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ONE HUNDRED ELEVENTH CONGRESS

# Congress of the United States

## House of Representatives

COMMITTEE ON OVERSIGHT AND GOVERNMENT REFORM

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June 19, 2009

### MEMORANDUM

**TO:** Members of the Committee on Oversight and Government Reform

**FROM:** Majority Staff, Committee on Oversight and Government Reform

**SUBJECT:** Full Committee Hearing entitled, "The Future of the V-22 Osprey: Costs, Capabilities, and Challenges."

On Tuesday, June 23, 2009, at 2:00 p.m., in room 2154 Rayburn House Office Building the Committee on Oversight and Government Reform will hold a hearing entitled, "The Future of the V-22 Osprey: Costs, Capabilities, and Challenges."

#### Overview

At the request of the Committee,<sup>1</sup> the Government Accountability Office (GAO) recently conducted a study of the V-22 Osprey that identifies several serious issues concerning the operational effectiveness, suitability, and cost of the aircraft.<sup>2</sup> GAO's report, "Assessments Needed to Address V-22 Aircraft Operational and Cost Concerns to Define Future Investments," finds that the V-22 still suffers from maintenance and reliability problems that affect its readiness and availability. The report discusses several operational deficiencies of the V-22 and cautions that the aircraft may be vulnerable in mid-threat environments and under harsh weather conditions. While the operational requirements of the V-22 have diminished over the years, the cost of the aircraft has increased significantly.

The Congressional Research Service (CRS) estimates that since 1983, more than \$27 billion had been appropriated for the V-22 program through Fiscal Year (FY) 2008.<sup>3</sup> Cost overruns for the

<sup>1</sup> GAO's review was conducted pursuant to requests in 2008 from then-Chairman Henry Waxman of the Committee on Oversight and Government Reform and then-Chairman John Dingell of the Committee on Energy and Commerce.

<sup>2</sup> GAO, "Assessments Needed to Address V-22 Aircraft Operational and Cost Concerns to Define Future Investments," GAO-09-482 (May 21, 2009) (2009 GAO Report).

<sup>3</sup> CRS, "V-22 Osprey Tilt-Rotor Aircraft," RL31384 (January 2, 2009), p.1 (referred to hereinafter as the "2009 CRS Report").

V-22 program have reached \$16.8 billion, making the program 186 percent over budget (based on unit acquisition costs).<sup>4</sup> The cost per aircraft has almost tripled since the V-22's inception, to approximately \$100 million each.<sup>5</sup> The V-22 is as much as five times more expensive than the CH-46E Sea Knight helicopter the V-22 was designed to replace.<sup>6</sup>

This hearing was first convened on May 21, 2009. However, Chairman Towns—with the support of Ranking Member Issa—immediately decided to postpone the hearing because the Department of Defense had not produced records in response to the Committee's May 5, 2009, document request.<sup>7</sup> Seven days later, on May 28, 2009, the Committee received a partial document production of four small binders, and on June 2, 2009, staff met with Marine Corps officers who provided additional documents that filled some of the information gaps remaining from the initial production regarding inventory. During the June 2 meeting, staff again requested internal memoranda concerning the operational status of the MV-22 fleet and received a second production, a single binder, on June 5, 2009. We do not believe that the total of five binders produced to the Committee represents the full universe of responsive records.<sup>8</sup> Nevertheless, as discussed below, the data and documents we did receive paint a troubling picture of the V-22 Osprey.

## Background

The V-22 Osprey is a tilt-rotor combat troop transport aircraft that combines the functions of a helicopter and a turboprop aircraft. This hybrid aircraft is designed to have the vertical maneuverability and flexibility of a helicopter and the speed and long range of a fixed-wing aircraft. The V-22 was developed through a joint venture between Bell Helicopter, a subsidiary of Textron, and The Boeing Company, and is powered by two engines manufactured by Rolls-Royce. There are two major variants of the V-22—the MV-22 used by the Marine Corps and the CV-22 used by the Air Force. The aircraft has a long development history that spans a quarter century. Over the years, there have been concerns regarding the aircraft's design, airworthiness, maintenance, parts reliability, combat readiness, and safety. From 1991 to 2000, the V-22 crashed four times, causing 30 fatalities. Its history has also been marred by aircraft fires, lawsuits by crash victims, subcontractor convictions for fraud, and convictions of three Marines for falsifying V-22 maintenance records.

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<sup>4</sup> Based on unit acquisition costs, in 2009 dollars. See Statement of Paul Francis, Managing Director, Acquisition and Sourcing Management, GAO, "Defense Acquisitions: Charting a Course for Lasting Reform," GAO-09-663T (April 20, 2009)(testifying before the House Armed Services Committee on acquisition reform).

