Performance Audit Report

Department of State Police
Aviation Command Helicopter Operations

Helicopters Were Used Almost Exclusively for Critical Missions

Improved Data Systems and Processes are Needed to Better Manage Operations, Including Maintenance

Staff Turnover Issues Need to Be Addressed

August 2008

OFFICE OF LEGISLATIVE AUDITS
DEPARTMENT OF LEGISLATIVE SERVICES
MARYLAND GENERAL ASSEMBLY

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OFFICE OF LEGISLATIVE AUDITS
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August 14, 2008

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Members of Joint Audit Committee
Annapolis, Maryland

Ladies and Gentlemen:

We conducted a performance audit of certain aspects of the Department of State Police's Aviation Command helicopter operations. The Command's primary responsibilities are to provide emergency medical transport (medevac) and certain law enforcement operations throughout Maryland. The Command operates its 12 helicopters out of eight bases throughout the State.

The Command consists of 161 employees who are extremely dedicated to accomplishing their mission of providing timely medevac services and meeting law enforcement needs. The Command is highly regarded throughout the country and it has an extraordinary helicopter safety record. Over a five-year period, helicopters were used almost exclusively for critical missions.

Overall, the audit identified a number of issues impacting management's oversight and the efficiency and effectiveness of the Command's operations. Management's ability to make informed decisions pertaining to helicopter availability and maintenance was severely hindered by the lack of reliable and extensive data systems. Based on our analysis, we determined that, on 51 days during fiscal year 2007, fewer than 8 of the 12 helicopters were available on those days due to maintenance issues. During that year, 6 helicopters were unavailable for more than 120 days. Furthermore, the Command was unable to identify the cost per flight hour, including the maintenance costs for each repair, and the cumulative repair costs per helicopter. Without this information, management is unable to reliably assess the efficiency of its maintenance operation, including determining the optimal number of staff and when the use of contractors for repairs is most beneficial.

There are several staffing-related issues that impact operations. The most significant issue involves turnover in key positions, such as senior management, pilots, and maintenance technicians, with the primary causes being the Command's management reassignment practices and comparatively low salaries, especially for pilots and technicians. Finally, although the Department reported that almost 95 percent of the Command's medevac missions during fiscal years 2005 and 2006 were completed within

one hour (that is, the “Golden Hour”), we were unable to verify the reliability of these results due to data control issues.

An executive summary of our findings can be found on page 7, and our audit scope, objectives, and methodology are explained on page 27. We wish to acknowledge the cooperation extended to us by the Command during our audit.

Respectfully submitted,

Bruce A. Myers, CPA
Legislative Auditor

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Executive Summary

We conducted a performance audit of certain aspects of the Department of State Police's Aviation Command helicopter operations. This audit was requested by the Joint Audit Committee, which also defined the scope and objectives. The purpose of this audit was fourfold:

1. To determine the use and availability of the Command's helicopter fleet, which consists of 12 American Eurocopter Dauphins, based at eight locations (referred to as sections) throughout Maryland
2. To assess the effectiveness and efficiency of the Command's helicopter maintenance and inspection operations
3. To evaluate the adequacy of the Command's staffing structure, personnel practices, and training policies
4. To determine the reliability of the Command's "Golden Hour" managing for results performance measure that identifies the timeliness of patient helicopter transport to trauma centers

During the course of our audit, Command employees demonstrated exemplary dedication and pride in their work, and a high level of commitment to their primary mission of providing emergency medical transport (medevac) and airborne law enforcement services. The Command is highly regarded throughout the country and, with respect to the operation of its helicopter fleet, possesses an impeccable safety record. Specifically, the current helicopter fleet (acquired from 1989 to 1999) has flown almost 90,000 hours without a National Transportation Safety Board reportable accident, injury, or fatality, giving the Command a safety record well above the national average for emergency medical services. For fiscal year 2007, the State's financial records indicated that the Command's expenditures totaled $22.3 million, including approximately 59 percent for salaries and related benefits for 161 positions.

Overall, our audit disclosed that management lacks reliable and extensive data systems needed to better manage critical aspects of its operations, such as helicopter availability and maintenance. Better systems are needed to determine the efficiency and effectiveness of maintenance operations, and to help minimize helicopter downtime. In addition, employee turnover at key positions is a significant issue. Due to data reliability issues, we were unable to assess the reliability of Command's "Golden Hour" performance. As a result of the shortcomings regarding operational data, we spent a

considerable amount of effort compiling the data presented in this report. Regarding Objective 1, we determined that, on average, approximately 97 percent of the helicopter missions that occurred over the five-year period ended June 30, 2007 were related to critical missions, such as to provide medevac services. We concluded that the use of helicopters for non-critical missions was not significant and, as such, did not appear to have a detrimental impact on the Command's operations.

Since helicopter downtime can have a significant impact on the Command's ability to perform missions, we also determined the potential impact of downtime on its operations. Although the Command tracks section downtime (that is, its duration and the reasons why any one of the eight helicopter sections is not available for missions during scheduled hours of operation), the downtime database suffers from reliability issues. Independent verifications were not performed to verify downtime recorded in the database and, as a result, errors were identified. Also, the Command did not track downtime by helicopter, which would be helpful for fleet management purposes.

We compiled data from several available sources, such as maintenance work orders, to estimate the impact of maintenance on helicopter availability during fiscal year 2007. Although the Command has 12 helicopters, we estimated that, for 51 days, fewer than 8 of the Command's helicopters were available, meaning that at least one of the eight sections did not have an available helicopter on those days. We could not determine the extent to which the lack of available helicopters on any given day affected the Command's mission capabilities. However, according to the Command, when only seven helicopters are available (in 42 of the 51 days), it usually temporarily closes one particular section which, if necessary, can generally be served by other sections or by an aviation unit of a federal government agency. In addition, the services of commercial transport providers can be obtained. Our analysis also indicated that 6 of the helicopters were individually unavailable for more than 120 days during fiscal year 2007. Some of the factors contributing to the lack of available helicopters relate to the findings identified in Objective 2.

Regarding Objective 2, we determined the Command lacked certain essential data to assess the efficiency and cost-effectiveness of its maintenance operations. The Command did not compile or track data to determine the direct operating costs per flight hour, including the actual maintenance labor hours spent for individual inspection and repair tasks. These data are necessary to assess whether maintenance tasks are efficiently performed, whether the current staffing level is sufficient, and whether it is more cost-effective to use contractors for certain types of repairs. Based on available

data, it appears that certain inspections are completed much more timely by outside contractors than by in-house maintenance staff. However, it is unclear whether this is due to staffing issues, delays in receiving or under-stocking necessary parts, or some other factor(s). Because of the lack of Command cost and labor-tracking data, the cost-effectiveness of using contractors could not be assessed.

The Command did not adequately use automated inventory system features to ensure that parts were pre-ordered and stocked to minimize downtime resulting from inspections and maintenance. We estimated that, for 20 selected critical parts (such as rotor masts), the Command was under-stocked for 7 of the critical parts based on estimated flight hours of the fleet. It is imperative that the Command use available information to ensure an adequate supply of critical parts and supplies is on hand, given the significant delays that can occur in receiving parts. Our test of orders for 20 other critical parts disclosed that it took the Command more than three months to receive 10 of the parts. The Command also needs to improve its inventory controls and record keeping practices. Inventory items were not routinely counted and reconciled with the records, access to the storeroom was not properly restricted, and procedures were not in place to ensure that all withdrawals were posted to the inventory records.

Our audit tests disclosed that the Command performs helicopter inspections at the required intervals, but certain maintenance tasks were not performed because inspection procedures were not updated in accordance with certain manufacturer service bulletins.

Regarding Objective 3, we had difficulty in determining the adequacy of the staffing (organizational) structure because there are few comparable law enforcement organizations or other entities that operate a helicopter fleet and that have a very similar mission profile. However, based on the information available and our comparisons with entities whose responsibilities included both medevac and law enforcement mission, we determined that the Command's organizational structure seems reasonable. Other entities we contacted (including other local and state law enforcement agencies) made mention of the Maryland State Police Aviation Command as a model for such organizations. However, we identified several staffing issues impacting operations, the most significant of which was turnover in key positions, such as senior management, pilots, and mechanics/technicians.

Over a recent five-year period, the Command had 13 personnel changes involving 5 senior management positions. The primary reasons for the management turnover were transfers between positions within the Command

and to other positions within the Department, as well as retirements. One underlying factor contributing to this turnover—the frequency of which the Department did not deem to be excessive or unusual—was the Department's practice to rely almost exclusively on troopers (with or without appropriate prior aviation experience or technical expertise) to fill management positions within the Command. Although this practice provides troopers with an opportunity for advancement, it does limit civilian employee opportunities, an issue brought to our attention by several Command employees. Also, management turnover can affect the continuity and consistency of leadership.

In addition to management, turnover has been significant among pilots and technicians, especially during fiscal years 2006 and 2007. Also, some positions were understaffed (due, in part, to military deployments), which has contributed to a rise in overtime costs from $538,000 (6.4 percent of total salaries) in fiscal year 2004 to $1,171,000 (12.5 percent of total salaries) in fiscal year 2007. The turnover experienced within the civilian pilot and technician positions appears to have been primarily the result of the Command's low salaries when compared to industry survey data and other entities. One key impact of high turnover, at numerous positions and levels, has been a reduction in institutional knowledge, as many current employees have limited experience with the Command. Turnover is also costly; we estimated that it costs more than $100,000 to train a pilot to the Command's standards.

Regarding Objective 4, we found that Command had not formally defined the term "Golden Hour" and that the underlying data supporting these reported results were not consistent with the accepted definition of "Golden Hour." The University of Maryland Medical Center defines the "Golden Hour" as the hour between injury and delivery of a patient to a trauma center. This definition is consistent with the definition used by medical professionals. Since the Command does not know the time of injury, it uses the time that the section receives the medevac request from its central Systems Communications center (SYSCOM) as the starting point of the "Golden Hour," which is always after the time of injury. Nevertheless, the Command should define the term and ensure its method of measurement conforms to this definition.

As a result of certain data issues, we were unable to conclude with respect to the reliability of the reported Managing for Results (MFR) for the "Golden Hour" for fiscal years 2005 and 2006, which showed that 94.81 percent and 94.36 percent of the missions were completed within the "Golden Hour" for the respective years. Specifically, quality control procedures had not been established by the Command to verify the accuracy of the mission times

recorded in the database used to determine the percentage of missions completed within the "Golden Hour." Furthermore, the Command did not retain documentation supporting its MFR calculations for fiscal years 2005 and 2006 nor did it retain voice transmission data, which would enable a verification of the recorded times in the database.

Using the database, we were able to recompile the information used by the Command to calculate the "Golden Hour" results for those two years. Although the Department of State Police's (DSP) reported results were properly computed, we determined that the underlying data (such as the recorded times for each mission) were unreliable based on certain questionable flight times.

