



ACQUISITION,  
TECHNOLOGY  
AND LOGISTICS

THE UNDER SECRETARY OF DEFENSE

3010 DEFENSE PENTAGON  
WASHINGTON, DC 20301-3010

JUN - 1 2010

The Honorable Ike Skelton  
Chairman, Committee on Armed Services  
U.S. House of Representatives  
Washington, DC 20515

Dear Mr. Chairman:

Pursuant to title 10 United States Code (USC), section 2433a, I have conducted a review of the F-35 Joint Strike Fighter (JSF) program that was restructured for the President's FY 2011 budget and I certify with respect to this program that:

- A. the continuation of the program is essential to the national security;
- B. there are no alternatives to the program which will provide acceptable capability to meet the joint military requirement at less cost;
- C. the new estimates of the program acquisition unit cost or procurement unit cost have been determined by the Director of Cost Assessment and Program Evaluation to be reasonable;
- D. the program is a higher priority than programs whose funding must be reduced to accommodate the growth in cost of the program; and
- E. the management structure for the program is adequate to manage and control program acquisition unit cost or procurement unit cost.

My certification reflects the restructured JSF program as reported in the December 2009 JSF Selected Acquisition Report (SAR) and the Department's review of this program in accordance with section 2433a. I have enclosed supporting information summarizing the facts, rationale, and assessments that I considered in making this certification, as well as the Root Cause Analysis and Assessment as directed by the Weapon Systems Acquisition Reform Act of 2009, Public Law 111-23 (WSARA).

The Department began an intensive review of the JSF program preceding submission of the President's FY 2011 budget, and the Nunn-McCurdy process has continued that review and analysis. Decisions and direction resulting from this ongoing review are aimed at putting the program on a solid, realistic foundation for development, production and sustainment.

The restructure reflected in the President's budget request took significant steps to address cost and schedule risk. The Department extended the development and operational test schedules, added test assets to the development program, elevated the

Program Executive Officer position to a 3-star billet to improve government program management, and re-structured the development contract fee structure to reward measurable progress against significant cost and schedule events. As a result of the Nunn-McCurdy process and the ongoing review of the program, we will take further actions including revising the risk management and cost control processes, addressing key program staffing shortfalls, managing test assets to a realistic test plan, working with the contractor to resolve critical Earned Value Management System shortfalls, and transitioning to fixed-price incentive production contracts.

It is our intent going forward to produce aircraft at a rate consistent with the actual progress of the development and test program and consistent with the recommendations provided by the Independent Manufacturing Review Team (IMRT) regarding the ramp-up of production. In constructing the production plan, we are balancing concurrency risk, which could result from ramping up too quickly, against cost increases and delay in delivery of military capability, which could result from slowing the ramp. I am prepared to restrict production if the development and test program does not make adequate progress.

The JSF program's estimated average procurement unit cost has increased significantly over the past eight years, and this is the reason the program is in Nunn-McCurdy breach. To support this Nunn-McCurdy review, CAPE conducted an independent cost estimate to update the results of the Joint Estimating Team (JET II) previously reported to Congress, using the same methodology. The CAPE estimates of Program Acquisition Unit Cost (i.e., 112.3 BY02 \$M) and Acquisition Procurement Unit Cost (i.e., 92.4 BY02 \$M) prepared to support the Nunn-McCurdy certification process are in the range of estimates provided to Congress in the December 2009 Selected Acquisition Report (SAR) for the JSF program. There are several major drivers to the growth in costs since the original JSF acquisition program baseline in October 2001.

- SDD was originally scheduled to complete in FY 2012. Now, SDD is projected to complete in FY 2016. SDD cost has grown as a result of four additional years of development activity.
- The Navy reduced their planned procurement quantity by 409 aircraft shortly after Milestone B, and the DoD reduced peak annual procurement quantities, extending the current production program by an additional 7 years.
- Actual and forecast contractor labor and overhead rates and fees have increased significantly. This is the single largest contributor to cost growth.

The CAPE estimate prepared to support the Nunn-McCurdy certification process does differ in several respects from the JET II estimate previously reported to Congress. The following items are contributors to the difference in the estimates:


- The JSF test program continues to encounter difficulties and has fallen behind the level of performance projected by the JET II.
- Several important aspects of the program were not fully defined and captured in previous cost estimates. These include development of the verification simulation capability, the extent of tooling required to produce the aircraft, and the military construction requirements to support service introduction of the aircraft.

