriad of other things that will contribute to keeping the strike fighter shortfall manageable.

Senator BROWN. So you are adjusting and adapting and you feel you are okay?

Admiral SKINNER. Yes, sir.

Senator BROWN. Okay. That is really all I wanted to know. Thank you.

Senator LIEBERMAN. Thank you, Senator Brown.

Senator Blumenthal, thanks for being here and I call on you now.

Senator BLUMENTHAL. Thank you very much, Mr. Chairman.

Thanks to each of you for being here today and for your service to the country. And congratulations, General Wolfenbarger.

I am very encouraged, Admiral Venlet, by your testimony that the Joint Strike Fighter is on track and that the design is sound and will deliver, which is very good news to the Nation. Maybe I should not say "news," but it certainly is a very solid endorsement of the program which I believe is vitally important to the future of our country. And you very persuasively attest to the technological marvel that it will be once it is achieved. And like any such highly technologically advanced system, there are bound to be issues along the way, hiccups, and bumps in the road, and I gather your feeling is that we are overcoming those kinds of software issues and other kinds of problems that are bound to arise in any such highly complex and advancing system.

Admiral VENLET. Yes, sir. Every issue that we have in view today is very much in the category of normal development for a fighter tactical aircraft. Good old-fashioned engineering is going to take care of every one of those, and we will work on each of them

hard enough and long enough until they are deemed good enough by the fleet, sir.

Senator BLUMENTHAL. And one point that I think is often lost on the public and maybe on some in this body is that the Joint Strike Fighter is replacing a litany of legacy aircraft across the Services. The cost of maintaining those aircraft and training separately for each of them in, I think, the view of many of us would exceed the eventual cost of the Joint Strike Fighter. And I wonder whether there is any way to sort of depict those costs for the American people so that they understand that the Joint Strike Fighter in a sense is not really or cannot be viewed on its own. It has to be viewed comparatively to what the costs would be of maintaining other aircraft.

Admiral VENLET. Yes, sir. We are looking very hard at the sustainment costs and the cost to own this aircraft because it is a large fleet that we aspire to own, as well as for our partner countries around the world, which are very important to contributing to the body of F-35s in the world that will be supported. And there is great opportunity to leverage that. We are looking at the categories of cost that industry can affect, the category of costs that the services affect by the requirements that we have, and then the category of costs that are affected by the strategies of the acquisition program by the Department. Each one of these is getting great scrutiny.

And the F-35 is coming with tremendous capabilities. It is coming with a tremendous software system that will help its maintenance, its operation. It is integral to the air system. It cannot operate effectively without it. It is something that maintainers and squadron operators have aspired to for a long time. It is very complex, and it has got some difficulties early in development. But again, those deviations are relatively small in the big picture of the program, and by attacking them now, we will be able to keep them on track.

Senator BLUMENTHAL. And is there an estimate on what it would cost to maintain and continue the existing aircraft or the combination of aircraft without the F-35?

Admiral VENLET. Sir, I cannot speak with authority on the existing fleet, but what I can say is when those cost comparisons are made, the challenge predominantly arises that you are comparing a decade mature fleet in any service that has lived with the realities of the constrained resources of each budget that it gets. In the F-35, since we have not got a body of experience in the fleet, we are estimating the full requirement for the future without the constraints of short budgets that will eventually be assigned to it. So it makes those comparisons difficult. It will cost more to operate and sustain than our existing fleet, no doubt. But it comes in the balance of the value that it brings for the country.

Senator BLUMENTHAL. You make the point in your testimony that you think that the remaining problems can be solved if the program is properly resourced. Are you satisfied that the President's budget provides those resources in a sufficient amount?

Admiral VENLET. Yes, sir, absolutely I am.

Senator BLUMENTHAL. And on the concurrency risk, is there anything that could have been done to lessen those costs and risks of

concurrency looking back, and also looking forward, can you explain perhaps in somewhat greater detail why you think those risks will lessen as we go forward?

Admiral VENLET. Yes, sir. Let me start with the last part.

