

**DEPARTMENT OF STATE POLICE
MARYLAND STATE POLICE AVIATION COMMAND
STRATEGIC PLAN FOR HELICOPTER REPLACEMENT
PROGRAM**



Pursuant to 2006 JCR Page 199-200
SB 110/Ch. 216, 2006
2005 JCR Page 338
HB 340/Ch. 445, Sec. 3, 2005

JUNE 1, 2006

**DEPARTMENT OF STATE POLICE
MARYLAND STATE POLICE AVIATION COMMAND
STRATEGIC PLAN FOR HELICOPTER REPLACEMENT
PROGRAM**

TABLE OF CONTENTS

EXECUTIVE SUMMARY.....	3
INTRODUCTION.....	5
BACKGROUND.....	8
MISSIONS	9
EXTERNAL ASSESSMENTS.....	15
DEPARTMENT OF STATE POLICE AVIATION COMMAND ASSESSMENT.....	17
MSPAC FINDINGS.....	22
MSPAC CONCLUSIONS.....	26
HELICOPTER REPLACEMENT PLAN.....	27
RECOMMENDATIONS.....	29
APPENDICES:	
APPENDIX “A” MSPAC HELICOPTER OPERATING BASES.....	30
APPENDIX “B” SCHEDULE OF AIRFRAME REPLACEMENT.....	31
APPENDIX “C” JUSTIFICATION OF 12 TH HELICOPTER.....	32
APPENDIX “D” FUNDING RECOMMENDATIONS.....	39
APPENDIX “E” MSPAC DAUPHIN FLEET.....	44
REFERENCES.....	45

EXECUTIVE SUMMARY

The Department of State Police, Maryland State Police Aviation Command (MSPAC) is rapidly moving toward an important operational decision relative to helicopter replacement. The Secretary of State Police has created a blueprint for success that propels this unique lifesaving replacement program firmly into the 21st century. Driven by the challenges of self examination and molded by a group of dedicated professionals, this plan is the foundation for MSPAC excellence.

Based on direction offered by the General Assembly in Fiscal Year 2007 budget language and following a thorough assessment of the needs of the MSPAC, the Secretary has directed the replacement plan adhere to the following objectives:

1. CONTINUITY OF AIRCRAFT OPERATIONS:
 - By combining a mixture of upgrades and replacements the MSPAC will be able to sustain the integrity of aircraft availability in operations.
2. FLEET TURNOVER:
 - Fleet turnover will be managed in a cost effective manner that maintains high quality aircraft and a high level of aircraft availability. New aircraft will be integrated within 9 1/2 calendar years beginning with initial procurement in FY09.
3. TRAINING OF PILOTS, CREWS AND MAINTENANCE STAFF:
 - The transition of personnel into new aircraft will be properly managed and standardized while maintaining the efficiency of legacy aircraft operations.
4. FLEET MAINTENANCE:
 - Will be conducted in a cost effective sequence that permits the MSPAC to maintain adequate inventory of parts and to provide for adequate backup and surge capacity throughout the replacement cycle.
5. SAFETY:
 - Oversight will be specifically targeted to key points in the acquisition process, while continuing to upgrade systems on legacy aircraft.

The need to replace MSPAC helicopters has not just appeared. Since 1995 a great deal of work has been completed by the Aviation Command, the State Emergency Medical Services Board (State EMS Board), the Maryland Institute for Emergency Medical Services System (MIEMSS), and others in an effort to maintain Maryland's program in the forefront. The time has come, however, to address this issue with a focused definitive approach that requires both a MSPAC operational vision as well as a sound and sustained financial commitment, in order to efficiently execute fleet replacement.

A fleet of 12 Eurocopter Dauphin helicopters purchased sporadically over a ten year period operates daily throughout Maryland with technology that is dated. Over the past five calendar years, the Aviation Command has averaged nearly 5,000 flight hours on this aging fleet each year. The primary goal of the Dauphin helicopter procurement was safety, with standardization being a key component. That goal has not changed. By

CY07, a well conceived move toward aircraft replacement should be in motion. This effort needs to be guided by the overall concern for the safety of the men and women who operate within this hazardous environment every day as they deserve the best equipment available.

The Aviation Command provides an intricate, high-tech link in a multi-tiered statewide EMS system. Its mission is to protect and improve the quality of life by providing the airborne delivery of emergency medical, law enforcement, and search and rescue (SAR) services to the citizens of Maryland 24 hours a day. Since the terror attacks of September 11, 2001, a fourth mission has been assumed by the Department of State Police - Homeland Security. This component was not considered during previous helicopter replacement purchases.

Federal Aviation Regulations (FARs) and aircraft advisory directives continue to improve the industry with the public's safety in mind. The MSPAC must proactively adhere to these evolving challenges in order to fulfill its vision of providing premier customer service. Keeping Maryland's program state-of-the-art will be expensive. Replacing the entire helicopter fleet with modern aircraft requires considerable fiscal investment and accountability.

Replacement of the existing Dauphin fleet with an entirely new airframe is the safest, wisest, and best course of action. Complete turnover of the present fleet and subsequent aircraft standardization will be accomplished in no greater than 9 ½ years. The MSPAC helicopter fleet replacement program will allow the Department to maintain the capabilities upon which Maryland's citizens have come to rely and will continue Maryland's leadership in helicopter services within the public domain.

In this report the MSPAC arrives at several conclusions, from which the Department of State Police is prepared to make the following recommendations:

- 1. MSP helicopter replacements should be projected to begin in Fiscal Year 2009 and should be completed in no more than 9 ½ calendar years.**
- 2. The Aviation Command will continue with the equipment replacements/upgrades identified for the medical interiors, sliding doors and rotor blade replacements.**
- 3. The Aviation Command should proceed with a replacement plan that includes a 12th helicopter.**
- 4. Consideration should be given to the utilization of a flight simulator compatible with the new airframe purchase.**

INTRODUCTION

Over the past thirty-six years of providing medevac services to the citizens of Maryland, numerous public and private entities have insisted on a safe and indeed state-of-the-art aircraft. Most recently, the Maryland General Assembly has reinforced its interest in the program, as indicated by the following language from Senate Bill 110 (Budget Bill for FY-07), from the 2006 General Assembly Session; which directs that:

“...the Department of State Police and the Maryland Institute of Emergency Medical Services Systems, in consultation with the Emergency Medical Systems Board and the Emergency Medical Systems Advisory Council, submit a plan to the budget committees by August 1, 2006, for the scheduled replacement of the Dauphin Med-Evac helicopters. The plan shall include a plan to finance the replacements and shall justify the ongoing need for a twelfth helicopter.”¹

The State EMS Board is an 11-member, Governor-appointed body that oversees Maryland’s statewide emergency medical services system and governs MIEMSS. MIEMSS is an independent state agency within the executive branch that is responsible for the coordination of all emergency medical services. The State EMS Board is assisted by a 29-member Statewide Emergency Medical Services Advisory Council (SEMSAC). The EMS Board is required by law to develop and adopt an Emergency Medical System Plan (EMS Plan) to ensure effective coordination and evaluation of emergency medical services delivered in this state.² The Plan is to include provisions designed to “maintain and enhance” the transportation systems for emergency medical services.³ The medevac mission performed by the MSPAC comprises an important component of this EMS Plan.

Dr. R Adams Cowley was an energetic heart surgeon and pioneer in cardiac surgery, trauma, and emergency medical services in Maryland. In the late 1950’s, Dr. Cowley was awarded a contract from the United States Army to study shock as it presents in humans. As a result of his study, Dr. Cowley noted patients who would successfully come through open-heart surgery; only to die days or weeks later of complications. Dr. Cowley described this phenomenon as “a momentary pause in the act of death.” He determined that irreversible organ damage occurred (and thus describes the “Golden Hour”):

“Think of it as a pause in the act of dying. It turns out that your last moments of life are busy... What we’ve discovered is that if you stay in shock for very long, you’re dead. Maybe you’ll die in 10 minutes or maybe you’ll die next week, but you’re dead. So if you’re in shock, we have to work fast. You’ve got, at most, 60 minutes. If I can get to you and stop your bleeding and restore your blood pressure, within an hour of your accident...then I can probably save you.”⁴

Having begun medical transports in 1970, the MSPAC is considered the oldest organized medevac program in the United States. Thereafter, the MSPAC became a

¹ State of Maryland General Assembly. Senate Bill 110. Annapolis: Maryland General Assembly, 2006.

² MD Code Ann. Education Article §13-509(a).

³ MD Code Ann. Education Article §13-509 (b)(1)(iii).

⁴ Rosenwald, Michael. *Yesterday They Would Have Died*. Popular Science, October 2003: 64.

globally-recognized leader in aviation. Nearly 37 years later, Maryland's citizens are well served by a statewide network of DSP helicopters capable of providing continuous "24-7-365" medevac, law-enforcement, search and rescue and homeland security services. This continuous statewide four-pronged mission capability, accompanied by centralized dispatch and fleet management, continues Maryland's history of being in the forefront of law enforcement and air medical transport in the United States.

Obtaining these accolades has come at a great cost. In 1968, DSP purchased its first Bell "Jet Ranger" helicopter. For more than 20 years, this aircraft formed the backbone of the Department's helicopter fleet. However, the Department learned that it was under-powered for its medevac mission and ill-equipped for single-pilot instrument flight rules (IFR) operation. In 1986, the fatal mishap involving a Jet Ranger in IFR conditions resulted in the acquisition of the first Eurocopter "Dauphin" helicopter in 1989. From 1989 to 1999, twelve of these aircraft were procured to outfit the DSP's helicopter fleet.

Every step in the development of the current aviation network has been paid for by public and personal sacrifices of the highest order. It would be an understatement to say that maintaining future recognition as an innovative and progressive, standard-setting aviation organization will require the dedicated efforts of all concerned. The path that is chosen will have far-reaching consequences. This is true not only for those who fly and maintain the aircraft but, more importantly, for the citizens of Maryland whose lives depend on these services.

The pilots and flight paramedics of the Aviation Command fly in the most hazardous and unforgiving sector of non-combat aviation. **This is a very important statement when the first rule for Aviation Command aircrews is to ensure the safety of all passengers, crews and persons the Command interacts with at all times.** On February 7, 2006, the Acting Chairman of the National Transportation Safety Board (NTSB), Mark V. Rosenker, released Safety Recommendation A-06-12 through - 15. This Safety Recommendation was addressed to Marion C. Blakey, Administrator of the Federal Aviation Administration (FAA). The focus of the recommendation was the frequency of helicopter EMS accidents in the United States between January 2002 and January 2005. During this period, there were 55 EMS accidents resulting in 54 fatalities and 18 serious injuries.⁵ The report noted that while the EMS accident rate for the period between 1992 and 2001 was 3.56 accidents per 100,000 flight hours, the more recent portion of this period, between 1997 and 2001, the EMS accident rate rose dramatically to 4.56 accidents per 100,000 flight hours.⁶

Aviation Command pilots have safely flown more than 82,000 flight hours since the first Dauphin launched in 1989. Over 116,000 patients have been treated and safely transported to Maryland trauma centers by Command flight paramedics. For over 36

⁵ National Transportation Safety Board. *Safety Recommendation; A-06-12 through - 15*. Washington: National Transportation Safety Board, 1: February 7, 2006.

⁶ National Transportation Safety Board. *Safety Recommendation; A-06-12 through - 15*. Washington: National Transportation Safety Board, 1: February 7, 2006.

years, Aviation maintenance technicians have dedicated thousands of hours to keep the helicopter fleet available and safe for flight. These brief facts give testimony to the experience, dedication, judgment and skill that the pilots, flight paramedics, and aviation maintenance technicians provide in daily service to Maryland's citizens.

“The Maryland State Police Aviation Division seeks to become the premier airborne public safety resource. This will be accomplished through the attainment and validated demonstration of extraordinary aviation-related public services. The Aviation Division will strive to be recognized globally as an innovative and progressive, standard-setting aviation organization.”