Background Information

Organization

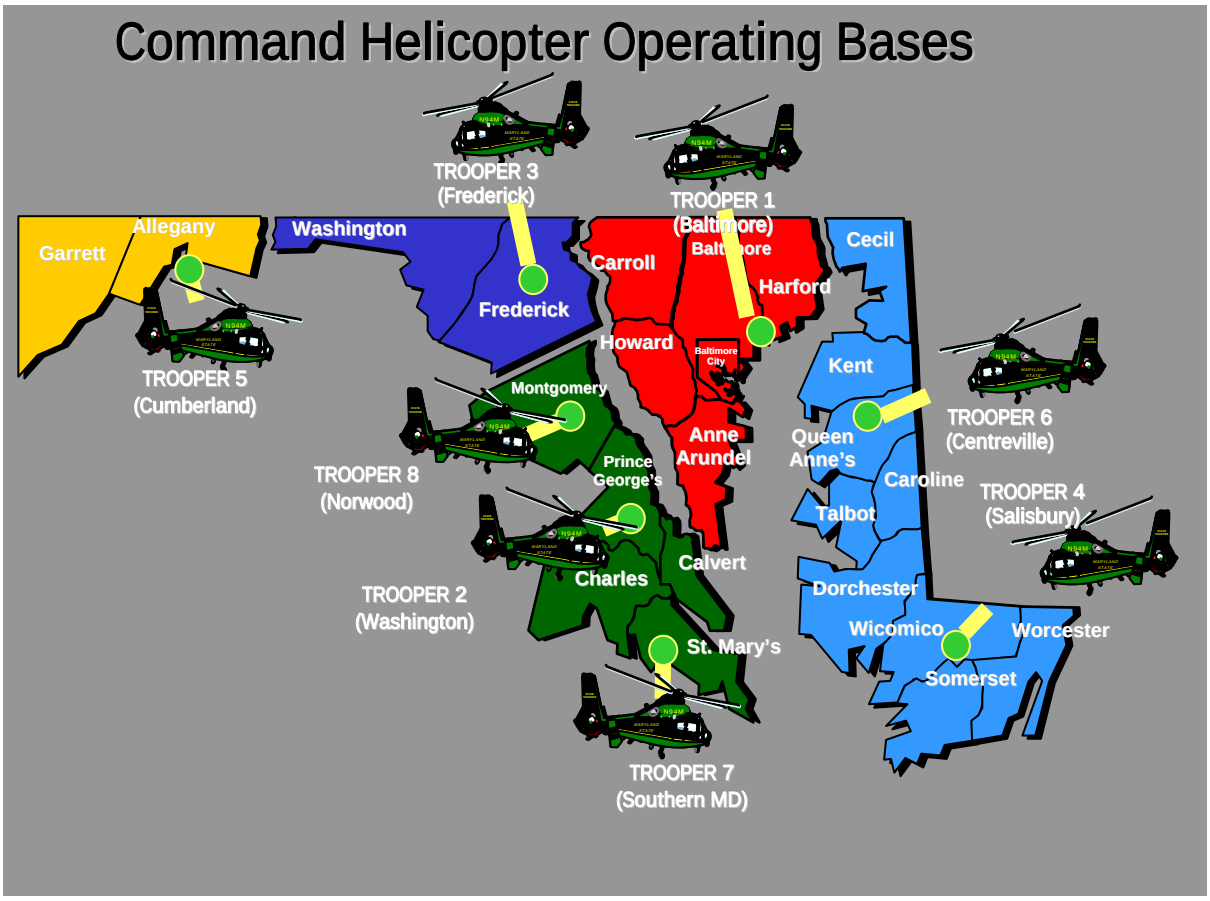
The Department of State Police Aviation Command (Command) is a public safety organization, with a primary mission of providing emergency medical transport (medevac), that also provides search and rescue services, airborne law enforcement services, and homeland security operations throughout the State of Maryland. As depicted on page 14, the Command operates its 12 helicopters and 2 fixed-wing aircraft out of eight bases (referred to as "Sections") throughout the State. Maintenance operations are conducted at Martin State Airport in Baltimore County. To carry out its missions, the Command employs pilots, trooper/flight paramedics, and maintenance technicians (referred to as "technicians"), in addition to management personnel and related support staff.

Table 1
Command Staffing as of December 1, 2007

Position	Total	Filled	Vacant
Pilots at Bases	46	40	6
Flight Paramedics at Bases	43	37	6
Technicians	25	22	3
Management and Administration	25	24	1
Other❶	15	15	0
Trooper Cadet	7	5	2
Total	**161**	**143**	**18**

Source: Command organization chart as of December 1, 2007

❶ "Other" includes System Communications center (SYSCOM), fixed-wing operations, homeland security, training, and risk management personnel.



Source: March 2007 Consultant's Report on the analysis and requirements of the Command's helicopter missions

Funding

The Command receives funding primarily through the Maryland Emergency Medical System Operations Fund. This Fund, established under the Transportation Article, Title 13 of the Annotated Code of Maryland, is funded by a surcharge levied on owners of motor vehicles registered in the State. The Command derives 80 percent of its operating budget from this Fund and the remaining 20 percent of its budget from general funds. This allocation is reportedly based on the previous years' proportion of the Command's medevac missions as a percentage of all missions. For fiscal year 2007, according to the State's financial records, the Command's expenditures were $22.3 million, of which approximately 59 percent was salaries and related benefits.[1]

[1] As noted elsewhere in this report, the Command also operates two fixed-wing aircraft for prisoner transport and homeland security; however, the Command's financial records do not permit an identification of those specific costs.

Chapter 416, Laws of Maryland 2006, established the State Police Helicopter Replacement Fund and provided that a portion of a $7.50 surcharge assessed in certain types of traffic violations be credited to the Fund. After reimbursement of implementation costs associated with the surcharge, funds collected are to be shared evenly between the Replacement Fund and the Volunteer Company Assistance Fund until such time that $20 million is credited to the Assistance Fund; all subsequent surcharges collected will be credited to the Replacement Fund. The Replacement Fund may be used for purchasing new helicopters and auxiliary equipment, ground support equipment, and any other capital equipment related to helicopters.

Section 6 of Chapter 6, Laws of Maryland 2007, Special Session, allocated $110 million of sales and use tax revenue collected from January through June 2008 to the Replacement Fund. It also specified that the budget bills for fiscal years 2009 through 2012 include amounts to purchase three helicopters each year and directed the Department to purchase a flight simulator for training purposes.[2]

Chapter 414, Laws of Maryland 2008, modified the 2007 Replacement Fund funding provision and reduced the allocation of sales and use tax revenue from $110 million to $50 million. To replace this funding, the law also provided that the Governor appropriate a total of at least $70 million to the Fund in fiscal years 2010 through 2012 to purchase 12 helicopters on or before June 30, 2012, and stated that these funds may come from any fund that receives proceeds of sales and use tax. The $70 million could be reduced depending on certain specified budgetary actions.

Helicopter Fleet

The Command operates 12 American Eurocopter Dauphin helicopters that were purchased and placed in service between 1989 and 1999 (see Table 2 on page 16). Due to the extended period between the purchases, the Command has three different versions or configurations of the Dauphin helicopters. The Command advised that the different versions require the pilots to perform different operating procedures in some instances. In addition, some parts are not interchangeable between the different versions and some maintenance requirements may vary.

[2] The actual responsibility for including funding requests in future budgets rests with the Governor.

Table 2 Command Helicopter Fleet				
FAA Registration Number	Purchase Date	Type❶	Date Reconfigured❶	Flight Hours as of October 2007❷
N38MD	August 1990	N-1	November 2001	7,962
N57MD	April 1989	N-1	NA	8,918
N61MD	September 1994	N-2	NA	5,668
N65MD	November 1994	N-2	NA	5,447
N79MD	July 1990	N-1	May 2002	7,659
N82MD	April 1999	N-3	NA	4,112
N92MD	May 1989	N-1	NA	8,550
N93MD	September 1989	N-1	NA	8,797
N94MD	November 1989	N-1	February 2003	8,203
N95MD	November 1989	N-1	November 2000	8,206
N96MD	November 1989	N-1	October 2002	8,074
N97MD	July 1990	N-1	June 2001	8,134

Source: Data compiled in October 2007 from Command records including Hobbs meter readings, and from the Federal Aviation Administration aircraft registration database

❶ The basic model is the AS365 Dauphin. N-1 is the original and older model, while N-3 is the most up-to-date configuration. The primary difference between models is performance improvements from more powerful engines. The Command has updated several N-1 models to the more powerful N-3 configuration. "Date Reconfigured" is the date the helicopter was retrofitted to an N-3 configuration, including new engines.

❷ The flight hour readings were taken on various days in October 2007 based on auditor access to helicopters. The source is the "Hobbs meter" on each helicopter, which records the number of hours of engine operation when the helicopter is airborne. When an engine is replaced on a particular helicopter, we were advised that the specific Hobbs meter is retained on that helicopter; therefore, the recorded flight hours actually represent total flight time since the original purchase date of the helicopter, and not necessarily the flight hours for the engines currently in use.

Mission Types

As noted previously, the Command's primary missions are for medevac, law enforcement, search and rescue, and homeland security. Table 3 (below) defines each of the Command's mission types.

Table 3
Command Helicopter Mission Types and Definitions

Mission Type	Definition
Medevac	Provision of emergency medical services care in conjunction with the rapid helicopter transfer of an ill or injured patient from a field site to a trauma center or to another specialty center within an expedited time frame.
Patient Transfer	Provision of patient inter-hospital transfer involving transport for critically injured or ill patients from one hospital to another for a higher level of care.
Damage Assessment	Provision of aerial surveys from natural and manmade disasters. For statistical purposes, these missions are considered a type of law enforcement mission.
Law Enforcement	Support for law enforcement activities, generally within State boundaries. Includes searching for and tracking suspected criminals, searching for stolen property (such as vehicles), civil disturbance responses, tactical medical support, and transfers of police personnel.
Search and Rescue	Provision of aerial search and rescue services for lost or disoriented children and adults, and for missing, lost, or overdue property, aircraft, and watercraft.
Homeland Security	Operations related to proactive and as-needed services, including patrol checks of potential terrorist targets, and transport of personnel for homeland security incidents.
Support	Operations related to personnel training, maintenance, demonstration, and executive transport.