What generates changes to the aircraft are the discoveries that we have, again, normal discoveries in flight test, and it is the overlap of aircraft that have already been built after those discoveries are manifested, that those jets then have to be changed and modified after we deliver them. The extension of the test program was not paced by a change in the beginning of the production program. And so that overlap of test and production is greater than what was originally intended.

The characteristic that will lessen the discovery of changes will come about in early 2015. We test the durability or the fatigue life of the structures, all three of them, and by the time—we test out to two and three lifetimes so that you have got margins to operate safely for the one lifetime that is required. You discover most of those changes in the first two lifetimes of ground testing. That will complete for all three variants in early 2015.

The flight test contribution is principally the loads that are experienced in flight. And so all three variants will get to about 80 percent of their loads envelope tested in early 2015. And our experience shows in fighter aircraft development that you learn most of your discovery about the structure and the life of the jet from 80 percent loads in flight, two lifetimes of fatigue, and after that, we expect it to—that is also an important use for partners where most of their procurement is beyond that window, and it is predominantly a burden that we will bear. And I am funded in these near years for the critical ones that have to be put in.

Senator BLUMENTHAL. I gather the engines are doing well.

Admiral VENLET. The engines are doing very well, sir. We are very pleased. The performance of the STOVL was a marvel to watch aboard USS *Wasp*. I was privileged to go with the Secretary of the Navy and the Commandant one weekend while that testing was going on and to see two STOVL's wildly exceed the expectations of that flight test in that period. I have done initial sea trials in aircraft, and you generally get portions of the expected test done. That completed everything expected. It was wonderful. And the propulsion system was a pleasant site to behold.

Senator BLUMENTHAL. Well, you have just answered my last question. I thank you very much.

Thank you, Mr. Chairman.

Senator LIEBERMAN. Thank you, Senator Blumenthal.

Admiral, to put this in context for those who are in the room or watching, the F-35 Joint Strike Fighter is a really important program to our military. It is a big program. It is expensive, but it is critical. And so the delays and cost increases that have occurred are troubling, but I appreciate the seriousness with which you have responded. The Nunn-McCurdy breach, to state it in simplistic terms, was a critical breach. That meant that the program was heading to a point where it was 50 percent more costly, if you will, than the original baseline.

So you have now done a technical baseline review of the program and you are implementing changes which you described today.

Let me ask you a tough question but it is one that is on our minds. Are you confident that with the changes you have implemented, it is unlikely that there will be additional delays in development or production of the Joint Strike Fighter?

Admiral VENLET. Well, sir, thank you. That is a very appropriate question and one that I think about nearly constantly with the team and the program.

I speak frequently about software and the complexity of the software. That will be the leading risk in successfully delivering a Block 3 capability.

And my basis for the confidence in my opening statement lies here. When we did the technical baseline review, sir, in 2010 after the Nunn-McCurdy breach, we recognized that the program had advanced to a point where those first two iterations of its capability, Block 1 and Block 2, initial training and initial warfighting, were already far enough along the line. They, unfortunately, did not get off on a sound requirements baseline and a stable foundation. And so we predominantly added margin for those to complete successfully. There were resources in money and there were resources in time for those.

And the Block 3 capability, sir, which is really what the fleet needs to have, is going to begin on a very rigorous and sound design review basis so that it will have the best possibility to succeed. And we have time and money to do that. I have lived in the acquisition domain long enough to know how disappointing it is to my fleet shipmates and Air Force and Marine to come up short or late with a capability. And I think it was very determinedly done to set this program on a foundation with money that it needs and the time it needs to succeed, sir, like you are asking me if it will.

We have a plan that is resourced with time and money. It has been scrutinized independently by the systems commands' experts in scheduling and schedule risk assessments and master schedule building. And they have looked me in the eye and confirmed for me they believe we have what it takes in time and money to absorb the further learning. We have the remainder of 2012, 2013, 2014, 2015, and 2016 for flight tests. There will undoubtedly be learning and discovery. If it all stays within the family of normal fighter development, we have the ability absorb that learning, make changes, and stay on schedule and cost.