- Mission/Vision Statement (Maryland State Police Aviation Division, 2004)

BACKGROUND

Current Helicopter Fleet

The Aviation Command operates helicopters out of eight bases located throughout the State of Maryland. A map depicting the locations can be viewed in Appendix "A". The Sections are listed and numbered in the order they came to exist:

- Trooper 1, Baltimore Section – Martin State Airport, Baltimore County.
- Trooper 2, Washington Section – Andrews Air Force Base, Prince George's County.
- Trooper 3, Frederick Section – Frederick Municipal Airport, Frederick City.
- Trooper 4, Salisbury Section – Salisbury Wicomico County Regional Airport, Wicomico County.
- Trooper 5, Cumberland Section – Cumberland Regional Airport, near Cumberland Maryland.
- Trooper 6, Centreville Section – Adjacent to the Centreville Barrack, Queen Anne's County.
- Trooper 7, Southern Maryland Section – Captain Walter Francis Duke Regional Airport, St. Mary's County.
- Trooper 8, Norwood Section – Maryland National Capital Park Police Special Operations Division, Montgomery County.

Procurement of Dauphins over a ten-year period has resulted in a mixed fleet of nine N1, two N2, and one N3 versions of the aircraft (six of the N1 versions have since been modified to N3 capabilities and are herein referred to as N1M versions). Multiple funding sources have been used to purchase the existing fleet (See Appendix "D" – Funding History). The original group of six helicopters was paid for by a five-cent gasoline tax that comprises the EMS Systems Fund. This fund is still in existence and was used to procure helicopters seven (7) through nine (9) for \$3.9 M each. The remaining \$11.7 M consisted of lease/purchase payments which were borne out of the EMS Operations Fund (EMSOF) and General Funds (70/30 split) from 1992 through 1996. The two aircraft delivered in 1994 were purchased from the Transportation Trust Fund (\$6.5 M) and from money borrowed and paid back to the EMSOF (\$4 M). The 12th helicopter was purchased from General Funds (\$2 million) and \$4.1 M borrowed from the EMSOF. Half of that amount has been paid back and the remainder is due in 2007. The N1M models, upgraded to N-3 capabilities, were paid 70/30, EMSOF and General Funds. For detailed information on individual airframes, see Appendix "E."

Maintenance standardization issues posed by operating three different versions of the same aircraft are accompanied by similar problems in operations, safety and training. Additionally, replacement parts are frequently specific to each model (N1/N2/N3) and not interchangeable. These standardization issues have been exacerbated by partial procurement of various avionics systems such as global positioning systems (GPS), collision avoidance and ground proximity warning systems. Remembering the differences in normal operating procedures, aircraft operating limitations and emergency procedures can be difficult in an unforgiving operational environment.

MISSIONS

The MSPAC has a long standing history as a “benchmark” aviation organization. Its sustained success in the four key mission areas of Medevac, Search and Rescue, Law Enforcement, and most recently, Homeland Security Operations, continues to draw interest from the international medical and law enforcement communities. It serves as a national model from which numerous states have developed similar programs. At the very foundation of the MSPAC’s missions is its world renowned Medevac mission.

Medevac

A critical component of any statewide EMS system is an effective and coordinated aeromedical system to provide timely and rapid transport to definitive care. Aeromedical responses to patient care involve both patient transports from a scene to definitive medical care and from one hospital to another for patient access to a higher level of care. Aeromedical transport can be a decisive factor in improving the outcome of severely injured patients. The collective agreement between the Department of State Police and Dr. Cowley to provide a public service to the citizens was termed a “unique, economical, and life-saving component” of emergency medical care.⁷ This beginning of a cooperative agreement began with the formation of the University of Maryland Shock Trauma Center in 1969 and was cemented on March 19, 1970, when a victim of a motor vehicle accident was transported to the University of Maryland Hospital and survived. This was the first medevac conducted by the MSPAC in its history. In 2003, the Aviation Division transported its 100,000th patient. As of May 1, 2006, 116,091 patients have been taken to various hospitals by the men and women of this world renowned unit.

The aeromedical system is a critical component of the Maryland EMS system. The border-to-border, seamless, urban, suburban, and rural aeromedical transport coverage provided by the MSPAC is not known to exist in any other state where such a service is provided by a single entity or agency. Also, in many states, patients are not necessarily transported by helicopter directly from the incident scene to definitive care; many times they are transported to community hospitals and subsequently transferred later to trauma or specialty care centers. In Maryland, however, MSPAC medevac helicopters transport critical patients directly to designated trauma centers or specialty care referral centers.

Helicopter transport has been shown to be a cost-effective treatment modality for trauma and for other types of critical patients.^{8 9 10} Much of this cost-effectiveness is due to the speed with which helicopters can transport patients to definitive care. Unstable patients with critical injuries or illnesses require rapid transport to a hospital capable of providing definitive care by a transportation team that has the necessary skills and

⁷ Edlich, Richard F. and Wish, John R. Maryland State Police Aviation Division. A Model Emergency Medical System for Our Nation. *Journal of Long-Term Effects of Medical Implantation*, Vol 14, Number 5 (November 2004): 412.

⁸ Silbergleit R, Scott PA, Lowell MJ and Silbergleit R. Cost-Effectiveness of Helicopter Transport of Stroke Patients for Thrombolysis. *Academic Emergency Medicine*, 10 (9), pp. 966-972, 2003.

⁹ Bruhn JD, Williams KA, Aghababian R. True costs of air medical versus ground ambulance systems. *Air Med J*. 12, pp. 262- 268, 1993.

¹⁰ Gearhart PA, Wuerz R, Localio AR. Cost-effectiveness analysis of helicopter EMS for trauma patients. *Ann Emerg Med*. 30, pp. 500-506, 1997.

equipment. These patients need, and can benefit from, the quick access to definitive care that is the primary goal of helicopter transport.

The goal of the Maryland State Police Aviation Command is to protect and improve the quality of life through the airborne delivery of emergency medical services to the citizens of the State of Maryland and its neighbors 24 hours a day. The current system has placed a high value on “Golden Hour” delivery and every minute that can be shaved off of a response time, flight time, or scene time will increase the compliance rate. The strategic location of the eight operational sections, in conjunction with the location of the critical care receiving centers, enable the Maryland State Police Aviation Command to enjoy a compliance rate of nearly 95%. Factors beyond Aviation Command’s control contribute to the remaining 5%.

The MSPAC operates as part of Maryland’s EMS System. The System consists of many participants, primary among them are:

- ◆ Public Safety Personnel – Including law enforcement at the State, County and Local level.
- ◆ Pre-hospital licensed EMS Providers – Including 10,358 First Responders, 15-597 EMT-Basics, 312 Cardiac Rescue Technicians (CRT), 337 CRTs trained to the 1999 protocols, 2175 EMT-Paramedics, and 731 Emergency Medical Dispatchers.
- ◆ Designated Trauma Centers and Specialty Referral Centers.

The MSP Aviation Command also meets the needs of the EMS provider at the scene by augmenting the EMS scene response, particularly for rural companies and providers. EMS services often operate under staffing constraints which can affect their ability to provide continuous, uninterrupted service over their geographic coverage area. These services can be further compromised when transporting patients who are a significant distance from the appropriate hospital. In those cases, long ambulance transport times can render the ambulance unable to provide a timely response to subsequent calls. MSPAC helicopters serve as an adjunct to the system and provide the rapid transport needed over long distances, thus freeing the local ambulance to return to service in its coverage area.

For medevac responses, MSPAC helicopters are dispatched through SYSCOM and are thus connected with Maryland’s EMS communications system. This complex network provides statewide communications among ambulances, medevac helicopters, dispatch centers, hospital emergency departments, specialty referral centers, and trauma centers. An MSP Aviation Command Duty Officer, stationed in SYSCOM, dispatches helicopters for scene responses. Medical communications from the helicopter to trauma centers and other medical facilities are available and a flight following system in SYSCOM tracks the status and location of all MSP helicopters.

Immediate intervention upon arrival at a trauma center has, and will continue to not only improve the quality of life, but actually save the lives of patients who have literally seconds before presenting with irreversible shock. Continuing the traditions that

began in 1970 with 2007 technology will ensure the survival of future patients flown by the Maryland State Police Aviation Command.

Search and Rescue (SAR)

Search and Rescue missions can involve lost or disoriented children and adults, missing/overdue aircraft and watercraft. The Dauphin's mounted hoist system is an integral part of the rescue mission. The SAR mission took a major step forward with the acquisition of nine Life Saving Corporation Model 499 rescue baskets in 2005. The importance of these baskets was demonstrated by the United States Military in helicopter rescues following Hurricane Katrina in September 2005. A crew of Trooper 5, Cumberland Section, with the support of the Cumberland Fire Department's Statewide Highrise Emergency Aerial Tactical (HEAT) Team, utilized this basket during a recent high profile mission involving three construction workers stranded atop a burning, 1000-foot-high, smoke stack in February 2006. Other examples of successful basket rescues include; persons in perilous situations such as floods, waterways, cliffs, ravines, water towers, boats, or high-rise buildings. The MSPAC SAR program is frequently utilized by the United States Coast Guard as a primary response aircraft.

The Aviation Command will continue to be the lead agency that coordinates and manages the HEAT Team Program. The HEAT Team program provides a standardized utilization of resources to public service agencies that request assistance in the evacuation of victims or injured persons during difficult access rescues including but not limited to:

- High Rise Fire Fighting and Rescue
- Mountain/Cliff Rescues
- Wilderness Rescues (for rapid delivery of patient care)
- Industrial Rescues (crane, smoke stack, tower, etc.)
- Water Rescue

Only Aviation Command trained and certified HEAT Team members and Aviation Command Flight Paramedics are authorized to be deployed via hoist from MSP aircraft. As the capability of the hoist program has evolved, so have the capabilities of the Aviation Command Flight Paramedics.

The advent of Rapid Sequence Intubation (RSI) has again placed Command flight paramedics at the pinnacle of prehospital care in Maryland. Rapid Sequence Intubation is a technique in airway acquisition used by flight paramedics which is similar to that technique used by an anesthesiologist prior to placing a breathing tube in a patient before surgery. More than 300 successful RSI procedures have been performed since the inception of the program in the MSPAC.

Having aerial deployment of Aviation Command flight paramedics as an option ensures an increased capability in providing patient care/rescue. Any of the below incidents might require Command flight paramedic assistance and some may involve the need for an RSI/advanced airway management capability. All of the scenarios listed have presented as actual missions for the Aviation Command and will continue to present potential missions for the future:

- Plane crash in a remote area (can be used for patient triage, treatment, scene preservation)
- Elderly, disabled persons, children and others lost in remote areas where ground access is restricted or would take an excessive period of time, or where environmental conditions will not allow ground rescue. Crews can provide immediate medical attention and facilitate a rescue by rigging the rescue net/basket and placing the victim within.
- Equestrian incidents in remote areas, often resulting in significant injury or disability.
- Assist with patient packaging and/or set-up and utilization of the rescue basket/net configurations necessary to accomplish a rescue.
- Provide assistance to HEAT/ATR teams by enhancing patient medical treatment capabilities.
- Access an area inundated with heavy snows or flood waters (provide emergency or routine medical care in areas where landing zones are not available and victims need medical or law enforcement assistance).

Law Enforcement

The Aviation Command's law enforcement mission includes support of DSP field personnel, as well as allied law enforcement departments throughout the State and occasionally within bordering states. The MSPAC is currently the only airborne law enforcement unit in Maryland that operates 24-hours a day, seven days per week. The Aviation Command's law enforcement missions include criminal tracking, surveillance, civil disturbances, high speed pursuits, crime scene mapping, and supporting, deploying and transporting the Department's Special Tactical Assault Team Element (S.T.A.T.E.) for tactical operations. In addition, the Aviation Command can transport tactical officers in times of crisis, including the movements of officers, specialized equipment and police dogs. These services are available to all jurisdictions in Maryland.

