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UNTIL RELEASED BY THE
SENATE ARMED SERVICES
COMMITTEE**

**STATEMENT OF
GENERAL JAMES L. JONES
COMMANDANT OF THE MARINE CORPS
UNITED STATES MARINE CORPS
BEFORE THE SENATE ARMED SERVICES COMMITTEE
MAY 1, 2001
CONCERNING THE MV-22**

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INTRODUCTION

Chairman Warner, Senator Levin, and distinguished members of this Committee, thank you for the opportunity to appear before you today to discuss the future of the MV-22. The crashes of two Ospreys and loss of twenty-three Marines in the past year have painfully illustrated the stark reality that military service and aircraft development, even in our modern era of improved technology, are still inherently dangerous pursuits. Marines and their families are our most valued treasures and we are deeply saddened by these accidents and the unimaginable grief they have caused.

As a result of the most recent mishap on December 11, 2000, we have conducted comprehensive external and internal reviews of the program. The Marine Corps should pursue the MV-22 only if it proves to be technologically mature, operationally reliable, and affordable. Safety undergirds each of these areas and transcends the entire program. As I have stated on many occasions: in the Corps, we do not love machines, we love the people who use machines. That is why when machines fail and cause loss of life, it is so very painful for the entire Marine family.

It was over twenty years ago that the Marine Corps began to consider replacement options for its aging CH-46E Sea Knight and CH-53D Sea Stallion helicopters. Following a rigorous evaluation of future mission requirements, tiltrotor technology was selected as the best option to achieve future needs for its promise to revolutionize our expeditionary capabilities. Since the early 1980s, various government agencies and contractors have conducted seven major Cost and Operational Effectiveness Analyses.

Each analysis validated the merit of tiltrotor technology and concluded that the Osprey was potentially more cost and operationally effective than any existing alternative.

Over time, it became apparent that the enormous potential of tiltrotor technology would allow the Marine Corps to greatly expand the scope of its combat operations. The Osprey would allow the Marine Corps, for the first time, to move away from traditional amphibious operations to more advanced, sea-based, expeditionary operations. At twice the speed, three times the payload, and five times the range, this aircraft significantly improves our operational reach and tactical flexibility. Furthermore, the Osprey dramatically increases our strategic agility with its capacity to self-deploy over 2,100 nautical miles with but one aerial refueling. Finally, tiltrotor technology also has great potential for civilian application.

In requesting that the Secretary of Defense appoint an independent review panel to conduct a comprehensive examination of the program, following the 11 December mishap, we hoped to obtain the answers to three basic questions: Is tiltrotor technology sufficiently mature to meet near-term requirements? Is it robust enough to satisfy our rigorous operational standards, including the safety of our personnel? And, finally, what is the most efficient and economical way to bring the aircraft into our inventory? We are grateful to the Review Panel for its hard work, thoroughness, and diligence, and we are pleased that its answer to the three important questions is “yes,” with some important caveats. We can now objectively assess the program in its entirety and determine the best way ahead.

THE IMPERATIVE TO REPLACE LEGACY SYSTEMS

The Marine Corps' fleet of CH-46E and CH-53D helicopters began their service in the mid-1960s. At the end of their twenty-year initial projected service life, both began experiencing escalating maintenance costs; reduced reliability, availability, and maintainability; and significant performance degradation. These challenges are even more pronounced today, as the average age of our CH-46E and CH-53D helicopters is over thirty years. These helicopters are old, their production lines are closed, parts are scarce, and their maintenance requirements exceed the bounds of reasonableness. They are truly "legacy systems" with numerous current and projected deficiencies: inadequate payload, range, and speed; and, no self-deployment or aerial refueling capability. Clearly, a capable replacement aircraft is required and long overdue.

The tiltrotor, vertical/short takeoff and landing (V/STOL) Osprey is designed to replace our aging fleet of medium lift helicopters and remedy their deficiencies while expanding our mission envelope. The MV-22 incorporates myriad advanced technologies: composite materials; fly-by-wire flight controls; digital cockpit; and, a sophisticated airfoil design. The MV-22 can carry 24 combat-equipped Marines or an 11,700 pound single point external load. Its two 38-foot rotor systems and engine/transmission nacelles mounted on each wing tip allow it to operate like a helicopter for takeoff and landing. Once airborne, the nacelles rotate forward 90 degrees, converting the MV-22 into a high speed, high altitude, and fuel-efficient turbo-prop aircraft.

The multi-mission Osprey will join the Advanced Amphibious Assault Vehicle and the Landing Craft, Air Cushion as an integral part of the mobility “triad,” and will enable the Corps to conduct operations from over-the-horizon and the sea-base. Missions for the aircraft include amphibious assault, raid operations, medium cargo lift, tactical recovery of aircraft and personnel, fleet logistic support, and special warfare. Possessing the attributes needed to fight and win on tomorrow’s battlefields, the MV-22 will be the cornerstone of Marine Corps assault support for the first half of the 21st century. Most importantly, it will save lives in future conflicts as it allows for the movement of troops and supplies farther and faster than ever before and with far less vulnerability to opposing forces.