Senator LIEBERMAN. Okay. So bottom line, you are confident, encouraged at this moment, based on the changes that you are implementing after the technical baseline review, that there will not be additional delays in the development or production of the Joint Strike Fighter.

Admiral VENLET. Yes, sir.

Senator LIEBERMAN. Okay, I appreciate that.

Let me ask another one of those bottom line questions literally, which is whether the cost of concurrency for each successive lot of aircraft is coming down or rising or remaining essentially the same.

Admiral VENLET. Sir, the cost of the concurrency impact on each year's production steadily declines. It is higher in these earlier years. We can speak about it in the cost per jet. That is one view of it. But the other view is each year you are buying more aircraft,

and so that total bill gets bigger. The cost per aircraft goes down each year. But, you know, LRIP—the first year we bought two. Then we bought 12, 17, and 30. So we are buying more. So the magnitude of the total bill goes up.

We are working very hard to analyze every one of those changes, categorize them into ?must do? because they affect short service life or those that could be deferred and done with modification budgets later in the life or possibly handled by inspection. And so we are applying that rigor to it to maintain and manage those costs.

Senator LIEBERMAN. One of the steps that you have taken that was strong and I appreciate was that you told the contractor that you are withholding award of six of the fiscal year 2012 aircraft with the intent to award these six with the 2013 contract, and that will be based on performance from the contracting team. That is a tough move but one that is justified by both the facts of what has happened and the demand for the program.

Can you describe for the subcommittee the measurable criteria against which the contractor will be judged when you decide whether to award these six 2012 aircraft with the 2013 contract?

Admiral VENLET. Yes, Senator. Let me begin saying I feel my duty to the Secretary is to manage the program so that we succeed and we do buy those jets. So we are withholding them, but I am definitely looking for success in this. And my viewpoint from here, a third of the way into the year, is that of the categories that I have described to the committee is several of them are on track and doing fine. The others are not off track, but they have more to be revealed before we can say. Those issues are, number one, the software, and principally the design review activity of Block 3 software must occur successfully this year. I have promising signs in view right now of that intent and behavior by industry.

The management of the concurrency change is very important. The time from initial discovery to when the engineering is available to cut it into production impacts—it reduces the modification after delivery. So we want that span time to go down. We will be tracking that specifically. So it is a time from discovery to cut-in of a change.

The qualification of the components, the actuators and the other boxes in the airplane when they go through their reliability quals, through the environmental testing—that is on a path that very much determines the reliability of the aircraft and its cost of ownership. That is tracking very well at this point.

Flight test overall is another one which is on track. And these are discussed frequently with industry, and we will provide an enhanced description of those as the year progresses, sir.

Senator LIEBERMAN. We would appreciate hearing about that.

Just a final quick question. Are you considering some award option other than all or nothing of the six aircraft that we have discussed?

Admiral VENLET. Sir, yes. Something between zero and six is certainly within the consideration.

Senator LIEBERMAN. Okay. Thank you very much.

Senator Brown.

Senator BROWN. Thank you.

Admiral Skinner, just to follow up where I left off, if the F-35 is delayed again, say, by 2 years due to developmental issues, how would this affect your ability to continue extending the service lives of the F-18s?

Admiral SKINNER. Senator, if the F-35 is delayed 2 years, we will have the ability to extend the service life of 150 of our aircraft. That is the current program of record for the SLEP. The population of jets that are available for service life extension exceeds those 150. So in the future, we would have the opportunity, if the need arose, to SLEP additional jets if we had to.

Senator BROWN. Thank you.

And, Admiral Venlet, with regard to the software—let me just make sure I do not misstate. In the most recent version of the selective acquisition report, the SAR, for the Joint Strike Fighter, it says that the software risk is the top developmental issue for the program, and you are aware of the challenges. What concerns do you have about the pace of the progress and development of software for the program?

Admiral VENLET. Yes, sir. The deviations in the software are relatively small in the big picture of the program, and that is why we are fortunately going to work very hard to keep those from growing. Specifically in the Block 2A release to flight test, just to help you understand the time I am talking about, there is about a 3-month pressure of delivery in a particular release of Block 2 in the flight test. That is going to have an impact on training but not a large impact and is, in the big picture of the program, not going to pressurize Block 3.