The cost estimates in this Nunn-McCurdy review are being conducted at a time when the program is just beginning to produce aircraft and before development and testing are complete. These estimates are therefore forecasts of a future production process that will unfold over the next 25 years. They therefore carry with them the uncertainty inherent in such a long-term forecasting process, but I believe they provide the most realistic foundation available for our planning and management at this time. I have directed the JSF program under its new management structure to make every possible effort to reduce the program costs forecast in these estimates. I believe that costs have gradually been built into the program over time, and that with disciplined management they can be removed. I will be monitoring and reviewing these efforts.

The JSF program will provide a critical capability to our warfighters and remains the backbone of the future tactical aircraft inventory for the Air Force, Navy, and Marine Corps, as well as our international partners. I ask that Congress fully fund the program to the amount requested in the President's FY 2011 budget.

Similar letters have been sent to the President of the Senate, the Speaker of the House, and the Chairmen of the congressional defense committees.

Sincerely,



Ashton B. Carter

Encl: Supporting Documentation and Root Cause Analysis and Assessment

cc:  
The Honorable Howard P. "Buck" McKeon  
Ranking Member

**Joint Strike Fighter (JSF)  
Nunn-McCurdy Certification  
Basis of Determination and Supporting Documentation  
“The continuation of the program is essential to the National Security”**

The Joint Requirements Oversight Council (JROC) reviewed the results of the F-35 Joint Strike Fighter (JSF) directed Nunn-McCurdy Review along with the Key Performance Parameters in the Operational Requirements Document of March 13, 2000. The JROC validated the F-35 JSF capability as essential to the national security, and revalidated the current Key Performance Parameters without amendment. These conclusions were documented in JROCM 078-10 dated May 20, 2010.

As a result, I have concluded that the continuation of the F-35 JSF program is essential to the national security.

**Joint Strike Fighter (JSF)**  
**Nunn-McCurdy Certification**  
**Basis of Determination and Supporting Documentation**  
**"There are no alternatives to the program which will provide acceptable capability to meet the joint military requirement at less cost"**

As part of the Nunn-McCurdy certification process, DoD assessed whether there are alternative aircraft to the JSF that provide acceptable capability to meet the joint military requirement at lower cost. The analysis assessed the F-22, F-15E, F-16 Block 52/60, and FA-18E/F. Concept aircraft and non-U.S. produced aircraft were not considered. The analysis compared the options on the basis of survivability, basing, lethality, and networking and also went beyond existing programs to examine potential upgrades to alternative aircraft airframes, weapons, sensors, and communications networks. The analysis obtained rough order of magnitude data on the cost of the basic and upgraded alternative aircraft, scaled to a JSF-size inventory quantity.

None of the alternatives provide the basing capability needed from conventional and austere land bases and from sea bases. There are no upgrades to mitigate the basing capability shortfall. The F-15E, F-16, and FA-18E/F also lack the stealth features to be survivable in higher threat environments. The F-22 is the strongest alternative in terms of survivability and lethality in the air to air arena, but it lacks the sensors and weapons to meet required lethality against ground targets. With extensive upgrades the F-22's capability against ground targets could be improved, but potential design limitations, technical risk, lack of basing flexibility, and high cost eliminated this alternative.

Based on this extensive analysis, there are no alternatives to the JSF program that provide acceptable capability to meet the joint military requirement at less cost.

**Joint Strike Fighter (JSF)  
Nunn-McCurdy Certification  
Basis of Determination and Supporting Documentation**  
**“The new estimates of the program acquisition unit cost or procurement unit cost have been determined by the Director of Cost Assessment and Program Evaluation to be reasonable.”**

The Director of Cost Assessment and Program Evaluation (D,CAPE) reviewed the JSF program and developed an acquisition cost estimate, including Research, Development, Test, and Evaluation (RDT&E), procurement, and military construction requirements to support the Nunn-McCurdy certification process. The D,CAPE estimate of the total acquisition costs for the JSF program is \$382,426.1 million (Then-Year dollars (TY \$)), \$ 54,173.2 million (TY \$) more than the current estimate reported in the Selected Acquisition Report (SAR) dated December 31, 2009. The D,CAPE cost estimates are based on procurement of 2,457 aircraft, associated spares, and remaining development activities.

The D,CAPE has determined that the Program Acquisition Unit Cost (PAUC) and the Average Procurement Unit Cost (APUC) for the restructured JSF program provided in the Table 1 below are reasonable.

**Table 1. D,CAPE Estimate of Acquisition Costs  
for Restructured Joint Strike Fighter Program**

JSF (CA Estimate May 2010)	BY2002 \$	TY \$
<b>PAUC</b>		
<i>(Program Acquisition Unit Cost)</i>		
Cost (\$M)	275,886.8	382,426.1
Quantity	2457	2457
Unit Cost (\$M)	112.3	155.6
<b>APUC</b>		
<i>(Average Procurement Unit Cost)</i>		
Cost (\$M)	225,733.2	325,057.6
Quantity	2443	2443
Unit Cost (\$M)	92.4	133.1

Note: The estimates above are at a confidence level of approximately 50%.