The Marine Corps is not the only service that will benefit from tiltrotor aircraft. The U.S. Special Operations Command has embraced the Osprey as the best solution to remedy its own current and projected aircraft deficiencies. Their current inventory includes a variety of fixed and rotary wing aircraft that lack the self-deployment and other high performance capabilities required for special operations. Consequently, they are developing their own version of the MV-22, the CV-22, which is specifically designed to conduct long-range, night and all weather special operations. The U.S Air Force and U.S. Special Operations Command plan to acquire fifty Ospreys. The U.S. Navy is interested in the Osprey as well, and intends to acquire forty-eight of the HV-22 model tailored for combat search and rescue missions, special warfare, and fleet logistical support. Finally, some of our allies, notably Great Britain, Australia, and Japan, have shown interest in the Osprey. I have provided the Committee copies of letters I have

received from dignitaries of foreign countries expressing their interest in utilizing tiltrotor technology in the future.

The potential of tiltrotor technology transcends the military community. Commercial aviation has recognized that the civilian use of tiltrotor aircraft has enormous potential. Tiltrotor technology could redefine regional air travel and commuting, particularly in congested areas of the country like the northeastern seaboard. A larger quad-tiltrotor aircraft that carries up to 100 passengers could help reduce air traffic delays, congestion, and noise pollution near airports while increasing the capacity of existing airports without adding more runways. Clearly, civil tiltrotor applications could potentially bring a new dimension to commercial aviation while greatly benefiting our industrial base.

THE DEVELOPMENT OF THE MV-22

Tiltrotor technology is not new. The MV-22 traces its origins back to 1954, with Bell Helicopter's tiltrotor prototype, the XV-3. In 1956, Boeing developed a tilt-wing aircraft, the VZ-2. During the 1960s, Bell and Boeing continued their development of tiltrotor technology. In 1973, Bell was awarded a NASA-U.S. Army contract to develop two tiltrotors. The result of this contract was the XV-15, first flown in 1977, with full conversion¹ occurring two years later. In fact, one of the XV-15s is still in service.

The success of the XV-15 led to the Joint Services Advanced Vertical Lift Aircraft Program (JVX) in December of 1981. The goal of the program was to meet the needs of all four services for a vertical takeoff and landing (VTOL), medium lift, tactical

¹ Full conversion refers to the ability to transition between airplane and helicopter modes during flight.

transport aircraft. Soon thereafter, the Joint Services Technical Assessment confirmed that tiltrotor technology was the optimal choice to achieve service needs.

In April 1982, the Bell-Boeing team was formed in order to combine the companies' resources and draw upon their collective strengths. One year later, the Bell-Boeing team was selected by the U.S. Navy to be the prime contractor for the JVX. The JVX later became the V-22, which was first flown in 1989. Since then, pre-production versions of the MV-22 have flown 3,324 hours. In the past two years alone, production model MV-22s have flown 1,869 hours.

It is a well known fact that military aviation is an oftentimes hazardous undertaking. In 1954, the Department of Defense had its highest number of aviation accidents: 775. In the 1990s, thanks in part to technological advances, the Department averaged about twenty aircraft accidents per year. However, the development of new aircraft retains inherent risk and, despite our best efforts, the MV-22 is not exempt from such risk. In the last ten years, there have been four Class A mishaps² involving the MV-22.

The first mishap occurred on June 11, 1991, when the Bell-Boeing Full Scale Development ship #5 crashed as a result of two out of three roll gyros³ being wired incorrectly. Essentially, the aircraft lost control due to reversed roll channel wiring. The second mishap occurred on July 20, 1992, as a result of an engine fire that spread through one of the nacelles and subjected the pylon-mounted drive shaft⁴ to high temperature exposure, causing it to fail. Consequently, the remaining good engine was unable to

² A Class A mishap is categorized by a loss of life or property damage in excess of one million dollars.

³ A gyroscopic instrument that helps the pilot to control the left and right roll of the aircraft.

⁴ This drive shaft allows either of the aircraft's two engines to drive both proprotors in the event that either engine fails.

drive both proprotors and the resulting crash claimed seven lives. Tragically, there were nineteen fatalities in the third mishap that occurred on April 8, 2000. The cause of this accident has been primarily attributed to flying outside the flight envelope established for the MV-22 (250% above the Naval Air Training Operating Procedures Standardization limit). The most recent mishap occurred December 11, 2000, near New River, North Carolina. A flight control hydraulic system failure was compounded by a flight control software anomaly, resulting in a crash and four fatalities. While acknowledging the tragic consequences of these mishaps, it is also important to recognize that they were not the result of any failure of tiltrotor technology.