In the full air system, the ground system software—we call it ALIS, the Autonomic Logistic Information System. The particular version with Block 1 has about a year impact to it. That was in view when we did the technical baseline review. That is not a new revelation, but even that is—we will have about 80 percent of the capability of the eventual Block 3. So by absorbing that year on ALIS, the ground system, we will have a sound foundation to get the last 20 percent out by Block 3.

Senator BROWN. And then just to shift gears just a little bit, could you describe how the developmental dial strategy will work and describe the specific decision criteria that were used to award the manufacture of more F-35 jets if they reduce concurrency and build jets on cost and on schedule with good quality without requiring in- or post-assembly line changes?

Admiral VENLET. Yes, sir. Those are the criteria of software performance this year in the Block 3 design reviews: the improvement of concurrency change management, the progress in the flight test program in total, the line replaceable units, the qualification test of the components. And there is one more that just flew out of my head that I can find here in a letter, sir. But essentially it was the same description I gave to Senator Lieberman a moment ago.

Senator BROWN. I just wanted to make sure I did not miss anything. Thank you.

Admiral VENLET. Yes, sir.

Senator BROWN. And finally, ma'am, just one final question. Under the current structure retrofit program, over the next few years the Air Force will need more than \$100 million to retrofit the

F-22 fleet just to ensure that they can meet the required 8,000 hours of service life. And over the last 2 years, the Air Force sole-sourced to the F-22 prime contractor, Lockheed Martin, two contracts totaling almost \$1.4 billion for sustainment of the F-22 fleet for just those 2 years. The Air Force recently completed a sustainment strategy for the F-22 and concluded that a joint contractor-Government approach could save over \$1 billion in sustainment costs of the aircraft.

How far along is the Air Force in adopting this study's recommendations and transitioning to joint sustainment with the contractor, and to what extent is the Air Force actively exploring opportunities to bring some competition to the sustainment work in the future, if at all?

General WOLFENBARGER. Senator Brown, we are executing to that strategy. It was approved in the middle of last year. I believe it was May of 2011. We have currently transitioned, I believe it is, 19 hardware types of workload. We have got several others in the dozens ahead of us. That is on the hardware side.

We also are in the process of working on the software transition as well. One of the integration laboratories that had been part of the prime contractor's development activity has been now relocated up to Hill Air Force Base, and it is going through its checkout now to be used to execute the organic activity associated with the software portion of that study.

So you are absolutely right. It is more than \$1 billion of anticipated savings. We are into the execution of that plan. It is going to take us through fiscal year 2019 to get to all of those different steps in that plan, and we will continue to put a spotlight on where we can compete.

Senator BROWN. And despite the Raptor is in sustainment, subject to modernization, will the Air Force continue to include the program in its SAR to afford Congress sufficient visibility into the program?

General WOLFENBARGER. Yes, sir. One of the recommendations that came out of a recent GAO study was that we should break out the next major modification effort and characterize that as its own acquisition category program. We have agreed to do that. And so what we will see in the future is actually to different SAR reports, one for the baseline program and one for that next increment of added capability, its increment 3.2B effort.

Senator BROWN. Thank you, ma'am.

General WOLFENBARGER. Yes, sir.

Senator LIEBERMAN. Thank you, Senator Brown.

Senator Blumenthal.

Senator BLUMENTHAL. Going back to the Joint Strike Fighter and going through some of the issues that I think remain outstanding, you are fairly confident that the software problems are on their way to solution and will be solved.

Admiral VENLET. Sir, I would say you can never take your eye off the software, and there will be that diligence by ASC, the Aeronautical Systems Center, and the NAVAIR Government engineers working with industry. It will take that concerted, combined effort to succeed. I believe, if that is applied appropriately, it will. What we are fortunate in is that the involvement of those independent

systems commands with that expertise to guide this is very much involved in the program, more so than it was before. And that is my basis for believing that, sir.