Source: March 2007 Consultant's Report on the analysis and requirements of the Command's helicopter missions

Mission Statistics

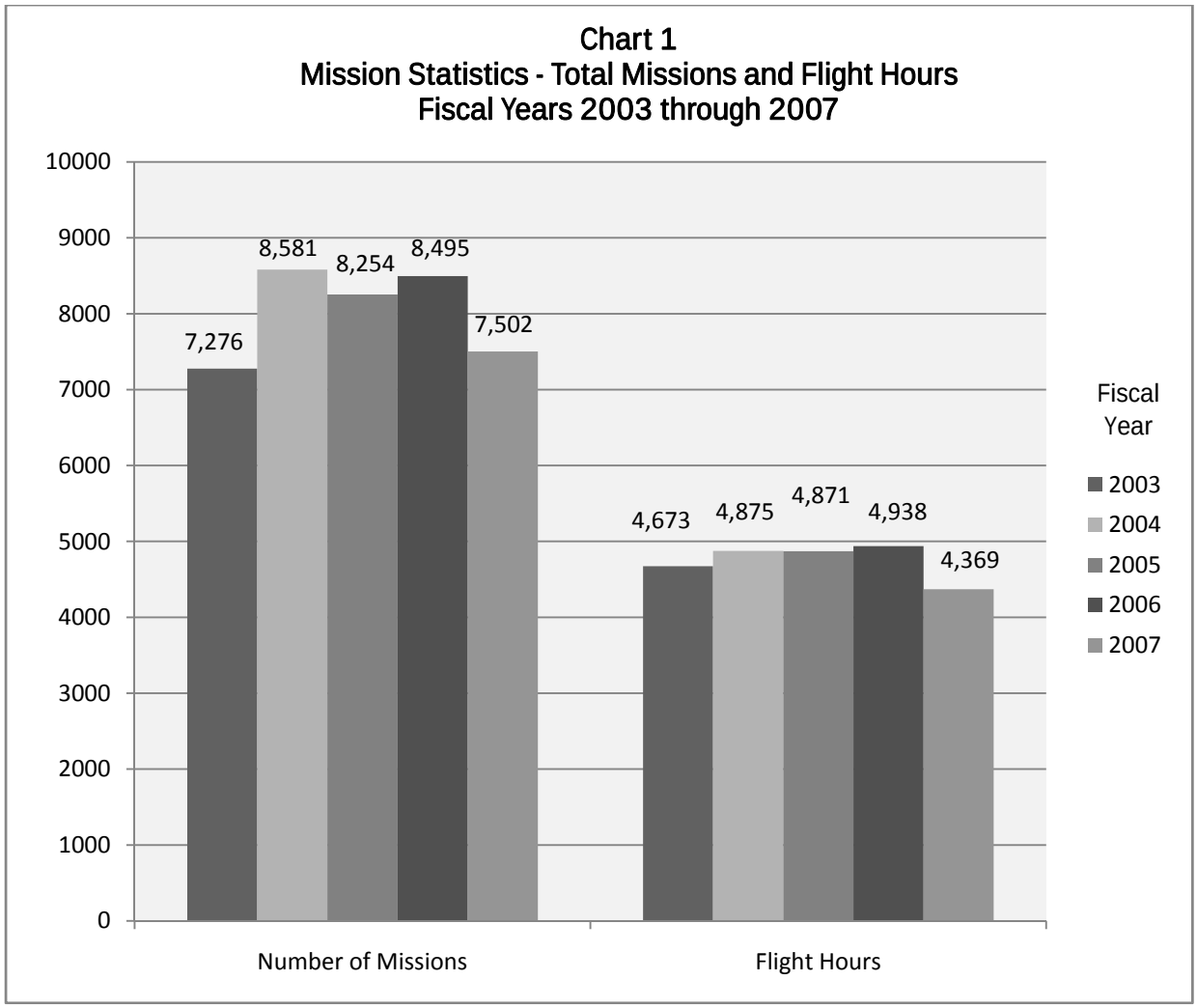
Using data recorded by the Command's System Communications center (SYSCOM) and contained in the automated RightCAD database (used to record and maintain mission data), we compiled completed mission statistics for fiscal years 2003 through 2007. The data shown in Tables 4 and 5 and Charts 1 and 2 on the following pages reflect all mission types but do not include missions performed by the Command's two fixed-wing aircraft and

cancelled missions (such as missions provided by other entities to assist the Command). For example, other nonprofit entities, such as the U.S. Park Police, provide medevac services in certain parts of the State when a Command helicopter is not available.

Table 4
Command Helicopter Completed Missions and Hours
Fiscal Years 2003 through 2007

Fiscal Year	Total Number of Helicopter Missions	Total Number of Flight Hours
2003	7,276	4,673
2004	8,581	4,875
2005	8,254	4,871
2006	8,495	4,938
2007	7,502	4,369
Average	**8,022**	**4,745**

Source: RightCAD database



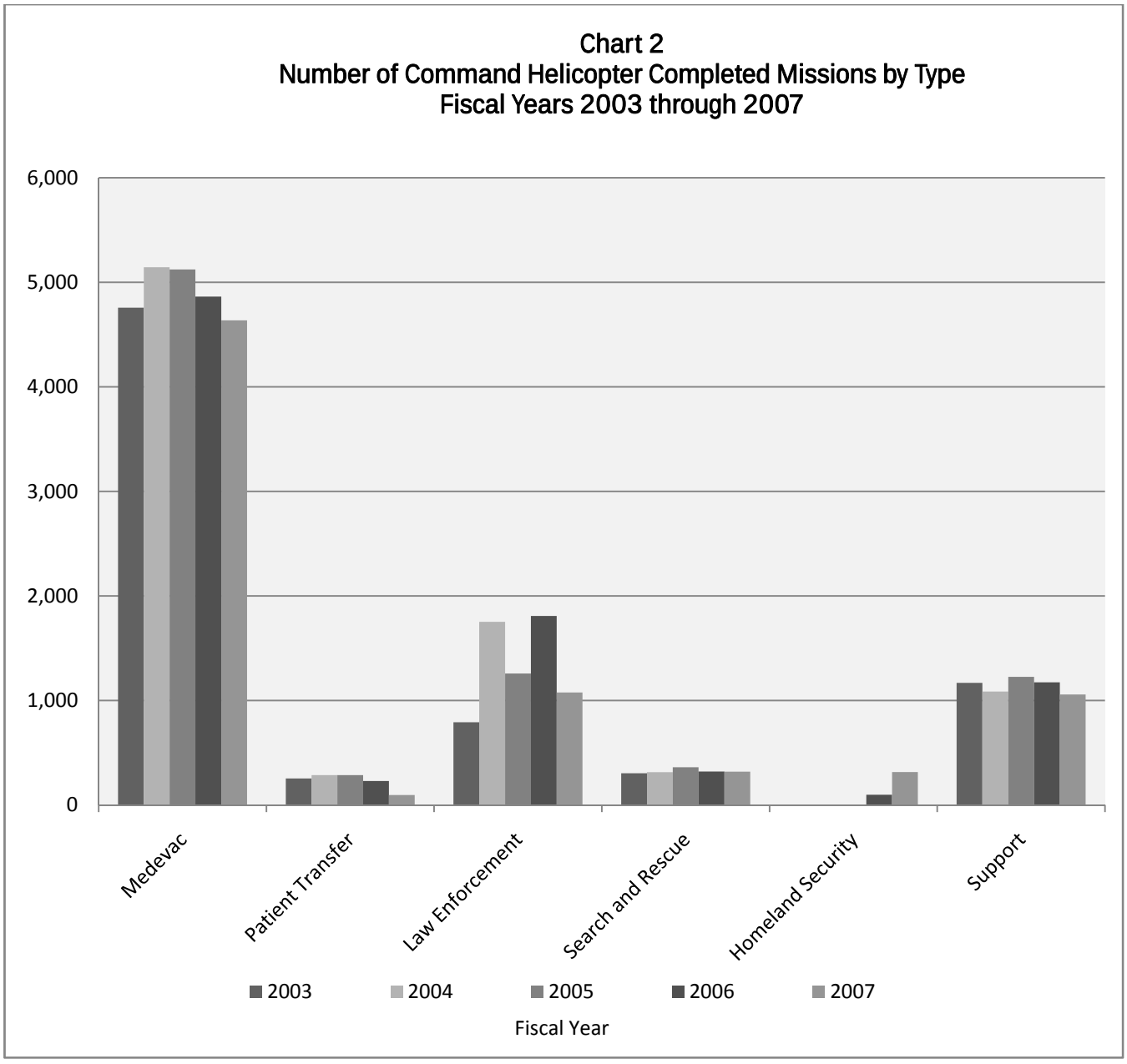
Source: RightCAD database

Table 5 and Chart 2 provide data for all helicopter completed missions based on the general mission type (such as medevac or search and rescue). Exhibits B and C on pages 92 to 95 provide a breakdown by specific mission type, along with the Command's definitions of the various mission codes used to specify the type of mission as recorded in RightCAD.

Table 5 Number of Command Helicopter Completed Missions by Type Fiscal Years 2003 through 2007					
	Fiscal Year				
Mission Type	2003	2004	2005	2006	2007
Medevac	4,757	5,144	5,123	4,863	4,636
Patient Transfer	254	286	286	230	96
Law Enforcement (including Damage Assessment missions)	792	1,752	1,258	1,809	1,077
Search and Rescue	304	314	361	321	319
Homeland Security❶	0	0	0	98	316
Support (such as Maintenance, Training)	998	860	914	896	785
Total Critical Missions	7,105	8,356	7,942	8,217	7,229
Noncritical Missions (such as, Executive Transport, Demonstrations)	171	225	312	278	273
Total Missions	**7,276**	**8,581**	**8,254**	**8,495**	**7,502**

Source: RightCAD database

❶ Homeland security missions were not separately identified until fiscal year 2006. Previously, these missions were classified as law enforcement missions.



Source: RightCAD database

Information Systems

All helicopters are dispatched from a central location, referred to as System Communications (or SYSCOM), located on the University of Maryland, Baltimore campus. SYSCOM is staffed around the clock by Command personnel, under the supervision of a trooper duty officer. All helicopter dispatch and mission information is entered into RightCAD, an automated system implemented in 2001 to better document mission information.

RightCAD is updated by the duty officer at SYSCOM, who dispatches the helicopters to various calls and communicates with the crews while on missions. Requests for helicopter services are received from various sources such as ground-based emergency medical teams (for example, volunteer fire department units) and local law enforcement. As the duty officer is speaking with the helicopter crew, the officer is entering the mission information into RightCAD in real time. Consequently, RightCAD does not rely on paper documentation to support the information recorded. Information documented includes the section that responded (such as Trooper 1), the date and time of the helicopter request, the dispatch date and time, the county where the mission is located, the crew member names, the type of mission, the entity that requested the helicopter, the drop-off location, and the total flight hours. The duty officer also documents the following dates and times as they are reported by the pilot while on the mission: (1) when the section responded or departed from the aircraft hangar, (2) when the unit arrived at the scene, (3) when the unit departed from the scene, (4) when the unit arrived at the destination or trauma center, (5) when the unit departed the destination and was back in service, (6) when the unit arrived back at the section.

In addition to RightCAD, we identified three other systems used by the Command to help manage and monitor its operations: Section Downtime Database, MxManager, and the Maryland State Police Data Management System (MDSP DMS). Like RightCAD, these are all stand-alone systems. The Section Downtime Database tracks the amount of time a section is unavailable for missions because of helicopter maintenance, weather conditions, or crew shortage. Similar to RightCAD, it is updated based on SYSCOM communications. The MxManager system, which is a work order system, is used by the Command to manage helicopter maintenance and parts inventories. Finally, MDSP DMS is a Department-wide system that provides the Command with daily flight status reports. Table 6 on the following page provides additional details on these four critical information systems.