Following the first three mishaps, problems in design and engineering were identified and remedied. After the December mishap, the decision to proceed to full-rate production of the aircraft was postponed and three separate investigations, in addition to the customary Aircraft Mishap Board Investigation, were conducted to ascertain the cause of the crash and to determine the future of the MV-22.

First, at my request, then-Secretary of Defense Cohen appointed a Review Panel to conduct a comprehensive examination of the program emphasizing training, engineering and design, production and quality control, suitability to satisfy operational requirements, performance and safety of flight. I declared at that time that I would recommend that the Corps not pursue the MV-22 program, if it became apparent that this was not the right thing to do.

Second, a Judge Advocate General's Manual (JAGMAN) investigation was convened to ascertain the facts surrounding the latest mishap. The results of the JAGMAN investigation were announced on April 5, 2001. The investigation revealed

that a main hydraulic line ruptured due to chafing caused by an electrical wire bundle. As a result, there was an uneven distribution of hydraulic power to the left and right swashplate actuators.⁵ As noted earlier, this problem was compounded by a software anomaly, causing the aircraft to depart controlled flight and crash.

The final inquiry was requested in January of this year, after a member of the Osprey training squadron, Marine Medium Tiltrotor Training Squadron-204 (VMMT-204), alleged in an anonymous letter, that the squadron's commander had encouraged his Marines to falsify maintenance records. Upon receipt of that letter and the audiotape that accompanied it, I directed the Marine Corps Inspector General to conduct a comprehensive initial inquiry. Subsequent to that action, based on my belief that the gravity of the accusations might invite undue perceptions of command influence, and that a full and impartial accounting was essential, I asked that the Department of Defense Inspector General assume responsibility for the investigation. That investigation is ongoing.

THE FINDINGS OF THE REVIEW PANEL

The Marine Corps is grateful for the Review Panel's thoroughness and objectivity and concurs with its conclusions and recommendations. First and foremost, the Review Panel concluded that tiltrotor technology is sound and mature. This finding mirrors our own and is consistent with the fact that tiltrotor technology was not found to be a factor in any of the four mishaps described earlier. The Review Panel also concluded that the aircraft's reliability and maintainability must be improved through additional engineering, testing, and evaluation. We have also come to this conclusion.

⁵ A swashplate actuator is a hydro-mechanical device that helps the pilot control the aircraft.

The Review Panel recommends development of a restructured program that uses a phased approach to achieve a return to flight and tactical introduction. Specific recommendations cover: minimal sustainable production rate in the near-term; adequate and stable funding; requirements validation; safety (hardware, software, and operations); reliability and maintainability; quality, training, and technical publications; and, communications across the program (among operators, contractors, engineers, etc.). Described later is our plan to implement these recommendations. Finally, the Review Panel concluded that the MV-22 is cost-effective and provides the Marine Corps capabilities that cannot be provided by any single helicopter or conventional aircraft. We agree.

Although I am pleased with the findings of the Review Panel and remain fully confident in the viability of the aircraft, I am deeply concerned by the as yet unresolved allegations of malfeasance and suggestions of program instability. The Marine Corps will seize upon this opportunity to ensure that we do not compromise our integrity, lower our standards, or jeopardize the safety of our Marines for any program. The resolution of the question of malfeasance, despite its grave importance, cannot occur until the Department of Defense Inspector General's investigation is completed. We look forward to a full examination of the investigation's results, which will aid our efforts to appropriately address these issues. We are also determined to embrace this opportunity to thoroughly evaluate the role we play in program management.

THE WAY AHEAD

A detailed plan is in place that will expeditiously implement the Review Panel's recommendations. The Deputy of the Program Executive Office for Tactical Aviation at the Naval Air Systems Command is leading a V-22 Acquisition Working Group to develop a restructured MV-22 and CV-22 program that complies with the Review Panel guidance, acquisition policies, and service needs. The goal of the V-22 Acquisition Working Group is to deliver to the military services a safe, reliable, and operationally effective V-22.

The options being developed will consider both the time and the funding required to efficiently achieve operational capability. This entails completion of both planned and additional developmental testing, correction of deficiencies and suitability issues, and verification through follow-on operational testing and evaluation. Restructuring of the program will be necessary to accommodate these actions. Participants in this process include members from the Program Management Activity; the Program Executive Officer for Air, Antisubmarine Warfare, Assault and Special Mission Programs of Naval Aviation; Assistant Secretary of the Navy (Research, Development, and Acquisition); U.S. Special Operations Command; the U.S. Air Force; Headquarters Marine Corps; the Commander, Naval Air Systems Command; and, representatives from Bell and Boeing. The group will produce program restructuring options for consideration by acquisition officials and will make recommendations on how to fund the revised program.