Senator BLUMENTHAL. The weight management issue you are confident is solved or on its way to being solved?

Admiral VENLET. Yes, sir. Weight has been very well controlled in these last couple years in the program.

Senator BLUMENTHAL. And the thermal concerns—are those still an issue?

Admiral VENLET. Well, there are thermal concerns—there are several. So I am not exactly sure what you have in mind, but I will speak to a couple of them.

There was the temperature at the roll post for the STOVL where the actuators needed some extra protection. That has been added. There has been temperature control of the fuel in the aircraft that would impact it. That has been improved by a dual-vane boost pump. And those are the two initial thermal ones that come to mind.

Senator BLUMENTHAL. And the logistics information system?

Admiral VENLET. Yes, sir. ALIS is what I was speaking about. It is a very powerful, good thing for the program that the fleet will get tremendous benefit out of. It is a very software-intensive system that is as challenging to develop and adjust as the mission system on the aircraft is, the radar and the other sensors. It is being managed just as rigorously as the mission system software.

Senator BLUMENTHAL. To what extent would those issues or others that have already been encountered be subject to the requirement that we wrote into the last defense authorization act that anything above the fixed cost be held accountable to the contractor?

Admiral VENLET. Yes, sir. That provision will be complied with in the production contracting. So when we negotiate the lot 6 and the subsequent contracts, we will negotiate a target cost, and the terms and conditions of the contract will require that any costs incurred above that target will be fully borne by industry, and that will be both in the aircraft and the engine contracts.

Senator BLUMENTHAL. How about the costs to date?

Admiral VENLET. The costs in the previous programs—we have the first 3 years of production—were cost-plus contracts, and we are paying those costs and there is a share line of those overruns. In lot 4, the 2010, and lot 5, those were our first two fixed price incentive contracts, and so there is a target cost, and those overruns are shared, but they have a ceiling that bounds the Government's exposure.

Industry's performance on those has improved steadily year by year. There was 11 to 15 percent on those early ones. Lot 4 is about 7 percent. So I am very pleased with that. That 7 percent is shared 50/50 with industry. And in lot 5, we began a sharing of these concurrency costs, so to the benefit of the Government. That will continue as well, sir.

Senator BLUMENTHAL. Looking forward to the economies of scale that will be achieved over the 5-year defense procurement program, over that 5-year period, a lot of those economies of scale will be achieved as a result of foreign partners or foreign military sales by the contractor. If economically those countries are unable or unwill-

ing to make those purchases that are projected, will that significantly impact the costs of the program for us?

Admiral VENLET. Yes, sir. Every country that buys an F-35 contributes to the benefit of quantity for cost control or cost reduction. Right now, every one of the original partners is solidly in the program. Certainly Italy did reduce by 41 jets. Australia is talking about an adjustment to the right. But those countries are still in, and so I think the success news is that they have stayed in the partnership. They have reacted to macro-economic conditions in their own country, and their recent adjustments will be because of that less than it is their confidence in the program.

We are in somewhat of a plateau here in these near years in the 2029 to 2030 range. My view is that the attainment of affordability in this plateau range does not need to be postponed. We can still work and expect and seek industry to achieve affordability even when this plateau is flat by paying attention to quality and getting the costs of quality down. We are tracking those metrics. The engine quality numbers are in single digits. The aircraft are above that at this point. We are discussing that with them. Processes throughout the supplier base can still show improvement. I am not saying there are any glaring problems. But we will work hard to improve affordability even while we are on this plateau.

Senator BLUMENTHAL. My reason for asking was not a concern that they do not want to be a part of the program, but that they will feel that their economic difficulties may preclude or economic challenges, just as the United States has those challenges. Obviously, European countries even more so. And my worry, I guess—it may be shared by others—is that they may just decide they cannot afford it, that their militaries cannot pay for it, not that they do not want it. So that was my reason for asking this question.

Thank you, Mr. Chairman.

Senator LIEBERMAN. Thank you, Senator Blumenthal.

Let me just follow up on that line of questioning by my colleague from Connecticut.