Table 6 Automated Systems Used by the Command				
System	**Section Downtime Database**	**RightCAD**	**Maryland State Police Data Management System (MDSP DMS) - Reporting and Maintenance**	**MxManager**
Date Implemented	May 2002	January 2001	July 2006	January 2002
System Description	An access database that tracks the amount of time a section is not available for missions because of maintenance, weather, or crew shortage	An emergency medical services (EMS) computer-aided dispatch system used to record data for all helicopter missions (such as, times, patients, mission type)	A Department-wide internet-based system used to record daily flight information (such as the status of individual aircraft inspections) for each aircraft	A system used to manage aircraft maintenance and inventory
Source of Data	A telephone call from section personnel to SYSCOM	Telephone call or radio transmissions	Daily flight report maintained in a notebook for each aircraft	Maintenance manuals, FAA airworthiness directives, manufacturer service bulletins, inspection checklists, inventory withdrawal sheets, work orders
Who maintains the system?	SYSCOM operators	SYSCOM operators	DSP headquarters staff	Command staff
Who enters the data?	SYSCOM operators	SYSCOM operators	Command pilots and production control supervisor	Maintenance technicians and inventory personnel
Management Report Capabilities	Reports cumulative time a section was down and the reason(s)	Provides statistical reporting, using both Command and vendor developed reports, on an ad-hoc basis	Provides the Aircraft Fleet Status Report, which displays the status of aircraft inspections	Capable of creating numerous management reports for inventory, maintenance tracking, maintenance forecasting, purchase orders, service orders, and maintenance work orders
How are reports used?	Used for the annual DSP report	Used to calculate the Command performance measures (such as Golden Hour measure)	Used by maintenance personnel during the daily maintenance briefings	Maintenance tracking reports used to ensure servicing of all tracked aircraft parts, and compliance with directives and service bulletins
System interfaced or stand-alone?	Stand-alone	Stand-alone	Stand-alone	Stand-alone

Source: Command staff

Federal Aviation Administration Regulations

The Command currently operates under Part 91 of the Federal Aviation Administration (FAA) regulations for general flight operations. These regulations specify certain operational requirements for certifications, flight rules, maintenance, and records. Entities that conduct similar operations on a fee-for-service basis must comply with Part 135 of these regulations for commercial operations. Part 135 is considered more stringent as it adds a number of additional requirements on those operators in areas such as certification, number of crew required on missions, and recordkeeping.[3] In Exhibit A on page 90, we compared some of the major provisions of Part 91 and Part 135. Although not required under Part 91, the Command has voluntarily implemented a number of policies that mirror Part 135 and that address flight and other operational requirements, including an operations manual, flight hour requirements for new pilots, flight crew duty time limitations, and flight crew duty rest requirements.

Safety Record

Although the Command's aircraft operations have had a number of minor incidents, as documented both in the media as well as in internal documents such as Accident Safety Reviews, it has established a significant record of safety in performing its missions. The last reportable helicopter accident with injuries and damage to a helicopter occurred in September 1989. The last helicopter accident with a fatality occurred in September 1986. Both of these accidents predate the Command's use of the American Eurocopter Dauphin helicopter.

The Command's accident rate is clearly better than the national average. In a January 2006 Special Investigation Report on Emergency Medical Services (EMS) Operations, the National Transportation Safety Board (NTSB) noted that, between January 2002 and January 2005, there were 55 EMS accidents in the United States, of which 41 involved helicopters. The report also noted that the national EMS helicopter accident rate per 100,000 flight hours increased from 3.53 accidents between 1992 and 1996 to 4.56 accidents between 1997 and 2001. However, during the period between September 1989 and October 2007, the Command's current helicopter fleet has logged almost 90,000 flight hours without an NTSB reportable accident, injury, or

[3] Consequently, if consideration were ever given to having the Command charge fees for patient transport or for missions conducted for other local law enforcement units, the evaluation would need to consider the additional costs necessary to comply with the more stringent requirements of Part 135 of the FAA regulations.

fatality. Over the past five years, the Command's records indicate that it has flown more than 40,100 missions, including more than 24,500 medevac missions.

Audit Scope, Objectives, and Methodology

Scope

We conducted a performance audit of certain aspects of the Department of State Police's Aviation Command (Command) helicopter operations and maintenance functions. This audit was conducted in response to a request from the Joint Audit Committee. We conducted the audit under the authority of the State Government Article, Section 2-1221 of the Annotated Code of Maryland and performed it in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Objectives

Our audit had four specific objectives, which were established under the guidance of the Joint Audit Committee:

1. To determine the use and availability of the Command's helicopter fleet, which consists of 12 American Eurocopter Dauphins, based at eight locations (referred to as sections) throughout Maryland

2. To assess the effectiveness and efficiency of the Command's helicopter maintenance and inspection operations

3. To evaluate the adequacy of the Command's staffing structure, personnel practices, and training policies

4. To determine the reliability of the Command's "Golden Hour" Managing for Results (MFR) performance measure that identifies the timeliness of patient transport to trauma centers

Given those objectives, which were established under the guidance of the Joint Audit Committee, the following objectives were excluded from our scope:

- An assessment of any current or future helicopter replacement plans
- An analysis of the costs and benefits of replacing the current State Police medevac fleet with a private patient transport helicopter service or of transferring the function to an existing or new State agency
- An assessment of the adequacy or appropriateness of the Command's funding sources
- An evaluation of the guidelines or protocols for an emergency or responder to request a Medevac helicopter to ensure that only critical patients are transported

Methodology

To accomplish our objectives, we reviewed and tested various mission, maintenance, and personnel records. We interviewed more than 110 Command personnel and performed extensive procedural reviews and tests of a number of information systems deemed critical to our audit objectives. The audit also included a review of appropriate Federal Aviation Administration (FAA) requirements and regulations regarding operations of rotary winged aircraft (that is, helicopters). Working with the Command, we determined whether there were similar operations[4] in other Maryland jurisdictions, in other states, and in the federal government (including the U.S. Coast Guard and U.S. Navy) to use for comparison purposes; we contacted those operations to obtain relevant data. To aid in the accumulation of those data, we prepared a survey, and the related responses are included, as applicable, throughout this report.

Our first objective was to determine the use and availability of the Command's helicopter fleet. To determine the extent to which the Command's helicopter fleet was available for critical missions, we conducted tests, based on non-statistical sampling, of the mission classification data contained in the Command's RightCAD database by verifying the recorded data to voice transmissions between the Command's System Communications center (SYSCOM) and the helicopter sections. Having determined it to be reliable for purposes of classifying missions, we compiled the recorded data to determine the impact non-critical missions had on the Command's operations, and to determine the extent of cancelled missions. To determine the impact helicopter downtime had on the Command's ability to perform missions, we

[4] For comparison purposes, we identified entities operating rotary winged aircraft for law enforcement or medical evacuation/transport, and/or entities flying American Eurocopter Dauphin helicopters of a model comparable to the Command's.

conducted tests, based on non-statistical sampling, of the data contained in the Command's Section Downtime database. Due to reliability issues of the underlying data, and deficiencies in the level of detail recorded, we compiled data from underlying sources, such as maintenance work orders, in an effort to estimate the extent to which helicopters were not available during fiscal year 2007 due to maintenance.

Our second objective was to assess the effectiveness and efficiency of the Command's helicopter maintenance and inspection operations. We assessed the internal controls over and the effectiveness of the Command's MxManager database—a work order system used to manage maintenance and inventory data—as well as the internal controls over the Command's parts and supplies inventories and its record keeping practices and conducted related tests. We used available source documents, including maintenance program manuals and Hobbs meter readings of flight hours, to assess the adequacy of the Command's parts inventory to minimize downtime resulting from helicopter maintenance. We conducted tests of the timeliness of helicopter inspections by referring to inspection reports, work orders, and Hobbs meter readings. We reviewed independent sources on helicopter maintenance operations, such as FAA guidelines, and attempted to identify best practices of entities with a similar structure and/or mission profile.

Our third objective was to evaluate the adequacy of the Command's staffing structure, personnel practices, and training policies. We surveyed other law enforcement governmental entities that operate helicopters and identified four state police departments that performed both medevac and law enforcement missions and compared their organizational structures with that of the Command. We interviewed more than 110 Command personnel (including most management personnel, pilots, trooper/flight paramedics, and technicians) to identify potential concerns, and reviewed personnel practices. We compared salaries to industry data by reviewing industry publications and by contacting entities operating helicopter missions, both private and governmental. We reviewed human resources files to quantify employee turnover rates and vacancies and the related reasons. Finally, we reviewed training programs and select employee training files.

Our final audit objective was to determine the reliability of the Command's "Golden Hour" Managing for Results (MFR) performance measure that identifies the timeliness of patient transport to trauma centers. We assessed the processes and quality control procedures over the Command's "Golden Hour" data compilations and calculations. We conducted analyses of the

mission times, as recorded in the Command's RightCAD database and attempted to verify flight times using tape recordings of voice transmissions between SYSCOM and the Command sections.

Fieldwork and Department of State Police Response

We conducted our fieldwork from June 2007 through February 2008. The Department's response to our findings and recommendations is included as an appendix to this report.

Findings and Recommendations

Objective 1

Availability and Operational Use of the Command's Helicopter Fleet

Conclusion

This audit objective was to determine the extent to which the Command's helicopter fleet was available for critical missions, as well as the extent to which it was used for other purposes (such as for demonstrations), over the five-year period ended June 30, 2007. Since helicopter downtime can have significant impact on the Command's ability to perform missions, we also estimated the extent to which helicopters were not available during fiscal year 2007 due to conditions such as weather and maintenance.

Based on our review of the Command's RightCAD database, which we deemed to be reliable for purposes of classifying missions, we determined that, on average, approximately 97 percent of the helicopter missions occurring over this five-year period were critical missions, such as to provide emergency medical transport and airborne law enforcement services. We concluded that the use of the helicopters for non-critical missions was not significant and, as such, did not appear to have a detrimental impact on the Command's operations.

A portion of the Command's critical missions included services provided to other states and the federal government; however, because of reciprocal arrangements, it appears that, generally, a corresponding amount of services was received by the State from those entities. The Command also assisted local law enforcement agencies who did not have helicopters available or whose helicopters lacked the necessary equipment to effectively respond to particular incidents.

Although the Command tracks section downtime (that is, its duration and the reasons why any one of the eight helicopter sections is not available for missions during scheduled hours of operation), the Section Downtime database suffers from reliability issues. Independent verifications were not performed to verify downtime recorded in the database and, as a result, errors were identified. For example, our tests of 61 downtime entries disclosed 32 instances of time entry errors. Also, the Command did not track downtime by individual aircraft, only by operational section. Since individual helicopters are rotated between sections, identifying specific helicopter downtime would be useful in managing the fleet.

Because we could not rely on the Command's Section Downtime database, we compiled data from several available sources, such as maintenance work orders, in an effort to estimate the impact of maintenance on helicopter availability during fiscal year 2007. While section availability is impacted by numerous factors, including weather and crew availability, individual helicopter availability is only impacted by maintenance.

Although the Command has 12 helicopters, we estimated that, for 51 days during fiscal year 2007, fewer than 8 of the Command's helicopters were available, meaning that at least one of the eight sections did not have an available helicopter on those days. We could not determine the extent to which the lack of available helicopters on any given day affected operations. However, according to the Command, when only seven helicopters are available (in 42 of the 51 days), it usually temporarily closes the section located in Montgomery County which, if necessary, can generally be served by other sections or by the United States Park Police aviation unit. Our analysis also indicated that six of the helicopters were individually unavailable for more than 120 days during fiscal year 2007. Some of the factors contributing to the lack of available helicopters relate to the findings identified in Objective 2.