It will take time to incorporate critical design improvements and we will proceed methodically. The current road map to full operations is a five-phased approach with specified entrance and exit criteria for each phase.

- Phase 0: Commence technical assessment and complete thorough flight readiness review.
- Phase 1: Resume testing with Engineering and Manufacturing Development aircraft (both the MV and CV models) and augment with Low Rate Initial Production aircraft as necessary.
- Phase 2: Resume Marine Medium Tiltrotor Training Squadron-204 (VMMT-204) training operations and production acceptance flights.
- Phase 3: Stand up a MV-22 operational squadron at New River, North Carolina and a CV-22 training squadron at Kirtland Air Force Base in New Mexico.
- Phase 4: Operational deployment/employment of the MV-22 and CV-22.

The immediate steps include: confirmation of industry willingness to support the restructured program; ensuring acquisition road map compatibility with technical assessment (development of entrance and exit criteria); finalizing a deficiency Matrix (including reliability and maintainability issues); developing timelines for correction; providing cost estimates for correction; developing cost, schedule, and production adjustments; and, finally, obtaining consensus among developmental and operational testers. We must also ensure that our training is deliberate and thorough and that quality assurance is maintained.

A WISE INVESTMENT

The MV-22 has been described, by some, as an unsafe aircraft ? a flawed hybrid, neither a good fixed wing aircraft nor a good helicopter. However, the facts show that

the MV-22's safety record compares favorably with the safety records of most tactical aircraft in the Department of Defense at a similar time in their program life. The principal aircraft the MV-22 will replace, the CH-46 Sea Knight, had 44 mishaps during its first five years of service four decades ago. In the face of such enormous difficulties, we adjusted our training methods, flight procedures, and maintenance. We also improved our airframes and avionics. As a result, the CH-46 has been in service for thirty-eight years ? well beyond its expected service life.

The MV-22 has weathered nearly two decades of scrutiny. Seven major Cost and Operational Effectiveness Analysis studies have confirmed its viability and concluded that it is more cost-effective than any helicopter or any mix of conventional helicopter types. It is, in fact, the only practical alternative that meets the tri-service requirements of the Marine Corps, Air Force, and Navy. Other options offer no real advantages in cost savings/avoidance, given the requirement. In fact, other options are accurately described as a "step back." A comparison of the capabilities of the MV-22 with those of the aircraft it will replace is illustrative.

The CH-46E has a crew of three, a payload of 12 combat troops or 4000 pounds (external), a cruise speed of 100 knots, and a combat radius of 75 nautical miles. By comparison, the MV-22 has a crew of three, a payload of 24 combat troops or 11,700 pounds (single point external), a cruise speed of 250 knots, and a combat radius of over 240 nautical miles. Additionally, it is capable of aerial refueling, "high speed" externals

(10,000 pounds @ 227 knots), and, as figure (1) illustrates, it has an exceptionally large area of influence.

Figure 1

On attached disk

A thoughtful consideration of current and future threats, as well as the multitude of other demands for limited resources, leads me to the conclusion that the capabilities of the MV-22, which will enhance our national security, continue to justify the investment. We must understand that our armed forces help to protect and promote our national security through military forward presence operations that enable our Nation to project power and influence, and by maintaining the ability to conduct operations across the spectrum of conflict. Our men and women in uniform will always be the foundation for success in these endeavors. However, they will need superior equipment and weapons systems to prevail on the complex battlefields of the future. This reality requires the Nation to leverage technology to not just do things better, but to do things differently. Maintaining our technological edge over future adversaries is fundamental to our success ? the MV-22 significantly contributes to this requirement.

CONCLUSION

In the early 1960s, the Apollo program was given the task of landing a man on the moon and returning him safely, before the end of that decade. This required aeronautical innovations in multi-stage rocketry and a multitude of other technological advances. Tragically, three astronauts of Apollo-1 died when a flash fire occurred in the command module during a launch pad test. Despite that tragedy, and with the knowledge that

progress is often accompanied by risk, the Apollo program steadfastly continued and eventually achieved historic successes that made all Americans proud.

We are all acutely aware of the challenges associated with the MV-22. In the near future, we will embrace the recommendations of the Review Panel and make corrections where we must to improve both the aircraft and the management of the program. We will ensure that the MV-22 is reliable, operationally suitable, and affordable ? just as we did forty years ago with each of the aircraft the Osprey is intended to replace. With time, diligence, the close cooperation of our partners in industry, and with the support of the Congress, we can work through the present challenges confronting us and achieve the tremendous operational capabilities offered by this remarkable aircraft.

As has always been the case, our actions will be guided by an unyielding commitment to do what is right for our Marines, their families, and our Nation.