The Joint Strike Fighter program, of course, from the beginning was envisioned to be an international program. Just for the record, remind us, if you would, Admiral, how many other countries are participating in the Joint Strike Fighter program.

Admiral VENLET. Yes, sir. There are the United States plus 10. The original eight—Turkey, Italy, The Netherlands, Denmark, United Kingdom, Norway, Canada, and Australia—are all solidly in, as they have been. In 2010, Israel signed a letter of offer and acceptance for their initial 19 to 20 aircraft. We were very pleased with that and they are a very committed partner of the program. And Japan has chosen in a competition, and next month we expect a formal signature on their letter of offer and acceptance. And we are in the midst of preparing a proposal to deliver in response to South Korea's fighter competition.

Senator LIEBERMAN. Good. First, let me say I am impressed that you remembered all 10 by name.

Their participation, to say the obvious, is not minimal. I mean, their participation is important to the fiscal viability of the program. Right?

Admiral VENLET. Absolutely, yes, it is.

Senator LIEBERMAN. And I just want to draw out a little because I appreciated what you said in response to Senator Blumenthal's question. First, what is the process by which you keep our international partners informed of ongoing developments of the program? And has there been no time, as we have had the discussions quite publicly here in Congress and elsewhere, the media about the increase in cost and delay in production—have there been any concerns expressed to you by the international partners?

Admiral VENLET. Absolutely, sir. They watch the reactions of the program and they do express those concerns. Let me speak to the interaction and how they stay involved and informed.

Senator LIEBERMAN. Yes.

Admiral VENLET. Embedded right in my program office team right here in Washington are senior level officers from each of those countries, and several of those countries have actually people embedded into our teams and are contributing to engineering. One of the most stalwart experts—the thing I forgot a minute ago on the criteria for deciding was durability and fatigue testing. And so that connects to this statement. There is an Australian Air Force officer who is the deepest expert on service life issues, and so when I am asking questions and I see him stand up in response, it is really comforting because there is a long history between the United States and Australia on the F-18 program. So those officers are embedded in the program.

We have twice-a-year a joint executive steering board where we meet with the partners at the one- and two-star military and civilian level, and then annually—in fact, we head to Hartford tomorrow for a day and a half with our partner countries at the National Armament Director, which is equivalent to our Under Secretary of Defense for Acquisition, Technology, and Logistics, and industry CEO's. So those are formal interactions. We have requirements working groups. We have sustainment working groups that the partners all attend with U.S. Services.

And every time we have an adjustment we see coming in the program, as soon as our budgets are delivered to the Hill, we immediately take the impact of that budget and push it to the countries as well so they have got an impact. They are not being affected by changes in the development program costs anymore. It is about the procurement changes and the flyways.

Senator LIEBERMAN. And bottom line, except for the case you mentioned about Italy, which may have more to do with their budget problems, all the 10 are on board. All are on board.

Admiral VENLET. Yes, sir. Each country has different situations going on with a level of parliamentary support, but they are all solidly on board.

Senator LIEBERMAN. Yes. They all want to buy.

Am I correct that they were aware of or perhaps even involved with you in the judgment you made about holding back the six aircraft, the 2012 aircraft?

Admiral VENLET. We did not involve them in the creation of that strategy, sir. We do not intend that strategy to affect any of their aircraft.

Senator LIEBERMAN. Right.

Admiral VENLET. This is really just in the lots 6–7 timeframe. That will be analyzed year after year whether we will continue with that, and it does not affect any of their aircraft.

Senator LIEBERMAN. But obviously they are aware of it now.

Admiral VENLET. Yes, sir, they are.

Senator LIEBERMAN. And are they generally supportive?

Admiral VENLET. In the sense that we find the support here for the protection of the capability. The real fundamental about that strategy, sir, is to assure that the jets we buy have the maximized capability and service life, and so as we observe the 2012 test program and get that confidence. And they are appreciative of that.

Senator LIEBERMAN. I am glad to hear that, and that is what I would assume. I mean, you have done a lot after your technical baseline review to bring this program onto schedule and within reasonable costs. But I think holding back those aircraft was really important and I am glad that the international partners agreed.