Finally, the Command should continue to pursue the acquisition of a flight simulator to reduce helicopter flight time for pilot training purposes.

Findings

Mission Data

1. **Helicopters were used primarily for the State's critical missions. Missions undertaken for other providers and non-critical purposes did not appear to significantly impact the helicopter usage and availability –** Our evaluation of the use of Command helicopters based on the RightCAD database, which we tested and deemed to be reliable for purposes of classifying the missions, disclosed that critical missions accounted for the vast majority of the helicopter missions.[5] Missions for other purposes (such as for demonstrations) and non-critical missions were generally not significant to the overall use of the fleet. Through reciprocal arrangements, the Command receives mission services from other states and the federal government that generally correspond to the amount of mission services it provides to them.

   On average, approximately 97 percent of the helicopter missions occurring over a five-year period pertained to critical missions, such as to provide emergency medical transport and airborne law enforcement services.

Table 7
Number of Command Completed Missions
Fiscal Years 2003 through 2007

	Fiscal Year					
Mission Type	**2003**	**2004**	**2005**	**2006**	**2007**	**Five-Year Averages (including %)**
Critical Missions	7,105	8,356	7,942	8,217	7,229	7,770 (97%)
Noncritical Missions	171	225	312	278	273	252 (3%)
Total Missions	**7,276**	**8,581**	**8,254**	**8,495**	**7,502**	**8,022** (100%)

Source: RightCAD database

[5] Much of the information presented in the tables in this section is based on the Command's RightCAD database. We tested the database to underlying source information and found the data to be generally reliable for the purposes of classifying missions. Although, in objective 4, we comment that the Command did not have a quality assurance process to ensure the reliability of mission times recorded in RightCAD, that deficiency had no impact on the classification of missions.

The use of helicopters for demonstration missions,[6] as shown in Table 8, is the most common reason for noncritical missions. The Command has implemented a policy requiring the review and approval of all demonstration missions in writing that considers a number of factors, including flight time and safety. The policy also states that demonstrations should be held, to the extent possible, at a Command section, rather than at a different location. Helicopters used for demonstrations are still available for missions, if the need arises.

Table 8
Noncritical Missions and Related Hours
Fiscal Years 2003 through 2007

Mission Type	Fiscal Year				
	2003	2004	2005	2006	2007
Demonstration	159	219	286	241	237
Non-Agency Training❶	10	4	24	28	29
Executive Transport	2	2	2	9	7
Total Number of Missions	**171**	**225**	**312**	**278**	**273**
As a Percentage of All Command Missions	**2.4%**	**2.6%**	**3.8%**	**3.3%**	**3.6%**
Demonstration (Hours)	50.2	60.7	87.7	75.4	74.7
Non-Agency Training (Hours)	6.8	1.8	17.3	17.7	15.0
Executive Transport (Hours)	1.2	4.7	2.3	8.1	9.4
Total Flight Hours	**58.2**	**67.2**	**107.3**	**101.2**	**99.1**
As a Percentage of All Command Flight Hours	**1.2%**	**1.4%**	**2.2%**	**2.0%**	**2.3%**

Source: RightCAD database

❶ Non-Agency training entails providing a helicopter to assist a local fire rescue unit in emergency response and medevac coordination.

The Command provides critical mission aid to certain other states and to the federal government. In addition, these entities, as well as commercial providers, provide assistance to the State. In this regard, the Command maintains memoranda of understanding (MOUs) with these entities and with commercial providers that provide services within the State. The MOUs do not call for reimbursement for flight costs; rather, they recognize the need for inter-jurisdictional cooperation and

[6] It is important to note that that a demonstration mission differs from a ride-along (referred to as the Operations Awareness Program or OAP), also provided by the Command. While a demonstration mission involves the use of a helicopter away from its base and is used as a public relations tool, an OAP flight involves taking appropriate personnel, who are involved in policy decisions or who interact with the Command, on routine missions. In accordance with Command policy, interested personnel must complete a request form. Accepted participants receive a safety briefing from Command duty staff and complete a form releasing the Command from any liability. Since participants then accompany the crew on any missions that section performs, these missions are included under the appropriate mission code (for example, medevac).

detail the scope of services to be provided. In addition, if a commercial provider performs a medevac mission, it can bill the patient or the patient's insurer for the related costs.

Tables 9 and 10 show that the Command receives aid from other providers (such as the U.S. Park Police) in amounts similar to the aid it provides to other jurisdictions. We concluded that, given that the amounts are similar, these missions do not have a significant impact on Command operations.

Table 9
Aid from Command to Other States and to the Federal Government
Fiscal Years 2003 through 2007

	Fiscal Year				
	2003	2004	2005	2006	2007
Total Missions	284	352	308	332	308
As a Percentage of All Command Missions	3.9%	4.1%	3.7%	3.9%	4.1%
Total Flight Hours	224.8	274.9	243.9	259.5	247.7
As a Percentage of All Command Flight Hours	4.8%	5.6%	5.0%	5.3%	5.7%

Source: RightCAD database

Table 10
Aid from Others to the Command – Total Missions
Fiscal Years 2003 through 2007

	Fiscal Year				
	2003	2004	2005	2006	2007
Total Missions❶	306	213	220	345	334
As a Percentage Compared to All Command Missions	4.2%	2.5%	2.7%	4.1%	4.5%

Source: RightCAD database

❶ Total missions include missions undertaken by commercial providers on behalf of the Command, which have decreased significantly from 2003 to 2007.

The Command also provides aid to Maryland jurisdictions (primarily local law enforcement agencies for enforcement and search and rescue assistance) as shown in Table 11 on page 36. The Command's helicopters essentially cover the entire State and, since 19 of the State's 24 local jurisdictions lack aviation capability, the Command provides assistance to those local law enforcement units. Given the Command's mission, the use of the State's fleet to aid local entities appears reasonable.

Table 11 Aid from Command to Local Entities – Total Missions Fiscal Years 2003 through 2007					
	Fiscal Year				
	2003	2004	2005	2006	2007
Total Missions	433	434	502	541	476
As a Percentage of Total Missions	6.0%	5.1%	6.1%	6.4%	6.3%
Total Hours	291.7	282.9	342.6	354.9	300.3
As a Percentage of All Flight Hours	6.2%	5.8%	7.0%	7.2%	6.9%

Source: RightCAD database

There are five local subdivisions in Maryland that operate police helicopters; however, Command advised that these helicopters lack the comprehensive equipment that the Command owns (such as power hoists and medical equipment) and/or are not operated in weather conditions or at times in which the Command will operate. For example, most Command helicopter locations are staffed 24/7, while most local police aviation operations are not. Anne Arundel County, for example, generally operates its helicopters eight hours a day, from 6 p.m. to 2 a.m. Table 12 provides details of the subdivisions with aviation operations.

Table 12 Local Police Forces with Aviation Operations As of February 2008		
Local Police Force	Number of Helicopters	Years of Aviation Experience
Anne Arundel County	3	12
Baltimore City	4	38
Baltimore County	3	24
Howard County	1	2
Prince George's County	2	8

Sources: Airborne Law Enforcement Association, Local Police Agency Websites
Note: Aviation experience also may include fixed-wing aircraft in addition to helicopters.

2. **Cancelled missions were primarily caused by situations outside of the Command's control –** In addition to statistics on critical and noncritical missions, the Command maintains statistics on cancelled missions—those in which a Command section was contacted but the mission was not undertaken or was not completed. Tables 13 and 14, which follow, show the number of and related hours for cancelled missions, according to the Command's RightCAD database.

   Our review of the Command's records of total missions and hours for cancelled missions disclosed that, in the vast majority of cases, the cancelled missions were caused by situations outside of the Command's control, including poor weather and ground responders cancelling the requests for services (labeled as "Service Not Needed" in Tables 13 and 14.)

Table 13
Cancelled Missions – Number of Missions
Fiscal Years 2003 through 2007

	Fiscal Year				
Reason for Cancellation	**2003**	**2004**	**2005**	**2006**	**2007**
Aircraft Mechanical Problems	34	25	39	43	43
Denied by Aeromedical Physician	4	7	4	7	5
Diverted to Another Mission	38	34	34	45	33
Estimated Time of Arrival Too Long	33	18	13	12	19
Follow Up Complete	0	0	0	1	0
Mission Complete	5	0	1	4	7
Not Enough Fuel	1	0	1	0	0
Other	0	0	45	127	79
Other Service Transported❶	254	281	220	144	47
Patient Deceased Before Arrival	89	87	84	94	85
Patient Too Combative	17	13	5	10	12
Service Not Needed❷	764	705	741	831	939
Weather	175	190	161	249	181
Total	**1,414**	**1,360**	**1,348**	**1,567**	**1,450**

❶ "Other Service Transported" refers to a situation in which the patient is transferred by another entity (such as a commercial provider) because a Command helicopter is not available due to circumstances such as being on another mission.

❷ "Service Not Needed" refers to a situation in which the mission is cancelled due to the ground provider determining that the services are not needed. Examples include the ground provider transporting a patient or a search and rescue is no longer needed because the person was found.

Table 14 Cancelled Missions – Flight Hours Fiscal Years 2003 through 2007					
	Fiscal Year				
Reason for Cancellation	2003	2004	2005	2006	2007
Aircraft Mechanical Problems	5.9	5.8	3.7	6.2	5.7
Denied by Aeromedical Physician	0.0	1.0	0.0	0.5	0.2
Diverted to Another Mission	8.6	5.6	2.3	6.1	5.3
Estimated Time of Arrival Too Long	3.1	0.7	0.6	0.3	2.4
Follow Up Complete	0.0	0.0	0.0	0.0	0.0
Mission Complete	0.9	0.0	0.1	0.3	3.6
Not Enough Fuel	0.4	0.0	0.3	0.0	0.0
Other	0.0	0.0	5.5	14.6	9.7
Other Service Transported❶	33.0	36.3	26.9	16.9	7.8
Patient Deceased Before Arrival	13.9	15.1	13.7	13.4	11.3
Patient Too Combative	4.3	3.0	1.4	3.1	2.1
Service Not Needed❷	91.3	84.8	83.4	83.4	116.6
Weather	25.6	24.6	18.0	20.4	11.9
Total	**187.0**	**176.9**	**155.9**	**165.2**	**176.6**

❶ "Other Service Transported" refers to a situation in which the patient is transferred by another entity (such as a commercial provider) because a Command helicopter is not available due to circumstances such as being on another mission.

❷ "Service Not Needed" refers to a situation in which the mission is cancelled due to the ground provider determining that the services are not needed. Examples include the ground provider transporting a patient or a search and rescue is no longer needed because the person was found.

Section and Aircraft Downtime Statistics

Background

The Command maintains the Section Downtime database to track the amount of time the various sections are down and not available for missions. Section downtime occurs as a result of weather conditions, helicopter maintenance, and/or crew unavailability. Weather conditions that cause downtime include those below minimum safety levels set by the Federal Aviation Administration (FAA), such as reduced visibility, and other weather-related factors that the Command considers would create unsafe flying conditions. Sections are down for maintenance reasons when helicopters are undergoing scheduled or unscheduled maintenance and no spare helicopter is available. Finally, sections can be down when a crewmember (pilot or trooper/flight paramedic) does not report for work unexpectedly and a replacement is not immediately

available. Information on downtime is reported by the section and is recorded by the Command's System Communications center (SYSCOM) personnel in the Section Downtime database. The time when a section returns to availability is recorded based on phone calls indicating that the weather has improved, replacement staff has arrived, or the helicopter has been released from maintenance.