**Joint Strike Fighter (JSF)  
Nunn-McCurdy Certification**

**Basis of Determination and Supporting Documentation**

**“The program is a higher priority than programs whose funding must be reduced to accommodate the growth in cost of the program”**

The Department of the Air Force and Department of the Navy consider the Joint Strike Fighter as one of their highest aviation priority programs. This commitment has been affirmed by Secretary of the Air Force and the Chief of Staff of the Air Force in the “2010 Air Force Posture Statement” dated February 9, 2010. This commitment has also been affirmed by the Chief of Naval Operations in his statement before the House Armed Services Committee on February 24, 2010 and Senate Armed Services Committee on February 25, 2010.

I have approved the current Director, Cost Assessment and Program Evaluation cost estimate and funding profile which identified some additional acquisition costs for the program. The Air Force and Navy will take necessary actions to fund the program. Changes in funding priorities can be best addressed during the upcoming FY 2012-2016 program and budgeting process. The Air Force and Navy will incorporate decisions to adjust funding based on Departmental guidance and current priorities.

**Joint Strike Fighter (JSF)  
Nunn-McCurdy Certification  
Basis of Determination and Supporting Documentation  
“The management structure for the program is adequate to manage and  
control program acquisition unit cost or procurement unit cost”**

The management structure evaluation was conducted in six primary areas to facilitate evaluation and development of recommendations:

1. Earned Value Management (EVM)
2. Risk Management (including sustainment, technical, and manufacturing focus areas)
3. Production Assumptions Risk
4. Program Office Structure and Personnel
5. Contract Strategy
6. Test Schedule Planning

The evaluation included a review of detailed documentation and assessments provided by the JSF Task Force, F-35 Joint Estimate Team (JET), F135 Joint Assessment Team (JAT), Independent Manufacturing Review Team (IMRT), Systems Commands (SYSCOMs), Defense Contract Management Agency (DCMA), Joint Program Office, and JSF contractors in response to queries for each of the six evaluation areas. It also included additional documentation reviews, on-site reviews, questionnaires, and interviews.

During the past nine months, including the review process that led to the restructure of the JSF program and the FY 2011 budget decisions, the Department made significant decisions and changes relative to the program. The Nunn McCurdy review found this restructure, and the actions taken as a result, to be fundamentally sound, with the following findings and recommendations:

- Lockheed Martin (Ft. Worth) EVMS was determined to be non-compliant with Department standards. This situation is disappointing and unacceptable. The Department has assessed this as a systemic corporate level problem and is challenging Lockheed Martin to deal with this issue on all levels. In the meantime, and in the best interest of the Department and the taxpayer, the Department is providing Government scheduling, program management, technical, and EVMS compliance expertise and assistance during to focus on:
  - EVMS Corrective Action Plan (CAP) completion and acceptance by The Defense Contract Management Agency (DCMA) Not Later Than (NLT) 30 June 2010.

- EVMS CAP showing measurable progress leading to successful completion of EVMS Compliance review as determined by DCMA NLT second quarter Fiscal Year (FY) 2011.
- Successful execution of the Integrated Baseline Review (IBR) by second quarter FY 2011.
- Risk Management was not integrated well enough across the JSF enterprise and there were not commonly agreed and understood risk management mechanisms between the government and contractor teams. A newly established Joint Systems Command/JSF Joint Program Office (JPO) risk review and management process is being implemented which will greatly improve this situation. I have directed accelerated implementation, complete documentation, and development of technical maturity metrics for training and Initial Operational Capability. Further, a Department-wide technical review will be accomplished by November.
- To support the production and manufacturing assessment, the IMRT conducted a "Quicklook" as part of the Nunn-McCurdy review process and determined there has been significant process improvement since the 2009 study; to include improvements in risk management planning, global supply, and change management. Additional progress is needed in Global supply chain management, parts shortages, schedule plans, first article inspections and processes. I have directed actions to address these items and the IMRT will re-evaluate in the fall. Most importantly, the IMRT continues to conclude that the 1.5 production ramp rate remains optimal, and either a lower or higher ramp rate will introduce risk.
- The review found that the JSF JPO has implemented numerous actions in personnel and staffing but more remains to be done to address organizational shortfalls identified in the Nunn McCurdy review. I have directed additional reviews focused on implementation of recommendations addressing JPO manning, organizational shortfalls, and balance across Services. I have also directed immediate action to fill certain critical high priority program office manning shortfalls.
- The contract strategy was thoroughly reviewed and no major changes were recommended. Continued emphasis on affordability and cost reduction are key to the program and incentives in this area will be reviewed at the planned Milestone review to be held late this year.
- The review of the re-planned development flight test plan identified 42 areas of concern within this plan that must be resolved or mitigated in order to successfully execute to the schedule. I have directed the JSF PEO to provide a

plan to address these concerns and I will review status against this plan at the Milestone review later this year.