General Wolfenbarger, I wanted to ask you a different kind of question, which you actually referred to a bit earlier. And this is the decision by the Air Force Research Lab to award a contract for a program called the Adaptive Engine Technology Development. You will forgive a little bit of what may seem like paranoia, but I forgot the exact Satchel Paige line here. But you know, if you are not looking back, somebody actually might be following you. It is a combination of two lines. You get what I am pointing to.

We just have gone through a multiyear battle here in Congress about whether we would build one or two engines for the Joint Strike Fighter. And I will tell you—and maybe you have already heard it. Probably you have. But there is concern that this Adaptive Engine Technology Development program is actually the beginning or kind of an end run on the decision of Congress to have one engine program for the Joint Strike Fighter. Well, I wanted to ask you flat out. Is the Adaptive Engine Technology Development program actually an alternative engine, a second engine for the F–35?

General WOLFENBARGER. No, sir, it is not. It is a technology maturation program that takes the advances that we have seen under the ADVENT program and takes them to the next maturity level. This engine could be used in a whole host of platforms should it ever reach the point of being a development program. Right now, it is just a question of ensuring that we are ready to go should we as an Air Force decide that we want to embrace this opportunity to really reduce the fuel consumption in future generations of either strike aircraft, bomber aircraft, tactical aircraft. So this technology is usable across all of those platforms in the future should we transition to a development program. This is, as I said, purely technology maturation.

Senator LIEBERMAN. So the main purpose for this program is in terms of fuel consumption. Is that right?

General WOLFENBARGER. Yes, sir, and keep our industrial base active in this turbine engine business so that we keep that intellectual capital that is so important to this country.

Senator LIEBERMAN. So one of the questions that I have heard posed about it is if the goal here about fuel consumption—I understand you said it is also, in part, about the industrial base. But if the goal is to improve fuel consumption and fuel efficiency—put it

that way. That is really what I mean to say—then why not invest in improving some of the existing engine programs for aircraft? In other words, are we heading down a road here with a new program, at a time when all of the Department is under tremendous fiscal pressure, that we cannot afford? I mean, in other words, is there a better use for this money by putting it into improving existing engine programs to improve fuel efficiency?

General WOLFENBARGER. Sir, we would not be able to reach those levels by just improving the existing engines. This effort really does leverage off of some fairly exciting technological advances under ADVENT and allows, as I think I might have mentioned, the opportunity for all of industry to participate. We had down-selected under ADVENT to two industrial partners. This allows us to kick off yet another technology maturation effort and open up that door to all of industry that may want to participate.

Senator LIEBERMAN. Okay. We will keep hopefully not totally motivated by paranoia, but we will keep an eye on this and ask you to continue to report to us about how it is doing.

I think one of the important points to make—and, Admiral Skinner, I will ask you to talk about this. General Wolfenbarger, maybe you want to get involved. You have used this term “SLEP” during the hearing, service life extension program. It is too close actually to the word from a different language which is “schlep.” That is something entirely different than the SLEP program.

But I mean, basically the SLEP program is an attempt to keep existing aircraft flying longer than they might have been intended to fly in part—and this is why I bring it up here. Well, let me ask. Is it not true or is it true that some of the delays anticipated in the Joint Strike Fighter program force you, us, to take steps to extend the life of existing aircraft? I will start with you, General Wolfenbarger.

General WOLFENBARGER. Yes, sir, that is true. So for the F-16 program, we are looking at a bridge capability that is made up of two activities. One is SLEP, service life extension program, which does allow us to ensure that our service life for that fleet, for a portion of the F-16 fleet, can be extended from the 8,000 hours that it is today up to 10,000 hours. And we have got kind of a sliding scale opportunity relative to the numbers. Right now in the President's budget, we have funding for 300 F-16 to extend that service life.

Senator LIEBERMAN. It is a serious number.

How do you evaluate risk, which goes back again to the question of safety? How do we minimize risk in aircraft that we are attempting to keep going longer than they were originally intended to?