Based on the information in the Section Downtime database, we compiled statistics for section downtime, in hours, as shown in the Table 15. Total downtime for all sections by reason is shown in Table 16 on the following page. For perspective, collectively, the eight sections should be operational for 67,160 hours for the year. This reflects six sections that operate 24 hours a day, and two sections that do not. As noted below, during fiscal year 2007, the data shows that sections were down a total of 7,797 hours, representing 11.6 percent of the available operational hours. It is important to note that individual section downtime may not significantly impact service delivery, as there is often some overlap in normal operational areas covered by each section. Additionally, as previously mentioned, DSP has a number of MOUs with other helicopter service providers in the event one or the other is unable to undertake a mission.

Table 15
Aircraft Downtime By Section (in hours) ❶
Fiscal Years 2003 through 2007

Section	Fiscal Year					
	2003	2004	2005	2006	2007❷	Total
Trooper 1	992.12	684.79	747.58	659.11	735.13	3,818.73
Trooper 2	1,424.02	788.79	1,020.51	691.53	863.20	4,788.05
Trooper 3	1,137.13	721.28	889.84	769.63	672.25	4,190.13
Trooper 4	1,254.81	836.37	841.33	826.10	980.96	4,739.57
Trooper 5	967.48	826.18	1,017.97	466.54	1,129.68	4,407.85
Trooper 6	1,118.19	642.35	851.64	630.89	757.59	4,000.66
Trooper 7	1,176.97	639.75	769.22	582.89	1,412.29	4,581.12
Trooper 8	1,325.71	1,011.27	1,129.56	1,552.72	1,243.60	6,262.86
Unallocated	0.00	0.00	0.00	0.00	2.56	2.56
Total	**9,396.43**	**6,150.78**	**7,267.65**	**6,179.41**	**7,797.26**	**36,791.53**
As a Percentage of Available Hours	**14.0%**	**9.2%**	**10.8%**	**9.2%**	**11.6%**	**11.0%**

Source: Section Downtime database

❶ As noted in Finding 3 on page 40, data in the Section Downtime were not always accurately recorded.

❷ The Section Downtime database erroneously shows a significant increase in crew-related downtime for fiscal year 2007. This was caused by an error in accounting for staffing hours at two sections. Specifically, Sections (Troopers) 5 and 7 are not staffed from 3 a.m. and 7 a.m. daily. There were occurrences in which these non-scheduled hours were mistakenly recorded in the Section Downtime Report; see Finding 3.

Table 16 Aircraft Downtime By Reason (in hours) ❶ Fiscal Years 2003 through 2007						
Reason	Fiscal Year					
	2003	2004	2005	2006	2007❷	Total
Crew	5.32	21.42	26.35	70.88	1,224.05	1,348.02
Maintenance	1,975.80	1,607.51	2,325.85	3,515.12	3,400.01	12,824.29
Weather	7,415.31	4,521.85	4,915.45	2,593.41	3,173.20	22,619.22
Total	**9,396.43**	**6,150.78**	**7,267.65**	**6,179.41**	**7,797.26**	**36,791.53**
As a Percentage of Available Hours	**14.0%**	**9.2%**	**10.8%**	**9.2%**	**11.6%**	**11.0%**

Source: Section Downtime database

❶ As noted in Finding 3 below, data in the Section Downtime were not always accurately recorded.

❷ The Section Downtime database erroneously shows a significant increase in crew-related downtime for fiscal year 2007. This was caused by an error in accounting for staffing hours at two sections. Specifically, Sections (Troopers) 5 and 7 are not staffed from 3 a.m. and 7 a.m. daily. There were occurrences in which these non-scheduled hours were mistakenly recorded in the Section Downtime Report; see Finding 3.

3. **The Command should implement a process to verify the reliability of the Section Downtime database, which we determined contained inaccuracies** – We randomly selected data posted to the database for fiscal years 2006 and 2007 and traced the information to original source documents, such as maintenance work orders, crew timesheets, and crew duty schedules, to determine if the information was entered accurately in the database.[7] Our test of 61 entries disclosed that 32 of these entries were inaccurate based on source documents. Specifically, 21 incorrect entries resulted in overstating the amount of time the section was down and 11 incorrect entries resulted in understating the amount of downtime. In many instances, the errors appeared to be caused by the incorrect entry of the time a section returned to service. Some discrepancies ranged from several minutes to more than an hour and, in one case, almost 10 hours.

   We also noted that data were not always entered in a consistent manner and there was no formal guidance on how to record the starting and ending times (for downtime). For example, in certain instances the database indicated that the downtime commenced when a helicopter left its home base for maintenance. In other instances, the database reflected that downtime began once the aircraft reached the

[7] We did not test entries related to weather, as it would have been difficult to determine precise weather conditions for dates and Section locations selected.

maintenance hangar at Martin State Airport. In addition, the Command had no process to independently verify the accuracy of the data in the database. Consequently, obvious data errors were not detected. For example, the Section Downtime database erroneously shows significant increases in crew-related downtime for two sections in fiscal year 2007. This occurred because SYSCOM occasionally recorded scheduled non-operational hours as downtime. These two sections operate 20 hours per day and generally do not fly between 3 a.m. and 7 a.m. daily.

This condition impacts the accuracy of the statistics used to determine the section downtime which could cause the operational status of the Command to be misstated, and could ultimately impact decisions on the number of helicopters needed to adequately service the needs of the Command.

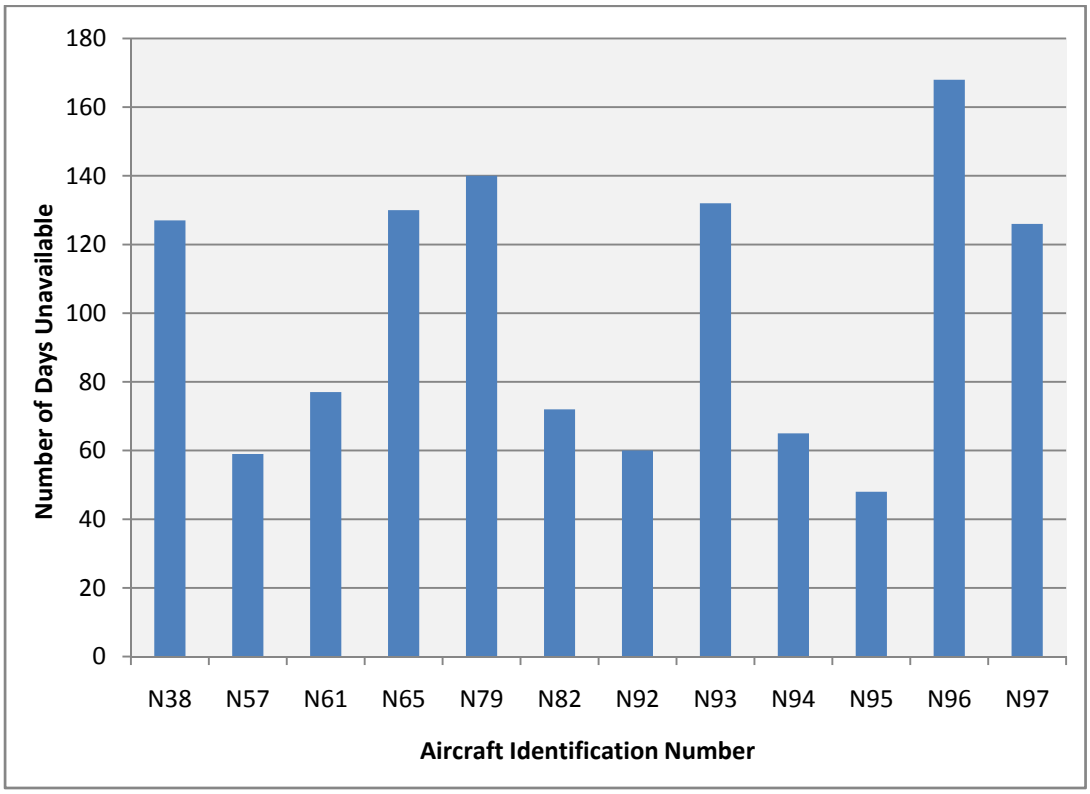
4. **The Command should track downtime by individual helicopter**—While section downtime can be caused by several factors (such as weather), downtime by individual aircraft results solely from maintenance issues. However, because downtime caused by maintenance issues was not tracked by individual helicopter, the Command could not use its current information systems to monitor the extent to which maintenance issues resulted in the availability of fewer than the eight helicopters needed to staff all sections.

   Due to the lack of available system records, in order to assess the extent to which the Command's helicopter fleet was available for missions, we used various information maintained at the Command (such as work orders, aircraft log books, and aircraft fleet status reports from the Maryland State Police Data Management System), and made certain assumptions to estimate the downtime by aircraft for fiscal year 2007.[8] Our analysis indicated that six of the helicopters were individually unavailable for more than 120 days during fiscal year 2007 as shown in Chart 3 on page 42.[9]

[8] Our determination of helicopter availability was based on a review of work orders, flight logs and aircraft fleet status reports, and included certain assumptions. Specifically, when the date of a work order was a day or more different than the date the inspector certified the helicopter as ready to fly on the log for the related work order, we concluded that the aircraft was not available from the date of the work order to the day prior to the inspector's signoff (in recognition of the fact that the helicopter would not likely be out of service for the entire day on both the date of the work order and signoff).

[9] Unlike Section downtime, helicopter unavailability relates solely to maintenance (scheduled or unscheduled).