Onboard equipment such as thermal imagers and search lights allow the flight crew to see in darkness in order to observe and monitor criminal activity, coordinate ground law enforcement activity, and support the law enforcement community in whatever role is required. The replacement of the Command's infrared cameras and search lights as well as augmentation of these vital tools is a key component of the replacement plan. Although the equipment now in service was state of the art for its time, the technology now utilized by the MSPAC is generations behind what is currently available.

In the environment faced today in this country by law enforcement, aircraft are especially valuable in enforcement efforts related to illegal drug activity, stolen cars, pursuits following robberies, other violent crimes and tactical operations. A police car's effectiveness is restricted by ground level observation limitations, traffic congestion, road conditions, and the due regard for the safety of other motorists. By comparison, a MSPAC crew can traverse and observe a vast area during a search unencumbered by traffic control devices and congestion. The crew can see tops of buildings, both sides of a fence or all four sides of a building at the same time. This level of observation is not

possible for conventional patrol personnel. In short, the helicopter is a “force multiplier,” for performing tasks while overhead, which would take scores of officers on the ground to complete. From an officer safety standpoint, these searches are done from 500 feet which affords the flight crew a degree of safety from armed suspects, not available to ground patrol personnel.

The relative speed of a helicopter in comparison to a patrol car is yet another benefit to law enforcement. If a suspect vehicle attempts to elude a patrol car, the patrol personnel generally pursue and attempt to stop the vehicle. These pursuits occur at high vehicle speeds which can result in injury to officers or innocent bystanders. With the assistance of MSPAC helicopters, ground pursuit vehicles can stay back and drive at relatively routine speeds allowing the Command’s crew to keep the vehicle in sight. Based on experience, it is virtually impossible for the suspect car to elude a helicopter. Additionally, suspects will sometimes stop fleeing when they realize a helicopter is following them. Given the relative risk of civil suits related to police pursuits, the cost of a properly equipped law enforcement helicopter may be considered small in relation to the potential for injury and monetary loss due to civil liability.

In support of the Department’s and allied law enforcement’s overall mission, the Command is available to conduct tactical and large incident management. During significant incidents, the MSPAC’s aircraft are available to relay reports to incident commanders regarding traffic congestion and crowd movement. These real-time assessments of conditions for on scene incident command consideration are invaluable. Additionally, aircraft and crews are trained to transport command level and incident management personnel to the scenes of major events to conduct assessments and evaluations. Finally, the State leaders may be assured that based on the MSPAC’s relationship with the federal authorities, a general grounding such as occurred following the September 11, 2001 terror attacks will not affect the Command following a future incident.

Homeland Security

The Aviation Command conducts homeland security surveillance operations on a proactive and as-needed basis, including homeland security patrol checks of identified potential terrorist targets. In support of the Department’s significant homeland security mission, the Command is tasked with transporting government officials during times of crisis. The nature of these transports requires that the mission be performed by a helicopter as the flexibility of a helicopter allows for quick response and the ability to land virtually anywhere. These transports include evacuation, and/or moving the official close to the scene of an incident to allow for observation, press briefings and planning. During the recent threat to the Fort McHenry and Baltimore Harbor Tunnels, the Command was on standby to quickly move tactical officers as directed by the Governor or Superintendent. Additionally, should the need arise, the Command’s aircraft and crews are available to assist the Office of the State Fire Marshal. The Command is well suited to move equipment and personnel from any component of Maryland’s Homeland Security Team. The strategic location of the Aviation Command’s eight sections assists with the readiness and response to these missions.

The importance of protecting AMTRAK and other North East rail connections is widely recognized as vital to the Homeland Security Mission of the DSP. The MSPAC is a critical component to that mission. The Command's helicopters are often the quickest way to evaluate a threat, especially one in a remote area. Couple this with the miles of pipeline, fuel storage facilities, fixed critical infrastructure such as bridges and tunnels, as well as power plants; including Calvert Cliffs and the importance of the MSPAC's mission becomes clear.

The Aviation Command is also an important participant in two homeland security program initiatives. The first is a federal program administered by the Centers for Disease Control and Prevention in conjunction with the U. S. Department of Homeland Security. This program initiative allocates and strategically stores quantities of antidote substances for nerve agent and organophosphate poisonings. The program details the procedures for the rapid deployment of these antidotes in the event of a Weapons of Mass Destruction attack, or other events which may result in a widespread contamination of the general public. Because of the regional distribution of the Aviation Command's sections and the speed of the helicopters, rapid and precise distribution of the necessary antidotes could occur anywhere in the State. Almost 100% of the population resides within an area that can be reached by an Aviation Command helicopter within 20 minutes, 80% (including Washington, D.C.) can be reached within 12-15 minutes.

The need for a mutual aid plan to provide for the safe movement of aeromedical assets into the National Capital Region during periods of heightened alert involving airspace restrictions came about after the terror attacks of September 11, 2001. In the immediate hours after the events, all aircraft were grounded for hours by the Federal Aviation Administration (FAA). A plan was developed and is designed to address mass casualty incidents in the first hour of a critical incident. The plan is an interagency cooperative effort between local, state and federal agencies in the Washington, D.C. area. The intent of this plan is to establish a coordinated aeromedical response to mass casualty incidents in or in close proximity to the "P-56" prohibited airspace, immediately surrounding the White House, Mall, U.S. Capitol and the Naval Observatory. The primary advantage of this plan is that it assures the ability of the Aviation Command to continue flying in Maryland during times of national crisis.

MSPAC aircraft are currently authorized to launch and conduct missions under the authority of the National Capital Region Command Center when flying within the restricted zones of the Capital Region. Additionally, Aviation Command aircraft provide support to both the President and Vice President during visits and summits in Maryland. As such, the Aviation Command continues to have a close working relationship with the United States Secret Service.

EXTERNAL ASSESSMENTS

1995 EMS Board Report

The issue of replacing the Dauphin fleet first surfaced in a 1995 report by the Maryland EMS Board. At the time, it was anticipated that the helicopter had a useful life of approximately ten years. This would have necessitated a replacement beginning in 1999. Funding to accomplish this replacement was a major consideration, prompting a call for discussions to begin as soon as possible.

In 1996, Senate Bill 160 tasked the EMS Board with the creation of a “Helicopter Replacement Committee” (HRC) to conduct a thorough study of the replacement issue and prepare a comprehensive replacement plan. The EMS Board formed the HRC and further subdivided it into two sub-committees. The “Needs-Assessment” subcommittee was tasked with the examination of airframe, maintenance and operational requirements as well as the useful life expectancy of the Dauphin. The “Finance” subcommittee was tasked with identifying potential funding sources and developing a procurement schedule. The work of these two subcommittees resulted in reports delivered to the EMS Board in 1997 as summarized below.

1997 EMS Board-State Emergency Medical Services Advisory Council-Helicopter Replacement Committee Report

The EMSB-SEMSAC-HRC had its first meeting on March 12, 1996. By 1997, the HRC produced its first major report, entitled “Maryland EMS Board, Statewide EMS Advisory Council, & Helicopter Replacement Committee, 1997.” The report identified four major conclusions:

- 1) The useful life expectancy of the MSP Dauphin helicopter was projected at 20 years or until significant degradations in maintainability/reliability occurred.
- 2) Data collection on the maintainability and reliability of MSPs Dauphin fleet was essential for any prediction of its decline and consequent replacement.
- 3) Procurement of a 12th helicopter was to be accomplished by 1999.
- 4) Capital budget, general fund and EMSOF revenue were to be evaluated for funding of the replacement aircraft.¹¹

Twenty years was determined to be the benchmark for the useful life of the Dauphin. The 12th Dauphin, Eurocopter’s first N3 in North America, was purchased for \$6.3 million in 1999.

2000 University of Maryland Study

The University of Maryland study reached the following conclusion:

“The implications for the Maryland State Police are clear. Because the Coast Guard helicopters are not showing any degradation of availability due to age and the

¹¹ Maryland EMS Board, Statewide EMS Advisory Council and Helicopter Replacement Committee. *Report on the Maryland State Police helicopter fleet*. Baltimore: Maryland Institute of Emergency Medical Services, May 6, 1997.

State Police helicopters fly fewer hours per year in a less rigorous environment, the State Police can anticipate minimal effects of aging over the next ten years.”¹²

The forecast period for the University of Maryland report was 2000-2010. Well into 2006, the opportunity to take action on recommendations of the report is within the next four years. Additionally, the study neglected any mention of the fact that the Coast Guard has a larger pool of resources for maintaining its aircraft. The Coast Guard’s Elizabeth City, North Carolina, aircraft maintenance/overhaul facility is superior to the MSPAC’s maintenance capabilities in both equipment and the number of personnel.

2001 Conklin & de Decker Report

Conklin & de Decker recommended replacement of the three oldest aircraft (N1 version) as soon as possible and subsequent replacement of the next oldest aircraft (the six N1 models modified to N3 capabilities). Commencement of the replacement process was recommended for 2007. Replacement of the fleet was suggested over a thirteen year period with completion in 2020.

The Conklin & de Decker study used MSP and industry standard data to arrive at its conclusions. This acquisition plan was based solely on aircraft flight hours on the existing fleet and the resulting resale value of the aircraft. It did not take into account any of the operational, training and safety considerations inherent with operating a mixed helicopter fleet for an extended period.

2001 EMS Board-SEMSAC-HRC Report

The Conklin & de Decker acquisition plan had the impact of forming the core of the HRC’s recommendations in its next significant report on June 1, 2001. This report extended the projected life of MSP’s Dauphin helicopters to 25 years. The HRC recommended replacement of the Dauphin fleet over a 17-year period beginning with N1 aircraft in 2007 and ending with the original N3 aircraft in 2024. The 2001 report went on to recommend use of the request for proposals (RFP) from the original purchase of the Dauphins to form the core of the RFP for the replacement aircraft. Additionally, it recommended that the EMS Board appoint a helicopter procurement committee in 2004.

2002 EMS Board-SEMSAC-HRC Report

The conclusions of the 2001 HRC report were echoed in the 2002 report. The 2002 report is the most recent external report on the MSPAC’s present situation.

¹² University of Maryland & Smith, P.J. *Analysis of downtime in Coast Guard HH-65A Dauphin helicopter fleet*. College Park: University of Maryland, December 18, 2000.

MSP AVIATION COMMAND ASSESSMENT

In an effort to begin preparation for the replacement of the MSPAC fleet, a helicopter replacement committee was formed in 2004 from within the ranks of the pilots, flight paramedics and aviation maintenance technicians of the Aviation Command. During the first meeting on September 2, 2004, pilots, flight paramedics, and aviation maintenance technicians were organized into respective sub-committees to study options and make recommendations. All three MSPAC sub-committees were unanimous in their recommendations that replacement of the existing fleet with a completely new aircraft was the best course of action.

There is a generally accepted consensus within the MSPAC that any new aircraft will need to retain the capability to perform the current four prong mission profile of medevac, law-enforcement, SAR, and homeland security. These required operational capabilities are relatively well-defined. Since September 11, 2001, homeland security has emerged as a new primary mission area. Acknowledging many overlapping requirements between missions, a summary of the projected needs of the Command follow:

(Note – All references to the “Dauphin” in the following section refer to the existing 12 aircraft flown by the Command, not the airframe manufactured by American Eurocopter.)

Medevac

As previously stated, the scene medevac mission is a hazardous and unforgiving sector of aviation. Having state-of-the-art equipment is a requirement to flying safely in an extremely difficult environment.

Wire Strike Protection

Scene medevac work is performed in an environment with frequent potential for wire strikes. There currently exists on the marketplace today wire strike kits. The next generation of MSPAC aircraft should include this technology.