<sup>5</sup> 2009 GAO Report, p.4.

<sup>6</sup> Anthony H. Cordesman and Hans Ulrich Kaeser, "America's Self-Destroying Airpower: Becoming Your Own Peer Threat," Center for Strategic and International Studies (CSIS), p.26 (updated February 9, 2009).

<sup>7</sup> The inventory information contained in the Committee's records request was vital to understanding how reliability and maintenance problems with the Osprey have affected the readiness of the fleet, and the effects such problems will have on procurement costs and mission capability, reliability, and safety going forward.

<sup>8</sup> It's worth noting that on May 27, 2009, the day before the partial records were produced, a V-22 Osprey flying in North Carolina experienced engine problems, and the Marine pilot had to land the aircraft in a wooded area. The engine exhaust reportedly caused a fire which may have damaged the aircraft, and an investigation is said to be underway.

## **The GAO Study**

GAO conducted a forward-looking examination of the V-22 that focused on whether the V-22 can perform as promised and explains the associated costs. Specifically, GAO was tasked with examining: (1) the performance of the V-22s in Iraq; (2) the aircraft's strengths and deficiencies in terms of its expected capabilities; and (3) its past, current, and future costs. GAO interviewed a wide range of military officials, service members (including pilots), and contractors, and observed the operation of V-22s aboard ship and in Iraq. Because the Marines have the largest and most active inventory of V-22s, the report largely addresses issues relating to the MV-22 variant. GAO conducted the performance audit from June 2008 to May 2009.

On September 17, 2007, a Marine squadron known as the "Thunder Chickens" deployed to Iraq with ten MV-22s aboard the USS Wasp. GAO investigators traveled to Iraq to observe the MV-22 in action. Observed strengths include enhanced speed and range allowing the Marines to carry troops and cargo faster, higher, and farther. Marines were able to use MV-22s to carry external cargo and for scouting missions to identify suspicious targets. The MV-22 could fly higher than helicopters to avoid the threat of small arms fire, and could essentially "cut the battlefield in half." The MV-22, however, was largely used in Iraq for general support missions and to transport troops and cargo from place to place in what GAO considered a "low-threat theater of operations."

According to GAO, the V-22 experienced operational problems that call into question whether the aircraft is best suited to accomplish the full range of missions of the CH-46E helicopter the V-22 was intended to replace or the range of missions provided by other modern helicopters.

In addition, GAO found that the V-22 has problems with parts, maintenance, reliability, and availability. Most importantly, GAO found that the V-22 may not be operationally effective in higher-threat environments, like Afghanistan, and questions the ability of the aircraft to operate in extreme environments.

## **Operational Issues**

GAO found various problems with the operational capabilities of the V-22. MV-22 crews in Iraq said the lack of cabin visibility is a serious weakness of the aircraft. The V-22 has poor cabin visibility because the troop cabin only has two small windows which limit the situational awareness of the troops inside. In addition, limits on the maneuverability of the aircraft may affect the ability of the air crew to execute evasive action under fire. As a result, the Marine Corps intends to employ the aircraft so as to limit its exposure to hostile fire, such as avoiding "hot" landing zones. This is contrary to the original intent—that the aircraft would be able to operate in such environments.

Moreover, test pilots have found limitations that restrict the aircraft's flight parameters and could limit its ability to respond to threats. The Marine Corps has imposed flight limits on the aircraft while it is in helicopter mode to avoid loss of controlled flight.

The aircraft lacks an integrated defensive weapon system to suppress threats in dangerous situations. The V-22 was originally designed to have a gun mounted on its chin; however, current V-22 variants have a weapon mounted on the aircraft's rear ramp which is not integrated and only protects the rear quadrant of the MV-22. GAO reports that the proposed interim belly-mounted

system being tested jams, adds extra weight, and reduces troop seats by two. Last month, the Marines were reportedly still considering—after more than 20 years of development—whether the V-22 should use a “plug-and-play” system in lieu of a permanent belly gun.<sup>9</sup>

The V-22 was intended to be used aboard ships, but there are severe limitations to such use. Due to the aircraft’s large size, fewer MV-22s can operate on Navy flight decks compared to other helicopters. In addition, the V-22 requires a very large inventory of spare parts that takes up too much space on the ship—so large an inventory that spare parts need to be pre-positioned onshore or on other ships.

GAO found that the extreme force of the “downwash” from the V-22’s rotors affects operations below the aircraft, both aboard ship and on land. In one case, a pilot had to control an adjacent aircraft from being blown off the ship on which the V-22 was landing. Downwash from the V-22 reportedly contributes to another problem called “brownout”—where the V-22’s rotors blow sand and dust in a way that severely limits visibility around the aircraft.