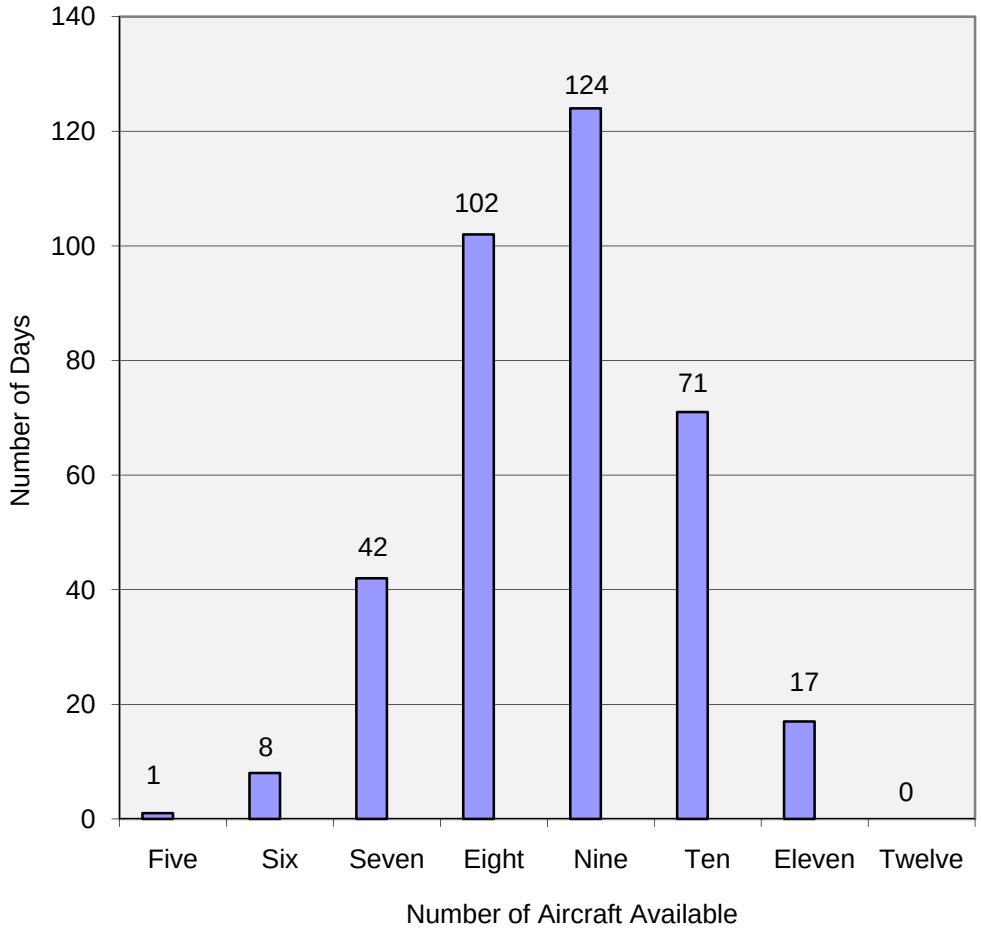
Chart 3
Number of Days Each Helicopter Was Unavailable (Estimated)
Fiscal Year 2007



Source: Auditor calculation based on review of various Command documents
Note: According to Command records, several of the helicopters underwent extensive scheduled maintenance during fiscal year 2007.

Using the estimated helicopter availability information, as reflected in Chart 3 above, we estimated the number of helicopters the Command had available for each day during fiscal year 2007. That projection is depicted in Chart 4 on the following page.

Chart 4
Helicopter Availability (Estimated)
Fiscal Year 2007



Source: Auditor calculation based on review of various Command documents

As noted above, we estimated that, for 51 of the 365 days in 2007, fewer than 8 helicopters were available on those days, which would require the temporary closure of 1 of the 8 sections, which is usually Trooper 8 located at Norwood in Montgomery County. For 42 of those 51 days, 7 helicopters were available which—because of some service area overlap and existing memorandums of understanding (MOU) with various other governments (such as the U.S. Park Police) and commercial helicopter providers—could have provided adequate coverage. For those days in which fewer than 8 helicopters were available, we could not determine the extent to which operations were affected.

5. **The Command should continue its efforts to procure a helicopter flight simulator for pilot training purposes –** State law (Section 6 of Chapter 6, Laws of Maryland, 2007, Special Session) directed the Department to purchase a flight simulator for training purposes. In November 2007, the Command prepared a detailed analysis of the costs and benefits and estimated that the use of a simulator could save the Command more than $600,000 annually because it would eliminate or reduce the need to use actual helicopters for training. In December 2007, in conjunction with the Department of General Services, the Department issued a solicitation for a simulator. However, Command personnel advised that the bids received significantly exceeded the allowable funding of $350,000 (the Command received two bids: $619,500 and $1.8 million). As of February 18, 2008, no additional action had been taken regarding the purchase of a simulator. Based on the RightCAD database, we estimated that approximately 300 helicopter flight hours were logged for training purposes during fiscal year 2007.

Recommendations

1. No Recommendation

2. No Recommendation

3. We recommend that the Command issue guidance to help ensure consistent recording of section downtime and establish a process to independently verify, at least on a test basis, the accuracy of data recorded in the Section Downtime database.

4. We recommend that the Command formally track downtime by helicopter and determine the impact of maintenance on individual helicopter availability.

5. We recommend that the Command continue its efforts to purchase a flight simulator for training purposes.

Objective 2

Effectiveness and Efficiency of the Inspection and Maintenance Policies and Practices

Conclusion

This audit objective was to determine the efficiency and effectiveness of the Command's helicopter inspection and maintenance operations. According to the Command's records as of December 1, 2007, the maintenance staff consisted of 22 technicians (including supervisors). Maintenance costs, including payroll, totaled $7.8 million for fiscal year 2007.

Our audit disclosed that the Command lacked certain essential data to assess the efficiency and cost-effectiveness of its operations. The Command did not compile or track data to determine the direct operating costs per flight hour, including the actual maintenance labor hours spent for individual inspection and repair tasks. These data are necessary to assess whether maintenance tasks are efficiently performed, whether the current staffing level is sufficient, and whether it is more cost-effective to use contractors for certain types of repairs. Based on available data, it appears that certain inspections are completed much more timely by outside contractors as opposed to in-house maintenance staff. However, it is unclear whether this is due to staffing issues, delays in receiving and under-stocking necessary parts, or some other factor(s). Because of the lack of Command cost and labor-tracking data, the cost-effectiveness of using contractors could not be assessed.

The Command did not adequately use automated system features to ensure that parts were pre-ordered and stocked to minimize downtime resulting from inspections and maintenance. Because certain maintenance is performed based on hours of flight and entails replacement of critical parts, it is possible to reasonably estimate the demand for certain parts. For example, we estimated that, for 20 selected critical parts (such as rotor masts), the Command was under-stocked for 7 of the critical parts based on estimated flight hours of the fleet. It is imperative that the Command use available information to ensure an adequate supply of critical parts and supplies is on hand, given the significant delays that can occur in receiving parts. Our test of orders for 20 other critical parts disclosed that it took the Command more than three months to receive 10 of the parts.

The Command also needs to improve its inventory controls and record keeping practices. Inventory items were not routinely counted and reconciled with the records, access to the storeroom was not properly restricted, and procedures were not in place to ensure that all withdrawals were posted to the inventory records. We identified a number of differences between the quantities of items actually on hand and the corresponding amounts in the inventory records.

Finally, the audit tests disclosed that the Command performs inspections at the required intervals, but certain maintenance tasks were not performed because inspection procedures were not updated. Our test of all 76 FAA directives and manufacturer service bulletins issued in fiscal years 2006 and 2007 disclosed 3 mandatory service bulletins that were not entered into the maintenance system and, as a result, were not included in the scope of maintenance work performed.

Background

The Command operates an FAA-approved repair station at Martin State Airport, and conducts routine maintenance and repairs helicopter airframes and certain components at that repair station. The Command is authorized to perform maintenance in accordance with the manufacturer's maintenance program but may not perform overhauls of certain complex parts (such as transmissions) nor perform any other maintenance not specifically authorized by the FAA or manufacturer. In those cases, contractors' services are used.[10]

To perform this maintenance and to inspect the completed work, the Command employs 17 maintenance technicians, 2 avionics (aviation electronics) technicians, 3 inspector supervisors, and certain other support personnel. The maintenance unit operates during normal business hours during the workweek and maintains a skeleton staff on weekends for unscheduled maintenance (that is, items of an emergency nature). Routine inspections and related maintenance are to be performed at intervals that are based on flight time (such as every 25 hours), on calendar time (such as every six months) or on both, as directed by the manufacturer for the specific aircraft type. For example, routine inspections and maintenance are to be performed at 25-hour intervals, with 50 and 100-hour inspections being more detailed than those at 25 and 75 hours. (See Exhibit D on page 96 for an

[10] As previously noted, the Command operates two airplanes. The Command's maintenance technicians are generally qualified to service both helicopters and airplanes. To the extent practicable, we attempted to limit our review to helicopter servicing but, in a number of cases, our findings might apply equally to the maintenance and servicing of airplanes.

example of a 25-hour inspection form.) Major service intervals occur every 600 hours (referred to as T inspections) and at 5,000 or 5,400 hours depending on the version of the helicopter (G inspections). All maintenance work must be inspected and approved by a Command certified inspector supervisor before a helicopter can return to flight.

An independent consultant was hired by the State to analyze the missions of both the Command's and the Department of Natural Resources' helicopter fleets for the purpose of determining options for and timing of replacing the current helicopter fleet. According to the consultant's report, prepared in March 2007, T and G inspection costs (including parts and service), per helicopter, were estimated at $100,000 and $450,000, respectively. This report also indicated that the Command faces significant costs for these inspections in fiscal years 2009 and 2010 — estimating, for example, that five aircraft will require G inspections at some point during this period. In addition to the cost implications, this inspection schedule could impact the Command's ability to have 8 of its 12 helicopters available at all times for missions, especially considering the need for other routine maintenance or unscheduled maintenance. (A minimum of 8 helicopters must be operational in order to have a helicopter on call at each of the eight helicopter sections throughout Maryland.) The Command has acknowledged the validity of this issue and advised us that it is currently working towards rotating aircraft in order to limit the number of aircraft down for these inspections at any one time.

The maintenance staff uses an automated system (based on a Microsoft Access database) called MxManager to maintain information on helicopter maintenance performed, parts inventories (including certain medical supplies), upcoming maintenance, and life limits on parts and components. The Command also maintains various paper documentation (such as work orders, discrepancy sheets,[11] and aircraft log books) that document work performed, as required by the FAA. Inventories of aircraft parts and supplies, as well as certain medical supplies, are maintained primarily in a central storeroom at Martin State Airport, and each section also maintains a small inventory of medical supplies and controlled drugs. The total value of the inventory (excluding controlled drugs), based on MxManager, as of November 2007, was $4.8 million.

[11] Discrepancy sheets are logs of maintenance problems or issues noted by pilots or mechanics to be addressed during inspections.

Best Practices

We reviewed various sources to determine if accepted best practices for helicopter maintenance operations existed. Based on our review, there does not seem to be an accepted single set of standards for helicopter maintenance operations or maintenance structure. However, there are a number of sources that provide information on maintenance operations, including the FAA (which sets, what are essentially, minimum requirements), manufacturer guidelines and recommendations, and business organizations, such as the National Business Aircraft Association.

We also attempted to identify best practices of entities that operate with a structure and/or a mission profile (for example, medevac) similar to that of the Command. However, we could not identify any other entities that were operating with both a very similar structure and mission profile. We noted significant differences impacting comparability, even among organizations with a similar structure or mission profile, such as the number of mission hours flown and the extent to which maintenance services were conducted in-house or were contracted out. For example, the Command has a staff of 22 technicians (including supervisors) to conduct routine maintenance and repairs for its 12 helicopters and 2 airplanes. Certain more extensive maintenance and repairs are performed by vendors. In contrast, two federal entities that operate with a mission profile and/or structure similar to that of the Command, and that operate a similar type of helicopter, have more staff than the Command to conduct routine maintenance and repairs for its helicopters. For example, the U.S. Coast Guard Station (USCG) - Atlantic City, which operates 10 of the same type of helicopter as the Command in a similar mission profile with about twice the flight hours, conducts routine maintenance using approximately 110 USCG personnel, but performs almost all major repairs and inspections at another centralized location also staffed by USCG personnel. We also noted two law enforcement entities in other states that operate with a mission profile and/or structure similar to that of the Command, but that operate a different type of helicopter. One has a smaller staff and the other has a staff size similar to the Command's, to conduct routine maintenance and repairs. For example, one state unit, which operates 13 helicopters, conducts routine maintenance and repairs for its helicopters using approximately 20 technicians (including supervisors). Contractors are used by the unit for more extensive maintenance, including certain maintenance tasks that, in contrast, the Command performs in-house.