Night Vision Imaging Systems (NVIS)

NVIS use in rural areas and areas of reduced visibility is common with the United States Military. The cockpit and cabin helicopter service area (HSA) lighting in the Dauphin is presently incompatible with NVIS use. An initiative is underway in the Command to begin the implementation of an NVIS program. In a recent safety recommendation to Marion C. Blakey, the Administrator of the FAA, Mark V. Rosenker, Acting Chairman of the National Transportation Safety Board, addressed the matter of NVIS in EMS aviation operations. The report recognized that NVIS enhance a pilot’s ability to see and avoid obstructions at night. In its review of 55 EMS aircraft accidents that occurred between January 2002 and January 2005 in this report, the NTSB offered that in 13 of these, NVIS

might have assisted the involved pilots in observing obstacles.¹³ The retrofit of current command aircraft to NVIS compatibility is important and should be a part of any replacement plan.

Terrain Avoidance

Controlled Flight into Terrain (CFIT) accidents are a very significant hazard to helicopter EMS operations. Terrain Avoidance Warning Systems (TAWS) and Enhanced Ground Proximity Warning Systems (EGPWS) installations are becoming commonplace. In the above referenced safety recommendation from Mr. Blakey, the NTSB recommended that the FAA require EMS aviation operations to install terrain awareness and warning systems on aircraft.¹⁴

Weather Avoidance

Of the accidents and incidents involving EMS helicopter operations, a vast majority have marginal weather conditions as a prevalent factor. Flight Information Services Data Link (FISDL) equipment is inexpensive and becoming commonplace within the cockpit of even small general aviation aircraft. New technology called “enhanced” or “synthetic vision” is now on the market as an engineering solution to the age-old weather avoidance problem.

Helicopter Service Area Equipment (HSA)

The medical equipment in the HSA is 17 years old. Medical diagnostic devices (e.g. multi-function monitors) require periodic replacement to meet the demands of a changing patient care environment. However, the existing medical interiors cannot be modified to accommodate the mounting and securing of these devices without extensive engineering and certification. The demands of a changing patient care environment and improved patient care techniques presents the need for temperature controlled storage to accommodate medications, IV fluids, and potentially, blood products. Funding was appropriated in the FY07 allowance to the MSPAC’s budget for replacement of four helicopter medical interiors. The Command anticipates requesting funding in the FY08 budget allowance to replace four additional interiors. Assuming that the projected FY08 funding is approved, four Command aircraft would remain with original interiors. The MSPAC projects that these four remaining aircraft would be sold with the original interiors, provided that the replacement schedule proceeds as recommended herein.

HSA Ergonomics

The equipment and procedures for loading and unloading patients into the aircraft have become outdated and have demonstrated potential for generating flight crew injuries and/or delaying patient care.

¹³ National Transportation Safety Board. *Special Investigation Report on EMS Operations; NTSB/SIR-06/01*. Washington: National Transportation Safety Board, 12: January 25, 2006.

¹⁴ National Transportation Safety Board. *Special Investigation Report on EMS Operations; NTSB/SIR-06/01*. Washington: National Transportation Safety Board, 12-13: January 25, 2006.

Body Hazards

Head strike areas within the aircraft (i.e. protruding radio consoles and medical equipment) have been greatly reduced in newer medical interior designs. Although crewmembers wear helmets, second providers and other passengers do not have this protection and are vulnerable to head-strike injuries. Additionally, the Dauphin's HSA does not have seating designed to reduce the severity of injury in the event of a crash.

Interior Design

Modern interiors feature modular components enabling rapid replacement of defective components and quick reconfiguration for other missions. The interior in the Command's current Dauphin does not offer this capability.

Law Enforcement

Effective law enforcement operations require sophisticated sensors, robust communications capabilities, detailed navigation, and a stealthy airborne profile. The Dauphin is limited in all of these areas. It should be remembered that since many law enforcement missions subsequently become medevacs (e.g. a high-speed vehicle chase which ends in a crash), these enhancements support the medevac mission as well:

Thermal Imaging Device

The Dauphin's thermal imaging device is a first-generation unit which is becoming increasingly difficult to maintain. Current third-generation thermal imaging devices offer better resolution and a host of important features. These include the ability to lock on to a target, the ability to "slave" the thermal imaging device with the searchlight for coordinated searches, downlink capability for relaying images to a command-post environment, and a color camera for daytime detection of specific vehicles or people. The existing thermal imaging device display in the Dauphin is small and limits consistent, reliable interpretation of thermal imaging device images.

Searchlights

New units are brighter, lighter, more reliable, and have the ability to be slaved to the thermal imaging device. The most frequent use of the searchlight in the MSP Dauphin aircraft is for lighting up landing zones during night scene medevacs in order to avoid wires and other hazardous obstacles.

Radio Communications

Simply stated, without an up-to-date radio capability, the MSPAC cannot communicate with the agencies and people they hope to assist. Without that communication, the mission cannot be efficiently accomplished. Many of the jurisdictions the MSPAC works with have migrated to 800 MHz systems. Upgraded radio systems are needed to ensure interoperability.

Airborne Navigation

Pursuits, searches, and scene medevacs are conducted at street level. To maximize effectiveness, law enforcement aircraft require an electronic moving

map display, with resolution available, down to the level of individual streets. Currently, navigation at this level requires the crew to use paper maps. Mapping/navigation programs now exist to work in concert with newer thermal imaging devices. This technology allows the aircrew to quickly locate areas of interest and convey this information to ground units responding to assist.

Fenestron Redesign

The Dauphin is instantly recognizable to many of Maryland's citizens by the distinct whine of its tail rotor. It is difficult to "fly neighborly" with a noisy machine; it is impossible to conduct a covert search for a criminal suspect who is alerted to the noise of the aircraft. A replacement tail rotor modification exists for the Dauphin and the Command is in the process of this retrofit. This will become a mandatory installation as parts for the existing tail rotor system are removed from production. New production aircraft have noise reduction as a legally-mandated requirement.

Search and Rescue (SAR)

Many of the requirements necessary for medevac and law enforcement missions are redundant to the SAR mission. However, some unique SAR requirements exist.

Hoist equipment

The hoist unit installed on MSP helicopters was manufactured in France. This has resulted in extended out of service times for mandatory overhauls. Aircraft have been deployed without hoists on occasion due to the length of time required to conduct overhauls.

Video

Coast Guard helicopters have a hoist-mounted video system to use for after action review. MSP aircraft need to duplicate this capability.

Additional Safety Features

In order to more safely respond to SAR missions, consideration should be given to aircraft emergency flotation equipment, self-contained "automatic approach to hover" over-water avionics, life rafts, and other aircrew survival enhancements.

Homeland Security

The Homeland Security mission borrows from each of the preceding missions, but has unique requirements of its own. Chief among these are secure interoperability with federal agencies and utility transport of high value personnel/equipment.

Surveillance

Federal airspace authorities currently rely upon the rapid response availability of the MSPAC to respond to unknown and potentially unauthorized entries of aircraft into the Air Defense Identification Zone (ADIZ). Command

aircraft, when requested, launch, identify, and if necessary, coordinate the landing of the aircraft, pending the arrival of appropriate Federal authorities.

Reconnaissance

MSPAC aircraft have assumed an increased level of responsibility in ensuring the safety of citizens. Currently, aircraft and crews survey critical infrastructure sites periodically. Technology now exists which would provide the added ability to record, geocode, and mark specific points of interest for further analysis, study, or investigation.

Video/Data Downlink

Advances in technology have enabled a wide array of devices to be available which provide the real-time transmission of airborne video and other data from the aircraft to a variety of locations on the ground, to include command posts within the Incident Command System.

Assisting Federal Authorities

The September 11th terrorist attacks shut down the National Airspace System. In order for MSP aircraft to operate in a similar situation, secure communications including aircraft identification and flight following capability will be necessary. The Dauphin's electrical wiring does not provide the modern digital architecture necessary for "plug and play" installation of avionics equipment. Lacking a digital data bus, it will be difficult to adapt the Dauphin to avionics necessary to support the homeland security mission.

Utility Transport

The Dauphin's HSA is specifically configured for medevacs and lacks the adaptability to efficiently transport personnel and equipment. As a mission, homeland security will undoubtedly necessitate the transport of VIPs, specialized personnel, and unique equipment.

MSPAC FINDINGS

Standardization

In aviation, the standardization of airframes is well documented as being an extremely important aspect of aviation safety. Standardization affects pilots, flight paramedics, maintenance personnel and local EMS responders. Although the Aviation Command has operated safely for many years with the current fleet, the safety record nationwide for EMS helicopter operations is currently being scrutinized by the FAA, NTSB and the media. From January 2002 to January 2005, 55 helicopter EMS accidents occurred in the United States.¹⁵ Different factors have apparently contributed to accidents recorded in recent years. Standardization of equipment may be one factor and is an area in which the State of Maryland can exercise control and enhance safety through this replacement process.

Dealing with a critical engine malfunction requires the pilot use a completely different set of emergency procedures for each model in the current fleet of N1, N2 and N3 aircraft. Every reasonable effort should be made to standardize the fleet. The more time a phased process takes, the greater the risk of lack of standardization due to mission change or technological developments. Retrofit of the existing fleet is worthy of consideration in certain areas. Even with the Department's plan to replace the fleet in no more than 9 ½ years, some of the MSPAC aircraft flying today will continue in service for many years. These retrofits will have a positive impact but are still limited to the capabilities of the current airframe.

The standardization of the fleet will minimize the number of aircraft configurations for maintenance and operations staff. Standardization of the fleet would save money, increase the flexibility of crew scheduling, allow for flexible asset allocation, parts pooling and interoperability. Commonality of parts reduces the inventory of parts currently needed for a mixed fleet. Additionally, a standardized airframe ensures the same maintenance procedures are required on all airframes, thus reducing the hours required for training maintenance personnel. This translates into greater availability of maintenance technicians to perform maintenance on aircraft. Standardization also ensures that any crew can climb into any aircraft on any shift and encounter a configuration for which they are trained and proficient. Currently, flight crews often work at sections other than their assigned location; standardization would allow them to go from section to section and operate smoothly, safely and efficiently.

Finally, standardization of the fleet ensures that other EMS and response-related personnel such as the Department's S.T.A.T.E. Team, Fire Department Tactical Teams (HEAT Teams), hospital staff, or scene providers will encounter the same aircraft configuration and capabilities. Continuing development of technological tools provides aviation units such as the Aviation Command avenues of increasing safety and improving overall flight operations. NVIS is a specific tool that will be beneficial to the Aviation Command during certain flight envelopes. Such variables as rotor-to-ground clearance

¹⁵ National Transportation Safety Board. *Special Investigation Report on EMS Operations; NTSB/SIR-06/01*. Washington: National Transportation Safety Board, 12: January 25, 2006.

heights, tail rotor placement and design, primary loading door location, useful load, rotor wash effects, NVIS compliance, and lighting and medical interior design are all issues to consider with fleet standardization. Presenting other providers with a mixed fleet can lead to confusion, delays, and significant safety concerns. Standardization would be more easily assured with a shorter replacement schedule.

Tracking Expenses

Determining the specific replacement schedule that optimizes aircraft life as well as resale value requires information on aircraft reliability (e.g., each helicopter's airframe, engine, gear box, etc.), and can be determined by an effective fleet management analysis system. Fleet management analysis systems allow tracking of airframe reliability and other measures that are critical to ensuring efficient and cost-effective use of helicopter assets. This information can be used to provide a reasonable prediction of future maintenance needs, an appropriate timetable for replacement and sufficient lead time to plan for securing sufficient financial resources.

The Aviation Command currently tracks aircraft maintenance requirements and the inventory associated with meeting those requirements through MxManager, a software program. Tracking is completed at the work-order and purchase-order level. In addition to aircraft parts, mission specific items and commodities, such as medical supplies, are tracked.