General WOLFENBARGER. Sir, we actually go through a very rigorous testing process, a full-scale structural testing activity, which we have undertaken on the F-16 fleet now, to inform us what needs to be done to ensure that structurally we can keep these aircraft sound.

Senator LIEBERMAN. Admiral, do you want to get into this? I must say that some of the numbers given at some of the posture hearings before the full committee on the average age of some of our aircraft were unsettling because they have risen dramatically. Have they not?

Admiral SKINNER. Yes, sir, they have. We have been flying our aircraft quite a bit over the course of the last decade. There is inherent risk in extending the service life of any aircraft. We have folks who know how to do that.

But for the Navy, in our program to SLEP 150 legacy Hornets in the fuselage area, we are at the very beginning of that program, and so it is a matter of what we do not know as opposed to what we know. Now, we have done a service life analysis so that we think that we have areas identified that we can develop and produce at low risk kits to fix those particular areas that the analysis shows, but until we really get into the fleet and open up those aircraft and look inside of them, that is when we will really know if that analysis is accurate. And so we start our first two aircraft later on this fiscal year and follow on with additional aircraft next year, and so we will know about where we are with that SLEP program probably next year.

Now, we have done some risk mitigation factors. We have done the SLAP. We have looked inside the aircraft for our high flight Arrow program that gets us up to 8,600 hours. We have a service life management program that we manage the fatigue life as we fly them, and we have a greater population of supplemental aircraft than what we have to do in the program of record. So if we open up an aircraft and it looks like it is beyond economic feasibility to repair, then we can button it up and get another one.

But there is inherent risk in extending the service life of a tactical aircraft because we fly them and operate them very rigorously, as you are well aware, sir.

Senator LIEBERMAN. Yes. That is the point I appreciate you are making and why there is such pressure, as you well know, Admiral Venlet, on bringing the Joint Strike Fighter in on schedule.

Give me some sense of what judgments you are making about availability of the Joint Strike Fighter and the number of aircraft that you have decided to SLEP. In other words, is it based on the current prediction of availability of the Joint Strike Fighter? General?

General WOLFENBARGER. Yes, sir, it is. So it is based on the fiscal year 2013 President's budget profile.

Senator LIEBERMAN. Right.

The same, Admiral?

Admiral SKINNER. Yes, sir.

Senator LIEBERMAN. So, obviously, any further delays would have an impact on that, and in that sense, although I know you will do everything you can to minimize risk, would both force more investment in extending the service life of existing aircraft and involve a risk that we can, I am confident, minimize with the Joint Strike Fighter.

Admiral, do you want to comment on that?

Admiral VENLET. Yes, sir. The F-35 program needs to deliver our production jets to relieve the burden. And so the most powerful thing is for, first of all, the President's budget to be supported and funded and then for those jets to deliver with full life and full capability, and that is what my job is to tend to.

Senator LIEBERMAN. Okay. I thank the three of you very much.

At the risk of being redundant, I just cannot say how important this Joint Strike Fighter program is. You know that. You work on it every day. And I think I am typical of most Members of Congress which is that we strongly support this program because we know how necessary it is, but we also are going to continue to push to get it back on schedule and bring down the cost per unit.

I personally think you have taken some very strong steps in the last couple of years, and I hope that our authorization bill and the budget will reflect that in terms of our response to the President's budget request. So anyway, keep it up because there is a lot on the line.

The subcommittee and the full committee will mark up our defense authorization bill for the coming fiscal year 2013 in the final week of this work period which—let us see—would be the week of the 21st of May. So your testimony today has been very timely and helpful to the committee as we prepare that markup.

I thank you very much.

We will keep the record of the hearing open for another 5 days for any additional statements or questions that anyone has.

With that, thank you, the three of you, for your extraordinary service to our country.

General Wolfenbarger, I always like it—somebody once said to me when a barrier is broken by one person, it opens the doors of opportunity wider for every other American. And you are about to break a barrier. Good luck. Congratulations. Thank you.

The hearing is adjourned.

[Whereupon, at 4:31 p.m., the subcommittee adjourned.]