GAO also found that the V-22 has problems with both icing and overheating. While the V-22 is supposed to fly at higher altitudes than regular helicopters, V-22s don’t typically fly much higher because of problems with icing. The V-22’s de-icing system simply does not work. The V-22 also has problems in very hot weather—the engines overheat within an hour when the aircraft is stationary, even with the engines running in depowered mode. In fact, pilots must take off and fly every hour to cool off the V-22’s engines. Moreover, the V-22 does not have a weather radar system so it cannot detect adverse weather conditions that could pose a danger to the aircraft.

### **Suitability Issues**

While DoD does not concur with the GAO’s assessment of the V-22’s operational effectiveness, it concurs that the V-22 has problems regarding reliability and maintenance which affect the V-22’s operational suitability. GAO defines “operational suitability” as the degree to which a system can be placed and sustained in field use.”<sup>10</sup>

GAO found that the V-22 has problems with unreliable parts and supply chain weaknesses that have reduced the availability of the aircraft for field use, below minimum requirements. Even though the MV-22 deployed to Iraq with a large inventory of spare parts that was three times the number of aircraft deployed, the spare parts inventories were depleted, and the Marines had to cannibalize parts from other aircraft for the MV-22s to be available for use. In Iraq, the three MV-22 squadrons averaged mission capability rates of 68, 57, and 61 percent—well below the minimum requirement of 82 percent. The MV-22’s engines fell short of their estimated service life of 600 flight hours—lasting only 400 hours before needing to be replaced. The Marines have actually been openly critical about reliability and maintenance problems. A witness for the Committee’s hearing, Lt. Gen. George Trautman, acknowledged earlier this month that the V-22 was “not meeting [his] full expectations yet,” and the period between part failures has been shorter than expected.<sup>11</sup>

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<sup>9</sup> “Mulhern: Navy Favors Plug-and-Play Over Permanent V-22 Belly Gun,” Inside Defense (April 20, 2009).

<sup>10</sup> 2009 GAO Report, p.6.

<sup>11</sup> “Marines Critical of V-22 Maintenance, Reliability,” SmartBrief (May 5, 2009).

### Rising Costs

DOD originally contemplated purchasing 1,000 V-22s within 10 years at \$40 million each. The Army abandoned the project in 1983 due to rising costs.<sup>12</sup> In 1989 and 1992, then-Secretary of Defense Dick Cheney tried to eliminate the V-22 program because of serious technical problems and high costs.<sup>13</sup>

Since then, the V-22's costs have risen significantly. The Marine Corps V-22 costs \$11,000 per flight hour to operate, which is 140 percent higher than the helicopter the V-22 is intended to replace.<sup>14</sup> Research, development, testing, and evaluation costs have increased 200 percent to \$12.7 billion. Procurement costs have increased 24 percent to \$42.6 billion (1986 through 2007). While this 24 percent increase in procurement costs over 20 years may seem modest, this masks the fact that DOD has reduced the number of aircraft it intends to buy from 1,000 to fewer than 500. In fact, overall costs per aircraft have nearly tripled, from \$42.3 million to \$121.2 million.<sup>15</sup> The table below summarizes these rising costs.

Table 3: V-22 Cost, Quantity and Schedule Changes from Development Start to 2007  
(Costs in millions of constant fiscal year 2009 dollars)

	1986	2007	% Change
R&D	\$4,211.8	\$12,682.0	201%
Procurement	\$34,362.9	\$42,585.2	24%
Procurement unit cost	\$37.7	\$93.4	148%
Average program unit cost (RDT&E plus procurement)/Quantity	\$42.3	\$121.2	186%
Procurement quantities	913	456	-50.1%
Production years	1990-1999	1997-2018	
Initial operational capability	1992	June 2007	

Source: GAO analysis of U.S. Navy V-22 Selected Acquisition Reports.

The operational and support (O&S) cost of the V-22 program is \$75.41 billion for the lifecycle of the program. However, GAO expects these costs to rise—especially given the V-22's problems with unreliable and expensive parts and maintenance. In addition, recent changes to the V-22 engine maintenance contract with engine manufacturer Rolls-Royce are expected to cause the O&S costs to rise even more.

<sup>12</sup> CSIS Report, p.28.

<sup>13</sup> Id.

<sup>14</sup> 2009 GAO Report, p.24.

<sup>15</sup> Id.

**Notes on Nomenclature:**

For purposes of clarity, it should be noted that the Defense Department refers to the Osprey by categories of engineering development: Pre-Block A, Block A, Block B, and Block C, in what the ordinary person might think of as “models.” Following are the definitions of each category:

Pre-Block A: The earliest models of the Osprey delivered to DOD were in various developmental stages. These are often referred to as “Pre-Block A” aircraft.<sup>16</sup> None of the Pre-Block A Ospreys are flyable without modification. These are outmoded, damaged, destroyed, or used as “maintenance trainers.”