MxManager tracks periodic inspections, service bulletins, and airworthiness directions by hours and dates and keeps the records updated on a daily basis as current aircraft hours are entered into the system. The daily reports are used to notify maintenance staff of scheduled inspections and other required maintenance. MxManager assists with scheduling all maintenance required by the aircraft manufacturer, the FAA and the MSPAC.

Inspections

Major Dauphin inspections are conducted at every 600, and 5,000 (for N3's and N1M's), or 5,400 (for N1's & N2's) flight-hour intervals for each helicopter. There is also a calendar time restriction in the event the specific aircraft does not accrue the listed hours within that preset timeframe. In such a case, the calendar time between the previous inspection and the next required inspection is the limiting factor. The inspection must then occur regardless of the flight hour accrual of the specific aircraft. Additionally, every 3,000 flight hours, the transmission and main gear box is overhauled. The most significant, time-consuming and costly inspection occurs every 5,000 (5,400) flight hours (known as a "G" inspection). The "G" inspection is the manufacturer's requirement for the Dauphin. The FAA requires compliance with manufacturer's requirements for the aircraft. Each "G" inspection involves a near-complete dismantling of the entire aircraft for close inspection, necessary repair and maintenance. A "G" inspection takes approximately twelve weeks to complete in-house, when the Maintenance section is fully staffed. Subsequent "G" inspections on the same airframe occur either when the hourly or calendar driven limits are reached. The timing of "G" inspections has a significant impact on the replacement and trade-in schedules. With the current fleet of Dauphin

helicopters, eleven have surpassed the first “G” inspection and are at various stages between that initial inspection and the second “G” inspection.

Equipment

Day/night/VFR/IFR/all-weather

To retain current capability, any replacement aircraft will need to be capable of day/night single pilot instrument flight rules (SPIFR) flight. Selection of a replacement aircraft with all-weather capability will increase MSP aircraft availability for medevacs during the winter season.

GPS/WAAS/NAS development

The National Airspace System (NAS) is in the midst of an evolutionary change as GPS technology matures. Wide-Area Augmentation System (WAAS) GPS capability enables precision IFR approaches to non-airfield locations without the need for ground-based navigation aids. This presents the opportunity for true IFR medevacs. WAAS-capable GPS navigation systems are already in routine use, including at airports in Maryland. Any replacement aircraft should be designed from the ground up for WAAS utilization.

Maintenance

The Maryland State Police Aviation Command Maintenance Section is dedicated to providing safe aircraft while promoting a safe and positive work environment. Procurement of new aircraft will affect the capabilities of the maintenance section. The aircraft components, avionics and instrumentation should have commonality with United States manufacturers and general U.S. aviation industry. The manufacturer should have an extensive inventory so that delivery of replacement parts occurs within twenty-four hours for any aircraft on the ground (AOG). Repair facilities should be in the United States and be able to turn around repairs within thirty days. To keep costs low MSPAC must have direct access to the manufacturer’s vendors. The manufacturer must be able to provide standardized manuals and maintenance schedules.

Training

In seventeen years of flying the Dauphin, the MSPAC has learned that the 12th helicopter is necessary to sustain the basing of aircraft at eight distinct locations. Likewise, the EMS Board in its 1997 report justified the 12th helicopter on the basis of the flight time burden on the fleet experiencing simultaneous “G” inspections (see Appendix “C”). Because it requires 12 airframes just to sustain essential operations, availability of dedicated aircraft for the purposes of pilot training become reduced. This impact on pilot training has been subtle but significant. Initial pilot training takes much longer and recurrent training lacks the flexibility a dedicated aircraft would provide. Recurrent training is especially important given the climate after the terrorist attacks of September 11, 2001, and the EMS helicopter safety environment the MSPAC operates in. Serious consideration should be given to the lease or procurement of a flight simulator to reduce the hours placed on Aviation Command aircraft.

Airframe Considerations

During the warranty period, maintenance hours and costs are anticipated to be lower, as manufacturer's warranties will cover initial problems, thus, overall maintenance requirements will be reduced. As a result, an initial savings in maintenance costs is anticipated. Mechanics will need to be trained in airframe, power train, electrical and avionics systems. An increase in personnel (mechanics, inspector/supervisors) in order to offset the loss of man-hours during training is expected. Personnel will need to be factory trained before delivery of the first aircraft with a full time factory representative on site as part of the sales package. New tools and test equipment for the new airframe will need to be purchased. All personnel will need training with an initial learning curve increasing turn around time until personnel become familiar with the new aircraft. A new inspection program will be implemented based upon manufacturer's recommendations. The MSPAC must ensure that current hangar facilities will house the aircraft. It will be necessary to make certain that sufficient floor space is available to conduct maintenance at the Aviation Command Headquarters complex and to identify vendors to support the airframe, parts and repairs. The incorporation of a proficient aircraft component data management program is essential.

MSPAC CONCLUSIONS

The Maryland General Assembly, the Department of State Police and the EMS Board have visited the issue of helicopter replacement on several occasions in recent years. Given the current, available information regarding upcoming major inspections on the current fleet, combined with the ability to obtain new technologies, the Department of State Police, Maryland State Police Aviation Command believes that the best available opportunity to address helicopter fleet replacement lies just ahead. Thus, a comprehensive strategy to replace helicopters should begin as soon as fiscally feasible. This will keep Maryland in alignment with a key recommendation of the National Highway Traffic Safety Administration (NHTSA). NHTSA conducted a comprehensive reassessment of the Maryland Emergency Medical Services System, and in its 2004 report, issued this recommendation regarding Maryland's EMS transportation system:

“Enhance (and expand as necessary to meet the mission) the strong presence of the Maryland State Police Aviation [sic] Division in the delivery of scene medical treatment and transport for trauma patients as part of a triple mission capability....The MSP service should be viewed as a core competency within the State EMS system.”¹⁶

After a thorough review of the information at hand, to include the external and internal assessments, combined with the previous experience of a fleet replacement in the MSPAC, and with the primary goal of maintaining the safest operation possible, the following conclusions have been reached:

- **An important issue driving a plan for helicopter replacement is standardization.**
 - Standardization has become an important safety issue, whether the issue is within the MSPAC, with the FAA, or with the helicopter industry as a whole. Aircraft standardization is a well known and well documented objective within the military and other helicopter fleet operators. A well designed, funded, and implemented plan of helicopter replacement and acquisition is desired to attain standardization of airframes to the extent possible.

- **The expected service life of a MSPAC helicopter airframe in current service is twenty (20) years.**
 - Data from the various studies suggest time frames ranging from 17 through 25 years. While it is true that airframes may be maintained in such a fashion which allows them to operate safely beyond this time frame, the data suggest that overall value of an airframe decreases significantly beyond this time. A twenty year expected service life is intended to derive the maximum trade-in value available for the existing fleet.

¹⁶ National Highway Traffic Safety Administration. *State of Maryland, A Reassessment of Emergency Medical Services; Transportation, Recommendations*; p. 20. Washington: National Highway Traffic Safety Administration, 1, June 1, 2004

- **A coordinated plan toward helicopter fleet replacement in 9.5 calendar years achieves standardization without sacrificing fiscal responsibility.**
 - Purchasing of aircraft over a period of many years, while extending the fiscal burden over a wider period, also reduces the likelihood of achieving a standardized fleet; without significant modifications to airframes purchased early in the replacement timetable. Those modifications would ultimately inflate the overall cost of fleet replacement in an effort to maintain standardization. A 10-fiscal-year replacement plan attempts to balance the fiscal burden with the need for standardization, and the likelihood that it can be attained.

HELICOPTER REPLACEMENT PLAN

Aviation operators replace aircraft by either a fleet wide replacement of all aircraft at the same time or a “phased” process. Fleet wide replacement is only practical for very small operations. A fleet the size of the Aviation Command’s requires a well-planned phased process.

The DSP has developed a time frame of no more than 9 ½ calendar years for replacement of the Aviation Command’s helicopter fleet (See Appendix “B”). This schedule specifically depicts the years when new airframes will be purchased and which existing airframes will be retired. This process will be accomplished in 10 fiscal years. The evidence provided that relates to standardization and safety is compelling. The DSP supports the goal of standardizing the MSPAC’s fleet and acknowledges the relationship between standardization and safety. The more time a phased process takes, the greater the risk of obsolescence, the larger and more costly the parts inventory and the more costly the airframe-specific training. The Department also supports the upgrades and renovations outlined as a means to ensure that the fleet is reliable and safe through the replacement period.

The goals of this plan rest upon the following notion of a phased process for the replacement of a fleet of aircraft. That the fleet during the replacement process consistently represents a mixture of standardized aircraft that are one third new; one third that have been retrofitted and standardized to sustain operations; and one third that are standardized and considered legacy aircraft that are maintained while they await replacement.

Fiscal Impact of Replacement

The fiscal impact of the MSPAC’s plan to replace the fleet in no more than 9 ½ calendar years, along with associated upgrades and equipment replacement items, is intended to be borne over a period of 10 fiscal years. The cost of replacement is projected to be about \$10.7 million for an equipped medevac helicopter in CY 2009. The origin of this cost estimate is explained in detail in Appendix “D”.

The acquisition of replacement aircraft will have a positive impact on the routine and heavy maintenance budgets. For a period of time, replacement aircraft will be covered by a manufacturer’s warranty. During this phase, the cost of parts and some

labor will be borne by the manufacturer. In addition to this savings, the replacement aircraft will likely experience less downtime due to the relatively low time on these airframes and their systems. This positive impact on availability will translate into better service to the citizens and it will permit Aviation Command maintenance personnel to focus on the legacy aircraft that require more attention.

RECOMMENDATIONS

The exact schedule of replacement will be evaluated closely through the replacement period utilizing the information to be made available by the fleet management analysis system. Specifically, the Department has determined:

1. MSP helicopter replacements should be projected to begin in Fiscal Year 2009 and should be completed in no more than 9 ½ calendar years.

The 9 ½ year replacement timeframe should maximize resale value of the existing fleet, allow for more timely standardization of the Command's fleet and address Aviation Command safety concerns. Although this replacement plan requires that two aircraft be purchased in one fiscal year three times during the process, the overall plan extends out over 10 fiscal years.

2. The Aviation Command will continue with the equipment replacements/upgrades identified for the medical interiors, sliding doors and rotor blade replacement.

The upgrades identified by the Aviation Command are necessary to sustain select helicopters during the replacement process. These upgrades were included in the Governor's allowance and approved by the General Assembly.

3. The Aviation Command should proceed with a replacement plan that includes a 12th helicopter.

There is support for the MSPAC's assertion that this aircraft is essential to the successful completion of the Command's four-pronged mission. See Appendix "C".