Therefore, based on the team's evaluation and my review, and with these changes in place, the management structure for the restructured JSF program is adequate to manage and control program acquisition unit cost and procurement unit cost.

**Joint Strike Fighter (JSF)  
Nunn-McCurdy Certification  
Basis of Determination and Supporting Documentation  
“Root Cause Analysis and Assessment”**

The cost growth described by the Joint Strike Fighter (JSF) Program in its December 2009 Selected Acquisition Report (SAR) triggered a critical Nunn-McCurdy breach. That SAR reported an increase in Program Acquisition Unit Cost (PAUC) of 57% compared to the original APB. *From a purely computational point of view, the production PAUC growth is due to recognizing the consequences of programmatic or technical changes that drive cost and the more conservative estimating framework selected as the basis for the estimate in 2009. The decision by DoD to adopt this more conservative set of estimating assumptions is the proximate cause of the breach occurring at this time.*

The analysis only addresses the cost growth identified in the SAR, although the latest Director, Cost Assessment and Program Evaluation estimate for the restructured program is greater than the SAR estimate. *The root causes fall into two large categories: flawed programmatic and technological assumptions at program inception; and a series of execution actions which hindered the overall government/contractor management’s ability to address the problems as they were encountered. Additionally, modest changes, such as putting the Electro-Optical Tracking System on all JSF aircraft, have caused some cost growth.*

**Issues at program inception and their consequences.** Unrealistic baseline estimates for cost and schedule are root causes of the subsequent growth. The Milestone (MS) B cost estimate was too low because the estimated airframe weights were too low, the escalation rates used were incorrect, and the acquisition strategy was incorrectly modeled in the cost model. These factors accounted for 23 percentage points of the PAUC cost growth. Additionally, a very aggressive and concurrent development schedule was assumed in order to meet externally mandated Initial Operational Capability dates and to reduce acquisition cycle time.

Moreover, excessive optimism at MS B about the weight estimate and weight control led directly to a major redesign. That optimism could have been tempered by the Department’s experience with developing both the AV-8B (which demonstrated the challenges associated with Short Take-Off and Vertical Landing) and the F-111 (which demonstrated the challenges posed by the integration of multiservice requirements). The need for a redesign had three consequences. First, both the materials and production processes and the assembly and tooling concepts had to be changed to produce more weight-efficient structures. Second, the need for a redesign combined with pressure to contain cost growth and stay on

schedule resulted in the loss of most of the affordability initiatives assumed in the MS B estimate. Finally, all of the major development milestones were delayed by several years. These factors accounted for 26 percentage points of the PAUC cost growth. In addition, stretches in the production profile have added another 5 percentage points to PAUC.

**Other issues in JSF's management and execution.** Given that the JSF entered System Design and Development with flawed technological, estimating, and programmatic assumptions, the program was on a path to uncover significant problems. Each of the following factors materially impacted the program's ability to overcome these latent problems as they were incurred.

- After the October 2001 contract award, the contractor took many months to properly staff the project which particularly affected early systems engineering and design efforts.
- The JPO, along with other government oversight and the contractor, created an environment in which there was a general intolerance for failing to meet externally-driven schedule goals.
- The award fee, as implemented was ineffective in sending signals to the contractor. As examples, the dollar amount of fee revenue was only weakly influenced by poor contractor performance prior to 2007 and incentives to control production and development costs proved to have marginal effect.
- Systems engineering discipline and procedures appear not to have been rigorously followed as evidenced by problems implementing risk management, technology maturity assessments, and systems engineering integration planning.
- Finally, there was a general reluctance to accept unfavorable information. This slowed down the ability of the contractor and government to recognize and respond to problems.

However, disentangling each of these execution factors' contribution to cost growth – separate from the initial causes – is challenging. We can, for example, identify that the early refusal to entertain any alternative that would hold IOC at risk delayed recognition that weight growth required a redesign. We can also estimate the total cost of this redesign. But, separately computing the additional time and resources required to address this issue due to this IOC fixation is infeasible.

The F-35 is about 17% into its estimated total program acquisition costs, so a 57% PAUC increase is mostly a statement about expected costs in the future. Specific areas of uncertainty in the immediate future include the ability of the contractor to develop and integrate the mission systems on a schedule that supports testing and production, to overcome inevitable problems revealed during testing while

**maintaining the design stability required for production ramp up, and to minimize the production cost of the aircraft with acceptable impacts on other attributes.**