Block A: These Ospreys were further along in design evolution, but are considered not combat deployable, for design and engineering reasons. They are said to be flyable, but considered usable for training only.

Block B: This is the current production Osprey. It is the only model the Marine Corps has that is considered combat deployable.

Block C: This is the most advanced Osprey, but it is still in development. None have yet been procured.

**How many V-22 Ospreys Does the Marine Corps Have and What is Their Status?**

The Committee staff encountered major difficulties in attempting to determine the answer to what might ordinarily seem like an obvious question: How many Ospreys does the Marine Corps have and what is their flight status? The Defense Department seemed to have serious difficulty in assembling this information. However, the staff was finally able to confirm that the Marine Corps has bought 105 Ospreys since 1988. Following is the current flight status of those aircraft:

Not usable for troops: (includes experimental and damaged, destroyed, or otherwise unflyable)	29
Not combat deployable; usable for training only:	27
Combat deployable:	47
Paid for, but undelivered:	2
<b>Total:</b>	<b>105</b>

The Marine Corps plans to procure an additional 255 Ospreys.

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<sup>16</sup> DOD inexplicably distinguishes between Pre-Block A aircraft and pre-Pre-Block A aircraft, but the distinction is pointless.

### **How Many Ospreys Are “Mission Capable”?**

To assess reliability, the Committee staff attempted to determine how many Ospreys were in a condition to fulfill all assigned missions, *i.e.*, the mission capability rate. The Marine Corps’ minimum requirement for the V-22 is a mission capability rate of 82 percent. The Marine Corps reported an average mission capability rate *per squadron* of 62 percent for the three squadrons that were in Iraq (a total of twelve Block B Ospreys). The average mission capability rate *per aircraft* for Block B Ospreys in garrison in the U.S is lower—54.6 percent, and for Block A, the mission capability rate *per aircraft* is drastically lower—38.8 percent.

### **How Many Osprey’s Are Ready for Combat?**

The Committee staff attempted to determine how many Ospreys are ready for combat on any given day. Thus, the Marine Corps was requested to produce a “snapshot” of the current inventory on a random date. As noted above, only 42 of 105 Ospreys can potentially be used in combat, and on the day selected by the Marine Corps for the operational “snapshot” of this fleet, only 22 of these 47 were fully mission capable. The 25 remaining Block B aircraft were in a condition such that they could perform none or only one of their assigned missions.

### **Other Issues**

Marine Corps documents raise additional questions about the operational capabilities of the aircraft. For example, an internal report by the “Marine Corps Center for Lessons Learned” provides an analysis of the MV-22’s performance in Iraq identifying a number of serious problems relating to the unreliability of the MV-22; and expresses concern that the MV-22’s full capabilities have not been explored due to “cautious tasking” and lack of opportunity to participate in assault support missions at the tactical level.

Other internal documents identify further serious deficiencies in the aircraft, discuss various operational challenges faced by the Osprey, question whether the V-22 underwent adequate and complete operational testing, and even raise serious questions about the safety and survivability of the aircraft.

### **Witnesses**

There will be one panel consisting of the following witnesses:

1. **Mr. Mike Sullivan**, the Director of Acquisition and Sourcing Management at GAO, will testify about the findings of GAO’s report “Assessments Needed to Address V-22 Aircraft Operational and Cost Concerns to Define Future Investments.”
2. **Mr. Dakota L. Wood**, Senior Fellow, Center for Strategic and Budgetary Assessments (CSBA), an independent, nonpartisan policy research institute that assesses security strategy and investment options, will testify about CSBA’s report, “Strategy for the Long Haul: The U.S. Marine Corps Fleet Marine Forces for the 21<sup>st</sup> Century.”

3. **Lt. General George Trautman**, Deputy Commandant for Aviation for the U.S. Marine Corps, will testify about operational issues regarding the V-22 and the current and future use of the V-22.
4. **Col Karsten Heckl**, Commander of the Marine Medium Tiltrotor Squadron 162 (VMM-162), which just returned from Iraq. He will discuss his experience with the V-22 in combat.
5. **Dr. A.R. Rivolo**, a retired Air Force pilot who flew combat operations during the Vietnam War and aviation expert who worked on operational testing and evaluation of the V-22 for the Institute for Defense Analysis which provides direct analysis and support to the Office of the Secretary of Defense's Director, Operational Test and Evaluation (DOT&E).

Should you have any questions, please contact Steve Rangel, Lisa Cody, or Neema Guliani of the Committee staff, at ext. 5-5051.