4. Consideration should be given to the utilization of a flight simulator compatible with the new airframe purchase.

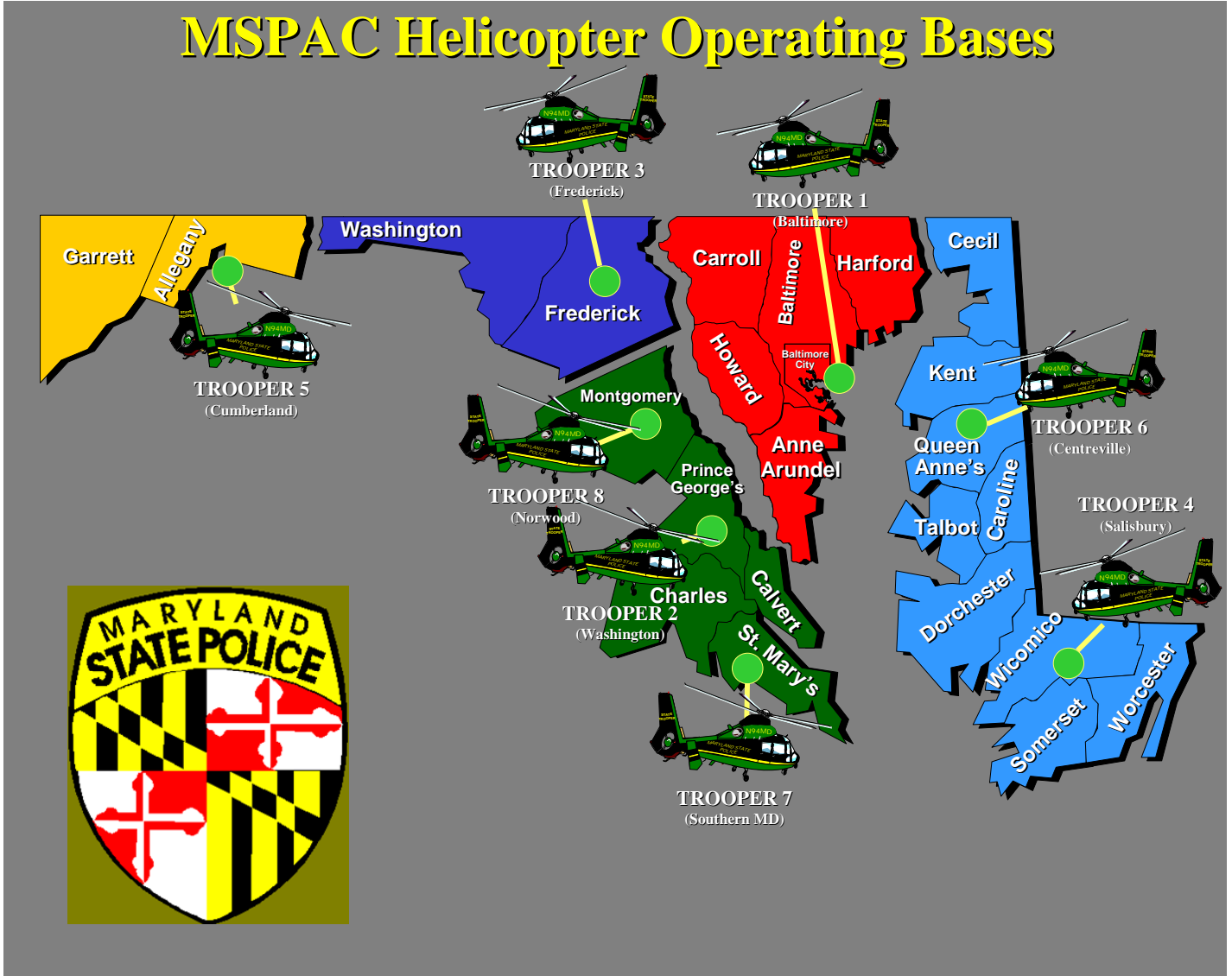
Pilots are required to perform training by FAA mandate and MSPAC policy. Substituting a simulator for actual flight time reduces the flight hours placed on airframes and still provides a realistic, uninterrupted flying scenario for the pilot. Time spent in a flight simulator will reduce or eliminate additional hours on an airframe, thus extending the calendar time between inspections and therefore reducing overall maintenance costs. It is believed that a significant return on investment in a flight simulator will be realized in addition to the potential which comes with more efficiently trained pilots. Therefore the use of a flight simulator has merits which warrant further exploration, research, and discussion.



Colonel Thomas E. "Tim" Hutchins
Secretary, Department of State Police

APPENDIX "A"

MSPAC HELICOPTER OPERATING BASES



APPENDIX “B”

Department of State Police Helicopter Replacement Schedule

Fiscal Year	9	10	11	12	13	14	15	16	17	18
Calendar Year	8/9	9	10	11	12	13	14	15	16	17
New Aircraft Delivery Year	2	2	1	1	1	1	1	1	1	1
Legacy Aircraft Retired per year	0	2	3	1	1	1	1	1	1	1
Aircraft Model		2xN1	N1	N1M	N1M	N1M	N2	N2	N1M	N3
			2xN1M							

Advantages of Plan:
 Minimizes “G” Inspection Schedule Costs
 Minimizes loss of modification investments
 Retains lower time legacy aircraft longest
 N1M = modified N1 to N3 configuration
 2 new aircraft in FY09 for crew training & operational development

Note: Funding in advance of FY 2009
 May be necessary to begin the “request for proposal” and procurement process in sufficient time to ensure aircraft delivery is initiated in FY / CY 09.

APPENDIX “C”

JUSTIFICATION FOR 12TH HELICOPTER

The original justification for twelve twin-engine medium sized helicopters has its roots in the original helicopter replacement plan which was the result of the 1986 crash of a Bell Jet Ranger helicopter and the loss of its crew.

As the mishap occurred in January 1986 and the General Assembly was in session, the General Assembly passed legislation creating the Joint Legislative Committee on the Medevac Program. The Joint Legislative Committee, among other things, directed the Secretary of the Department of Public Safety and Correctional Services (DPSCS), under whom the Maryland State Police was an agency, to prepare an Aviation Asset Deployment Plan, which would provide a framework for the basing of helicopter sections and a Request for Proposals (RFP), whereby the Department of Transportation (DOT) would seek competitive bids for replacement aircraft models.

The Asset Deployment Program was developed through the compilation of data, and the completion of multiple studies, some internal, and some provided by external consultants with experience in EMS helicopter operations and helicopter flight operations in general. This work was coordinated through the Maryland Executive Helicopter Advisory Committee (MEHAC), which was an Executive-appointed body charged with the authority to oversee the operational needs of the helicopter fleet, determine strategic basing locations, and produce operational and medical protocols for the usage of the fleet. The Asset Deployment Plan was submitted as an update to a plan previously submitted on June 2, 1987, to the Joint Legislative Committee on the Medevac Program, and was prepared in response to the Joint Chairmen’s report of the House Appropriations and Senate Budget and Taxation Committee.

The Joint Legislative Committee on the Medevac Program recommended in its report of the 1986 Interim to the Maryland General Assembly on page 2, paragraph 1, that, “The Maryland State Police Aviation Division mission is a three pronged one involving emergency medical transportation, law enforcement, and search and rescue. Protocols for cooperative use, deployment, and priority of helicopter service are to be developed by the Maryland Executive Helicopter Advisory Committee.”¹⁷ (MEHAC) Thus, the Maryland State Police Aviation Division Asset Deployment Plan was published and delivered to the Joint Chairmen on January 18, 1988.

At the time of the submission of the Asset Deployment Plan, the current inventory of MSP aircraft was as follows:

- 8 Bell Jet Ranger helicopters owned by the State
- 2 Bell Jet Ranger helicopters leased by the State, where the leases were not intended to be renewed

¹⁷ Maryland Department of Public Safety and Correctional Services. *Maryland State Police Aviation Division Asset Deployment Plan*. Baltimore: Maryland State Police, 1, January 18, 1988.

- 1 Bell UH-1B Huey helicopter owned by the State, military surplus, and used for heavy lift, aerial rescue capability
- 1 Piper Navajo Twin Engine Airplane
- 1 Cessna 182Q Single Engine Airplane¹⁸

Discussion of the inventory here is intended to establish that the Maryland State Police was already operating eleven helicopter airframes, even though it was only operating seven base locations in 1988.

The Asset Deployment Plan established that twelve medium-sized twin turbine engine helicopters would be procured over a three fiscal year period, FY1989, FY1990, and FY1991. Base locations included the existing seven helicopter bases, and added an eighth operating section in the Olney-Sandy Spring area of Montgomery County, based upon the recommendations of the MEHAC committee. A timeline was created within the Asset Deployment Plan which called for the delivery of the twelve helicopters over a two-year, three-month period beginning in September 1988 and completing in December of 1990.¹⁹

In order to understand the rationale for twelve airframes, it is necessary to revisit briefly the vision for basing helicopter sections as it was in 1987-1988. Immediately after the 1986 crash, the General Assembly ordered a comprehensive external review of the entire medevac, EMS, and helicopter system statewide. An outside consultant, PHH Aviation Services, performed this review, and produced a report to the General Assembly, known as the Report of the 1986 Interim; this report was delivered on October 1, 1986. At that time the Maryland State Police operated six helicopter sections. Norwood/Montgomery County and Southern Maryland were not open as of this time.

In the consultant's report under Helicopter Basing Summary, PHH recommended a continuation of operations at the existing six helicopter sections. Long term planning was recommended to establish additional helicopter sections and regions mentioned included the Southern Maryland region and "between Baltimore and Washington."²⁰ The consultant further recommended that with six operating sections, given the industry's best practice standards for maintenance and aircraft availability; the State should plan to procure a minimum of nine aircraft,²¹ for a ratio of 1.5 airframes per operational section.

The partnering agencies were given opportunities to respond to the Interim Report. The Maryland State Police commentary on fleet size maintained that with six operating sections, a fleet size of ten airframes was necessary, to account for increased training, maintenance, and support missions not otherwise assigned to an operational section. The MSP recommendation further stated that, "With the consideration of a

¹⁸ Maryland Department of Public Safety and Correctional Services. *Maryland State Police Aviation Division Asset Deployment Plan*. Baltimore: Maryland State Police, 1-2, January 18, 1988.

¹⁹ Maryland Department of Public Safety and Correctional Services. *Maryland State Police Aviation Division Asset Deployment Plan*. Baltimore: Maryland State Police, 5-6, January 18, 1988.

²⁰ PHH Aviation Services. *Technical Supplement to the Maryland Joint Legislative Committee on the Medevac Program - Helicopter Basing Summary*. Annapolis: PHH Aviation Services, 261, October 1, 1986.

²¹ PHH Aviation Services. *Technical Supplement to the Maryland Joint Legislative Committee on the Medevac Program - Helicopter Basing Summary*. Annapolis: PHH Aviation Services, 261, October 1, 1986.

seventh section, eleven aircraft would be a minimum number needed.”²² The MSP position was supported in part by the fact that they were currently operating six sections with ten Jet Ranger airframes and an eleventh helicopter, the UH-1 Huey, which had borne the burden of special operations missions. Meanwhile, the Maryland Institute for Emergency Medical Services Systems (MIEMSS) took a position that given the medical evacuation mission and the increasing number and complexity of medical skills being performed by medical flight crews, from a medical standpoint, “eight operational helicopter sections were needed to provide adequate Medevac coverage for the State.” MIEMSS further recommended, as did others, the establishment of additional sections in Southern Maryland and in the Baltimore-Washington corridor.²³

The unified position of MIEMSS, MSP and the MEHAC committee was for eight helicopter sections. By application of the consultant PHH’s ratio of 1.5 airframes per operating section, the airframe need was calculated to be twelve. Accordingly, the preliminary Asset Deployment Plan of June 2, 1987, and the final Asset Deployment Plan of January 18, 1988, were produced using a twelve helicopter replacement scenario; and the subsequent Helicopter RFP was published with the mandate that, “Any helicopter Acquisition Contract awarded in connection with this RFP shall,...Provide for the CERTAIN ACQUISITION of six helicopters and related service...[and]...Contain options for the possible acquisition of up to six additional helicopters...through the period ending December 1990.”²⁴

The position of the Department of State Police with regard to a twelve helicopter fleet has not wavered since the Asset Deployment Plan of 1988. The MSPAC has consistently requested twelve airframes, and has consistently demonstrated the need for twelve airframes.

The State subsequently purchased the original six Aerospatiale (now American Eurocopter) 365N1 Dauphins after award from the original RFP; these aircraft were delivered in 1988 and 1989. In 1990, the State exercised its option on three additional airframes bringing the total to nine. During this period the intense training of pilots, flight paramedics, and pre-hospital personnel on this new model of aircraft, combined with the expansion of the Aviation Division mission, resulted in a disproportionate amount of flight time being applied to what are now the oldest airframes.

As a result of the purchase of nine new aircraft, by the end of 1990 the Maryland State Police Aviation Division was able to transition six helicopter sections to Dauphin sections. Dauphin helicopters were stationed at Baltimore, Washington, Frederick, Salisbury, Cumberland, and the newly-opened facility at Norwood. Centreville and Southern Maryland continued to operate Bell Jet Rangers at their respective facilities.

²² PHH Aviation Services. *Technical Supplement to the Maryland Joint Legislative Committee on the Medevac Program - Helicopter Basing Summary*. Annapolis: PHH Aviation Services, 447, October 1, 1986.

²³ PHH Aviation Services. *Technical Supplement to the Maryland Joint Legislative Committee on the Medevac Program - Helicopter Basing Summary*. Annapolis: PHH Aviation Services, 482, October 1, 1986.

²⁴ Maryland Department of Transportation. *State of Maryland Helicopter Procurement, Request for Proposals* Baltimore: MDOT, 12, February 1, 1988.

A nationwide economic downturn, having occurred during the Gulf War of 1991, had dramatic effects on the Maryland budget in subsequent years. No aircraft procurements were made throughout 1991 through 1993 in large part due to the severe lack of funding. In 1994, Governor William Donald Schaeffer proclaimed at his State of the State Address that it was time to bring the faster twin-engine helicopters to the citizens of the mid-shore and Southern Maryland. Subsequently, the General Assembly funded a procurement of two additional Dauphins and these were delivered near the end of 1994. Southern Maryland and Centreville sections were, in turn, upgraded to Dauphin sections and the last of the retired Jet Ranger fleet was sold or traded by 1995.

By the end of 1995, the Maryland State Police Aviation Division had its Dauphin fleet, and was operating eight helicopter sections with eleven airframes. The effects of this were relatively unnoticed, as the airframes themselves were relatively young in age. With the knowledge that upcoming 5,000 hour “G” Inspections would become due in a few years, in 1996 the General Assembly included language in the budget bill which required the EMS Board to appoint a committee to look into the future needs of the Aviation Division and the procurement of a replacement aircraft. The Helicopter Replacement Committee began work on this issue in March 1996 and concluded with a final report to the General Assembly on May 28, 1997.²⁵

The report cited long term usage studies of medium range twin engine aircraft, and relied heavily on comparative data acquired from the United States Coast Guard (USCG) which operated 94 airframes virtually identical to the MSP Dauphin, although the mission profile varied somewhat. Highlighted recommendations from this report included;

- That an airframe should last until the earlier of twenty years or the time when maintenance costs and airframe unavailability rise to an unacceptable level,
- That fleet replacement should be staggered and be conducted over a ten year period beginning in Fiscal Year 1999.
- That a twelfth helicopter be procured such that the average flight time per airframe per year would be reduced by spreading the flight time over an additional aircraft.²⁶

It is noteworthy that in the Executive Briefing to Maryland State Police Superintendent Colonel David B. Mitchell, submitted June 24, 1997, Aviation Commander Major Donald G. Lewis wrote, “The 12th ship is the most controversial issue. The following is offered in support: The original plan was to have 12 ships. There were six purchased and an option for six more. We are now asking to complete the original request...”²⁷

²⁵ Maryland EMS Board. *Executive Summary: Report on the Maryland State Police Helicopter Fleet*. Baltimore: EMS Board, SEMSAC; Helicopter Replacement Committee, May 6, 1997.

²⁶ Maryland EMS Board. *Executive Summary: Report on the Maryland State Police Helicopter Fleet*. Baltimore: EMS Board, SEMSAC; Helicopter Replacement Committee, May 6, 1997.

²⁷ Lewis, Donald G., Major. *Executive Briefing Sheet, Helicopter Replacement*. Baltimore: Maryland State Police, June 24, 1997.

The Helicopter Replacement Committee's report to the General Assembly further reinforces this point by noting in a footnote that the original Asset Deployment Plan of January 18, 1988, indicated the need for twelve helicopters.

From 2001 through 2004, the State took advantage of an upgrade program whereby six of the original N1 Dauphins were sent to American Eurocopter for factory refurbishment; this modification included new engines and main gearbox, and encompassed the 5,000 hour "G" inspection. An immediate advantage of this upgrade was improved performance equal to that of the newest N3 model. Excluded from this upgrade were the oldest three (3) N1 Dauphins, on the basis that they had already undergone their "G" inspection, and would hopefully be sold or exchanged for replacement at a point which would maximize their value to the State prior to the next "G" inspection.

CONCLUSION, 12TH HELICOPTER

In the post-Jet Ranger era, the Maryland State Police has consistently maintained a position that given the current mission profile of the Aviation Command and the strategy of maintaining eight operational helicopter sections throughout the State, a minimum of twelve airframes are needed. Original plans called for all twelve airframes to be delivered and operational by December 1990.

While the Department was fortunate to have received nine new airframes in the initial procurement, various funding issues, postponements and deferrals, most of which were beyond the Department's control, resulted in a need for the Department to operate two helicopter sections with Bell Jet Rangers for nearly five years longer (1990-1994) than originally planned. When, in 1994, the two additional airframes were purchased, bringing the total to eleven the expectation was that the two new airframes would allow Southern Maryland and Centreville to expand to Dauphin operations. This in fact occurred, however the Department was placed in a position where it had to operate eight helicopter sections with only eleven airframes for an additional five years (1995-2000).

The net effect of deferring the purchase of the tenth and eleventh helicopters and ultimately delaying the purchase of the twelfth helicopter a full ten years is that total average annual flight time across the fleet is amortized across a smaller number of airframes, thus each airframe's average annual flight time flown is greater. This accelerated the aging process on the original nine helicopters and in particular the first six Dauphins.²⁸

²⁸ Robey, Gerald C., Inspector. *Dauphin Aircraft Times: Comparison 11 Aircraft versus 12 Aircraft*. Baltimore: Maryland State Police, March 28, 1997.

MSPAC Airframe-Day Demand Analysis

The graphic below reflects the best case scenario under ideal circumstances. Any degradation in assumptions would adversely impact maintenance scheduling. The graphic calculates the known shortfall in airframe-days based upon the following known values:

- That a requirement to operate eight (8) sections from eight (8) bases 365 days per year exists. This value is expressed as “**Required Operational Days.**”
- That eight (8) aircraft currently exist to achieve the above.
- That based upon MSPAC current experience, the number of days required per-year to service an airframe at known intervals can be calculated and amortized across the eight (8) aircraft fleet. The sum of the days lost to these maintenance events is expressed as “**Maintenance Days.**”
- The remaining airframe days which the eight (8) aircraft fleet is available to perform the mission is the result of the difference between the “**Required Operational Days**” and the “**Maintenance Days**” lost. This value is expressed as “**Available AirframeDays – Fleet.**”
- The “**Average Days/Year/Airframe**” is the resulting average number of days each airframe is available to perform missions in a given calendar year.
- The “**Aircraft Shortfall**” calculation results from the premise that the 886 airframe day deficit cannot be made up by a fleet capable of producing only 2034 airframe days per year. The calculation concludes that 3.48 additional airframes are necessary to produce the airframe days required.

Aircraft Day Demand Analysis	Leap Year				
	Year 1	Year 2	Year 3	Year 4	Year 5
Required Operational Days	2920	2920	2928	2920	2920
Maintenance Days	886	886	888	886	886
Available AirframeDays - Fleet	2034	2034	2040	2034	2034
Average AirframeDays/Year/Airframe	254.25	254.25	255	254.25	254.25
Aircraft Shortfall	3.484759	3.484759	3.482353	3.484759	3.484759
Assumptions					
1. uninterrupted supply chain					
2. mature airframe engineering					
3. no manufacturer fleet groundings					
4. no exceptional manmade or natural disasters					
5. adequate maintenance personnel					

This Demand Analysis intends to factor in known issues based upon the experience of the MSPAC with the current airframe. Other assumptions (see “Assumptions”) are made and are listed therein. Note that any changes in the five (5) assumed factors, notwithstanding unforeseeable factors, will cause changes to the matrix which ultimately may affect the Aircraft Shortfall value.

Even with a twelve airframe fleet supporting eight operational sections, two of the sections, Cumberland and Southern Maryland, operate 20 hours each day. During times when, statistically, the levels of requests are the lowest, coverage for the affected areas is provided by the next closest available MSPAC aircraft, sometimes with significant increases in response times. Although reduced operating hours at these sections have, as their primary cause, limited staffing, airframe time distribution would likely become a significant factor in progressing toward 24/7 services at these sections.

With expanding populations in these regions, particularly in Southern Maryland, and in the resort areas of Garrett County, and with limited trauma, referral center, and airborne law enforcement or rescue options available during times of section closures; MSPAC envisions a point at which 24/7 coverage will be required or expected. Continuation of a twelve helicopter fleet will ensure that the MSPAC will have the airframe time necessary to provide a uniform level of services to all citizens statewide.

Therefore, it is the position of the Department of State Police that any scenario under which Department helicopters are replaced must address helicopter replacement on a fleet wide, standardized basis. With the current mission profile charged to the MSPAC by the Governor and General Assembly and the aircraft basing strategy conferred upon the MSPAC by the original MEHAC committee, the fleet of medevac-capable helicopters required to efficiently, effectively, and safely perform this mission must consist of a minimum of twelve helicopters.

APPENDIX “D” FUNDING RECOMMENDATIONS

In order that helicopter replacement continues as scheduled and without disruption to the ability of the MSPAC to provide essential services, it is imperative that the current funding source be matched and timed with the current fleet replacement schedule as published herein.

Current Fleet Value Estimate

Approximate values of the current State-owned helicopters were obtained through a source known as Heli-Values, Inc. Heli-Values, Inc. is the most widely regarded source of helicopter values currently available. As banks utilize the information provided by Heli-Values, Inc, a fair analogy would be the Kelley Blue Book®, as it applies to motor vehicles. As Heli-Values is a web-based subscription service which is available at significant expense, the information was provided by American Eurocopter, who used its subscription to obtain this information.

The MSPAC has internally estimated the approximate values of aircraft in its fleet by applying the Heli-Values, Inc. published values, after applying the following assumptions:

- That N1 and N2 airframes are considered “mid-time” aircraft when applying the Heli-Values’ numbers to the relative hours flown for the airframe’s age,
- That N1 airframes modified to N3 capabilities (N1M’s) would be considered “high-time” for the average age of a pure N3 model, with the N1M’s theoretical model year set at 1997,
- That the pure N3 airframe (N82MD) would be considered a “mid-time” aircraft using the above assumptions

Based upon the above, the MSPAC estimates the value of the current airframe models to be as follows:

- N1 aircraft estimated value today is \$1.934 M
- N2 aircraft estimated value today is \$3.075 M
- The N1-Modified aircraft are estimated at between \$2.5 and \$3M
- The N3 airframe’s estimated value today is \$3.4 M
- The estimated total value of the current fleet in FY09 is \$30.352 - \$33.352M²⁹

²⁹ Current value estimates are projected based upon a 3% inflationary index per fiscal year, starting with FY05

Replacement Airframe Value Estimate

Approximate costs of new, replacement airframes were informally derived by consulting the major manufacturers of medium-sized twin-engine helicopters, and calculating an average price from among those quoted. In 2005, this average was calculated to be \$9.5 M. Assuming an annual inflationary adjustment of 3% for each fiscal year beyond FY05, the projected cost of new aircraft procurement can be estimated:

Replacement Schedule Cost Estimate Matrix											
	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	TOTAL
Purchases	2	2	1	1	1	1	1	1	1	1	12
Cost per	10.692	11.013	11.343	11.683	12.033	12.394	12.766	13.149	13.543	13.949	
Total/FY	21.384	22.026	11.343	11.683	12.033	12.394	12.766	13.149	13.543	13.949	144.27
Less Trade-In #		2	3	1	1	1	1	1	1	1	12
Estimated Value Per		2.242	2.309	3.025	3.116	3.209	4	4.12	3.404	4.7	
Less Trade-In Amount	0	4.484	6.927	3.025	3.116	3.209	4	4.12	3.404	4.7	36.985
NET	21.384	17.542	4.416	8.658	8.917	9.185	8.766	9.029	10.139	9.249	107.285

Replacement Schedule Cost Matrix; Costs represent Dollar amounts in Millions. Trade-in value reflects current estimated total fleet value, plus a 3% inflationary index per fiscal year.

Funding Streams

During the procurement of the existing aircraft fleet, several funding sources were employed at different times in the process.

Chapter 291 of the Acts of 1987, Laws of Maryland, (House Bill 256) Increased the license tax in respect to motor fuel by 5 cents per gallon. This legislation also provided for FY88 only, that \$31 million derived from the revenues be allocated to the Maryland Emergency Medical Services System Fund from the Transportation Trust Fund. This language is in current statute, MD Annotated Code, State Finance and Procurement, 7-313.

The 1987 Joint Chairman's Report (JCR) added the following language to the Budget Bill:

“No funds may be expended or committed for the procurement of helicopters and related capital equipment and services for the state’s Medivac [sic] System except as herein provided.”

The language provides additional guidance in creating an RFP for procurement of the helicopters.

Chapter 269 of the Acts of 1992, Laws of Maryland, established a surcharge for vehicle registrations of \$8.00 (the current surcharge is \$13.50). Eleven dollars (\$11.00) of each surcharge collected is distributed to the Maryland Emergency Medical System Operations Fund. The law provided that the funds have several uses including “the medically oriented functions of the State Police, Special Operations Bureau, Aviation

Division.” It is noted with emphasis that at no time were EMSOF funds intended to be utilized for capital purchases, to include procurement of aircraft. This continuous funding source is necessary to sustain the continued operational budgets of the entities or agencies for which the revenue is intended by statute.

HB 1668, enacted by the 2006 General Assembly and signed into law by Governor Ehrlich, establishes a State Police Helicopter Replacement Fund as a special, non-lapsing fund; and specifies methods by which the Fund receives revenue, and requiring the Fund to be used for a specified purpose. It is estimated that the State Police Helicopter Replacement Fund, in its current and foreseeable form, would need to be augmented by other sources of revenue in order to implement the helicopter replacement plan as offered herein.

The following portions of Appendix “D” contain charts which summarize the funding history of the existing twelve helicopters.

The MSPAC would be remiss not to emphasize that the above projected costs and the need to fully fund them will change over time, and that periodic reviews and adjustments will be necessary to account for inflationary factors and other factors not foreseeable at this time. The MSPAC would caution that factors which would interrupt, defray, or prolong the helicopter replacement process beyond its intended duration would have profound systemic effects on the remaining fleet, and the Command’s ability to provide the sustained services our citizens have come to expect.

The funding history states in regard to the 12th helicopter delivered in 4/99, that \$2M from the EMSOF is due to be paid back in FY07.

APPENDIX “D” FUNDING HISTORY

Funding History of 12 State Police Helicopters

<u>Source</u>	<u>Amount</u>	<u>Notes</u>
Emergency Medical Service System Fund ¹	\$30.3 million	Includes (1) \$26.4 million for helicopters 1-6; (2) \$3.8 million for down payment of helicopters 7-9; and (3) \$0.1 million for a fiscal 1992 payment on helicopters 7-9.
General Funds	15.4 million	Includes (1) \$5.1 million for lease payments on helicopters 7-9 from fiscal 1992 through 1996 ² ; (2) \$4 million repaid to MEMSOF in fiscal 1999 for helicopters 10 and 11; (3) \$2.2 million paid for with general funds in fiscal 1999 for helicopter 12; and (4) \$4.1 million borrowed from MEMSOF in fiscal 1999 (nearly \$2 million repaid to MEMSOF with general funds in fiscal 2001 and second payment of \$2 million will come in 2007).
Maryland Emergency Medical System Operations Fund	6.6 million	Includes lease payments for helicopters 7-9 from fiscal 1993 through 1996.
Transportation Trust Fund	6.5 million	Includes \$6.5 million from the Transportation Trust Fund in fiscal 1995 for helicopters 10-11.
Total for 12 Helicopters	\$58.8 million	

¹ The Emergency Medical Service System Fund was created by the General Assembly in 1987 as part of the legislation (Chapter 291, Acts of 1987) increasing the gasoline tax and motor vehicle license fees. A total of \$31 million from the proceeds of the increase in revenues was allocated to the fund for acquisition of helicopters including related equipment and for improvements to the communications system.

² The lease payments on helicopters 7-9 were paid from fiscal 1993 through 1996 with a 70% MEMSOF / 30% General Fund split. This split began in fiscal 1993; the payment in fiscal 1992 was made with \$2.3 million in general funds and \$0.1 million from EMSSF.

Funding History of State Police Helicopters

Helicopter	Date of Delivery	Cost (in millions)	Source	Notes
1	April 1989	\$4.3	Emergency Medical Services Systems Fund (EMSSF) ¹	Total cost of \$26.4 million for helicopters 1-6 paid from EMSFF. Total cost includes \$25.8 million for the helicopters and \$0.6 million for the training of pilots, mechanics, and related equipment.
2	April 1989	4.3	EMSSF	
3	September 1989	4.3	EMSSF	
4	September 1989	4.3	EMSSF	
5	November 1989	4.3	EMSSF	
6	November 1989	4.3	EMSSF	
7	July 1990	4.6	EMSSF, Maryland Emergency Medical System Operations Fund (MEMSOF), and general funds (GF) ²	\$3.8 million used from EMSFF in 1990 for down payment of helicopters 7-9. Nearly \$0.1 million was used from EMSFF in fiscal 1992 as part of the lease payments. Remaining \$11.7 million balance (includes interest) financed over 5 years from fiscal 1992 through 1996 (split 70% MEMSOF/30% GF from fiscal 1993 through 1996). ³
8	August 1990	4.6	EMSSF, MEMSOF, and GF	
9	September 1990	4.6	EMSSF, MEMSOF, and GF	
10	September 1994	5.25	MEMSOF and Transportation Trust Fund (TTF) ⁴	\$6.5 million from TTF and \$4 million borrowed from MEMSOF for helicopters 10 and 11 (\$4 million paid back in full to MEMSOF with general funds in fiscal 1999)
11	October 1994	5.25	MEMSOF and TTF	
12	April 1999	6.3	MEMSOF and general funds ⁵	\$4.1 million borrowed from MEMSOF in fiscal 1999 and \$2.2 million paid with general funds for helicopter 12. Partial payment of nearly \$2 million repayed to MEMSOF with general funds in fiscal 2001, second payment of over \$2 million will come in fiscal 2007.

¹ Helicopters 1-6 were purchased for \$26.4 million from Aerospatiale including training of pilots, mechanics, and related equipment.

² Helicopters 7-9 were purchased for \$15.6 million (including interest) on a 5 year lease purchase option with Aerospatiale.

³ The lease payments for helicopters 7-9 lasted 5 years. In fiscal 1992, the payment included \$0.1 million from EMSFF and \$2.3 million from GF. Beginning in fiscal 1993, the payments were made on a 70% MEMSOF/30% GF split. This amounted to roughly \$1.6 million per year from MEMSOF and \$700,000 per year from GF.

⁴ Helicopters 10 and 11 were purchased for \$10.5 million from American Eurocopter Corporation (formerly Aerospatiale).

⁵ Helicopter 12 purchased for \$6.3 million from American Eurocopter Corporation

**APPENDIX “E”
MSPAC DAUPHIN FLEET**

Aircraft #	Acquisition Date	Type	Retrofit Date
57 MD	4/89	N-1	
92 MD	5/89	N-1	
93 MD	9/89	N-1	
94 MD	11/89	N-1M	2/03
95 MD	11/89	N-1M	11/00
96 MD	11/89	N-1M	10/02
97 MD	7/90	N-1M	6/01
79 MD	7/90	N-1M	5/02
38 MD	8/90	N-1M	11/01
61 MD	9/94	N-2	
65 MD	11/94	N-2	
82 MD	4/99	N-3	

REFERENCES

1. State of Maryland General Assembly. Senate Bill 110. Annapolis: Maryland General Assembly, 2006
2. MD Code Ann. Education Article §13-509
3. Silbergleit, R., Scott, PA, Lowell, MJ and Silbergleit, R. Cost Effectiveness of Helicopter Transport of Stroke Patients for Thrombolysis. *Academic Emergency Medicine*, 10 (9) 2003.
4. Bruhn, JD, Williams, KA, Aghababian, R. True Costs of Air Medical versus Ground Ambulance Systems. *Air Medical Journal*, 1993.
5. Gearhart, PA, Wuerz, R, Localio, AR. Cost-Effectiveness Analysis of Helicopter EMS for Trauma Patients. *Annals of Emergency Medicine*, October 30, 1997.
6. Rosenwalt, Michael. *Yesterday They Would Have Died*. *Popular Science*. (October 2003).
7. National Transportation Safety Board. *Special Investigation Report on EMS Operations, NTSB/SIR-06/01*. National Transportation Safety Board: January 25, 2006.
8. Edlich, Richard F. and Wish, John R. Maryland State Police Aviation Division. A Model Emergency Medical System for Our Nation. *Journal of Long-Term Effects of Medical Implantation*, Vol 14, Number 5 (November 2004).
9. Maryland Department of Public Safety and Correctional Services. *Maryland State Police Aviation Division Asset Deployment Plan*. Baltimore: Maryland State Police, January 18, 1988.
10. PHH Aviation Services. *Technical Supplement to the Maryland Joint Legislative Committee on the Medevac Program – Helicopter Basing Summary*. Annapolis: PHH Aviation Services, October 1, 1986.
11. Maryland Department of Transportation. *State of Maryland Helicopter Procurement, Request for Proposals*. Baltimore, February 1, 1988.
12. Maryland EMS Board. *Executive Summary: report from the EMS Board*. Baltimore: Joint Aeromedical Committee, August 23, 1995
13. Lewis, Donald G., Major. *Executive Briefing Sheet, Helicopter Replacement*. Baltimore: Maryland State Police, June 24, 1997.
14. Robey, Gerald C., Inspector. *Dauphin Aircraft Times: Comparison – 11 Aircraft versus 12 Aircraft*. Baltimore: Maryland State Police, March 28, 1997.

15. Maryland EMS Board, Statewide EMS Advisory Council and Helicopter Replacement Committee. *Report on the Maryland State Police helicopter fleet*. Baltimore: Maryland Institute of Emergency Medical Services, May 6, 1997.
16. University of Maryland & Smith, P.J. *Analysis of downtime in Coast Guard HH-65A Dauphin helicopter fleet*. College Park: University of Maryland, December 18, 2000.
17. Conklin & de Decker. *Executive Summary: aircraft acquisition plan / Maryland State Police*. Arlington, TX: Conklin & de Decker, January 4, 2001.
18. Maryland EMS Board, Statewide EMS Advisory Council and Helicopter Replacement Committee. *Maryland State Police helicopter replacement update*. Baltimore: Maryland EMS Board, June 1, 2001.
19. Maryland EMS Board, Statewide EMS Advisory Council and Helicopter Replacement Committee. *Maryland State Police Helicopter Replacement Update*. Baltimore: Maryland EMS Board, December 1, 2002.
20. Technical Supplement to the Maryland Joint Legislative Committee on the Medevac Program (October 1, 1986). *Helicopter Basing Summary* Baltimore: Maryland Institute for Emergency Medical Services Systems.
21. National Highway Traffic Safety Administration. *State of Maryland, A Reassessment of Emergency Medical Services; Transportation, Recommendations; p. 20*. Washington: National Highway Traffic Safety Administration, 1, June 1, 2004.