Findings

6. **The Command performs inspections at required intervals** – For this objective, we conducted tests to determine if all inspections were performed at the required intervals (essentially after every 25 hours of flight). (See Exhibit D on page 96 for an example of a 25-hour inspection form). For three judgmentally selected helicopters, we verified, by reviewing work orders and related Hobbs meter readings taken at the time the helicopters were grounded for maintenance, that the Command performed all inspections, including any T and G inspections, at the appropriate intervals during fiscal years 2006 and 2007.

7. **The FAA has recognized Command maintenance technicians and the Command for meeting certain training requirements** – Although training enhancements are possible, as discussed in objective 3, the Command and a number of its maintenance technicians have been recognized by the FAA for meeting certain levels of training in maintenance operations under the FAA's Aviation Maintenance Technician Awards Program. This Program provides maintenance technicians with incentives to improve safety by actively participating in initial and recurring training and recognizes employers who take a proactive role in training their technical workforce. Awards for individuals are made based on the amount of training received in a calendar year, and awards to employers are based on the percentage of technical staff participating in the Program. In September 2007, the FAA recognized seven Command employees for meeting the training requirements of the Program. In addition, the Command received a Gold Certificate of Excellence for meeting certain participation criteria.

Maintenance Costs

Background

Aviation units spend a significant portion of their resources maintaining aircraft. Depending on the age of aircraft, maintenance costs can be the single largest operating cost. Collecting and analyzing maintenance cost information can help ensure that resources are available when needed, and that costs are controlled without compromising safety.

8. **The Command should develop comprehensive costs and operational data** – The Command did not separately track costs for helicopter operations and for airplane operations, and did not track actual labor hours spent on helicopter inspections and repairs. Consequently, the Command could not determine, and we were unable to develop, an accurate and comprehensive cost per helicopter flight hour, and the efficiency of the maintenance operations and the adequacy of the related staffing levels could not be assessed.

   Although we were unable to estimate costs for helicopter operations, using total annual direct maintenance expenses (all maintenance costs, including maintenance salaries related to helicopters and fixed-wing aircraft), as well as the flight hours per the Hobbs meter readings, we determined an approximate cost of $1,250 to $1,300 per flight hour for fiscal years 2005 to 2007 to maintain each helicopter and fixed-wing aircraft.

   The development of an accurate and comprehensive cost per flight hour would be useful in determining and monitoring the cost-effectiveness of operations, as well as for comparative purposes with similar entities. The Command also did not record labor hours spent on specific maintenance tasks, even though the automated system could record and track this information. Without tracking the number of maintenance hours used, it would be difficult to monitor potential problem areas and training needs, as well as to evaluate personnel efficiency. The tracking of maintenance hours could also be used to identify the optimal number of personnel required for the Command's maintenance operations. Furthermore, since the Command did not know how much time was spent on specific inspections, it was unable to make an accurate assessment of the costs and benefits of using contractors to perform various maintenance services (see Finding 9).

   Assessing the adequacy of staffing levels was further complicated by an apparent lack of industry standards. For example, without providing appropriate benchmarks, the National Business Aviation Association's *Management Guide* states that a set of rules cannot be established for the size or number of maintenance department personnel, although it goes on to identify factors to be considered, such as type and number of aircraft, and parts supply availability.

9. **The Command should establish a process to identify when outsourcing certain maintenance is in its best interest** – The Command periodically uses a contractor to assist in or to perform major inspections, and to supplement its own maintenance staff. Although a formal process had not been established to assess when a contractor should be used (other than for certain services for which the Command's staff is not qualified to perform), the Command considers technician workload and the need to have helicopters return to flight. We reviewed Command and contractor inspection reports for eight recent T inspections that were started during the period from February 2005 through June 2007— four inspections each by the Command and the contractor. The T inspection is one of the more complicated and comprehensive scheduled inspections and is required every 600 flight hours. Our review disclosed that the helicopters were returned to duty significantly faster when the T inspections were performed by the contractor. The average inspection times for the eight inspections are shown in Table 17 below.

Table 17
Time to Complete Four T Inspections

	Command	Contractor
Average Inspection Time (days)	135	42
Range (days)	66 - 226	37 - 45

Although the Command agrees that contractor inspections are generally performed in less time than in-house inspections, the two in-house inspections that took more than 160 days were caused by delays in obtaining parts that were not on hand at the time of the inspection (that is, parts not routinely requiring overhaul or replacement). Since each Command helicopter averages about 400 flight hours per year, T inspections can be frequent and delays in completing them can significantly affect helicopter fleet availability. (Note that elsewhere in this report we comment that the Command does not always have the necessary parts available when a required inspection commences.)

Command management advised us that they are often not able to assign the required number of personnel to these helicopter inspections because of insufficient staffing (such as level of staffing). However, since records were not available to determine what work was done by each technician at any given time, we could not substantiate the Command's assertions regarding staffing. Management also advised that assignment of maintenance staff for these T inspections could delay other required maintenance work, causing further delays in returning the

helicopters to service. The contractor generally charges $80,000 for each T inspection but, as noted in Finding 8, a lack of specific cost and labor tracking data did not allow us to estimate the Command's comparable in-house costs.

10. **The Command should track maintenance and repair costs associated with aviation-related incidents** – All aviation-related incidents which impact safety are reported to and investigated by the Command's risk management unit, which consists of a safety pilot, a trooper/flight paramedic, and a chief inspector. The results of the investigations are documented on an Aviation Safety Report (ASR). All ASRs are sent to Command management and are maintained for three years. In addition, the Command compiles a quarterly Safety Report (essentially, the preceding quarter's ASRs) which is reviewed for trends (that is, similar types of incidents) and distributed to all Command personnel with the intent of keeping personnel informed, preventing similar safety incidents from occurring in the future, and providing additional training for individuals or groups of employees.

    We reviewed the database used to retain ASR information in an attempt to determine repair costs associated with addressing the reported incidents. However, the Command does not specifically track repair costs that result from an incident that generates an ASR and cannot link a work order in MxManager to a specific ASR even though MxManager is capable of tracking work orders generated from ASRs. Since an ASR could be due to a maintenance problem, accumulating related cost data for any repair would be helpful in determining the extent and the financial impact of the safety incident.

Maintenance Information Systems

Background

Helicopters are subject to certain inspections of varying complexity based on the number of flight hours. In addition, certain critical components and parts have a useful life based on flight hours and are required to be replaced or overhauled as a safety precaution once those predetermined hours are reached. The Command maintains an automated system (MxManager) to inventory its helicopter parts and to maintain work order information. Accurate inventory records and timely availability of parts are critical to keep the maximum number of helicopters available and to reduce downtime resulting from maintenance.

11. **The Command should take the necessary action to ensure the timely availability of parts** – Although the Command has experienced and acknowledged delays in obtaining helicopter parts for its fleet, and has recently taken certain steps to address this, more should be done. Specifically, the Command tracks flight hours of each helicopter to anticipate required inspections, but it did not use available features of MxManager to pre-order parts that would be needed for these inspections. Availability of parts directly impacts the timeliness of completing inspections (see Finding 9).

To gauge the impact of these conditions, we identified 20 critical parts currently stocked by the Command (such as gearboxes and rotor masts) and, using maintenance program manuals, maintenance log cards, and Hobbs meter readings of flight hours, we estimated probable current and future needs for the helicopter fleet. Our analysis indicated instances of both too many and too few parts based on known or projected demand for helicopters to be brought in for scheduled inspections and service. For example, quantities on hand for 7 of the parts tested appeared to be insufficient to meet estimated upcoming service needs as shown in Table 18 below. We did note that other entities operating helicopter fleets used a formal maintenance forecasting model to schedule maintenance that focused on minimizing downtime and had a process to ensure that known parts to be replaced were pre-ordered to be available when the inspection comes due.

Table 18
Examples of Critical Parts Not Adequately Stocked

Item	Anticipated Need Per Year	Quantity On Hand or On Order as of January 14, 2008	Amount Required to Address Need
Hydraulic Filters	49	10	39
Main Gearbox	1	0	1
Tail Rotor Blade	11	6	5
Main Rotor Servocontrol - Left	4	3	1
Starflex Star	2	0	2
Starter Generator	4	2	2
Main Rotor Mast	2	0	2

Furthermore, the Command had not formally considered entering into guaranteed maintenance programs with manufacturers (at a cost per

use), which would give it priority when ordering parts specified under the contract, and would enable it to obtain parts faster and limit downtime.[12]

Our test of 20 other critical parts also disclosed that the Command has experienced routine delivery delays in obtaining certain helicopter components and parts that individually are necessary to place a helicopter back into service. For 10 of the items tested, the Command did not receive the parts until more than 90 days after ordering; in 7 of these instances, the delays were more than 150 days. We were not able to determine if these delays resulted in delays placing helicopters back in service because the Command did not maintain data in the automated records or in supporting documentation to track these delays. A similar issue regarding delays in receiving parts was noted in the aforementioned March 2007 consultant's report on the Command.

In response to delivery delays, Command management advised us that they had recently put into place a process to meet with one large manufacturer's representatives on a routine basis to discuss the manufacturer's records of unfilled purchase orders for parts. However, the Command did not periodically compare its lists of unfilled purchase orders to the manufacturer's list of unfilled purchase orders. When we compared those two lists, both dated October 10, 2007, we noted that the manufacturer's list did not include 38 of the 89 unfilled purchase orders recorded by the Command. Twenty-four of these 38 purchase orders were three months old or older as of the report date.

In addition to the delays experienced in obtaining helicopter parts, the Command did not use inventory stock reports for reordering medical supplies (non-controlled drugs). Finally, although MxManager included minimum and maximum stock levels for medical supplies, the Command had not reviewed usage to determine if these pre-determined levels were appropriate to meet its operational demands.

12. **The Command should ensure the accuracy of critical information entered into its automated maintenance system** – Certain critical maintenance information and documentation of work performed on helicopters was not always recorded in MxManager and a process did not exist to ensure the completeness or appropriateness of recorded data. Specifically, one employee entered relevant information received from the FAA and the manufacturers (such as updated

[12] Two helicopter operators indicated that such agreements reduce delivery time for critical hard-to-obtain parts.

inspection requirements), set system alert parameters for parts expirations, and entered completed work orders into MxManager. Without an independent review to ensure the accuracy of this posted information, errors or omissions could occur and remain undetected. Specifically, we noted the following conditions:

- Information entered into MxManager from FAA and manufacturer sources was not complete. Our test of all 76 FAA directives and manufacturer service bulletins issued in fiscal years 2006 and 2007 disclosed that 3 bulletins (dated December 2005, June 2006, and August 2006) deemed mandatory[13] by the manufacturer were not entered into MxManager as of December 2007. Consequently, the technician or pilot inspection checklists excluded these bulletins, and the related parts were not inspected.

- System alert parameters which, based upon predetermined periods, alert users that specified parts will need maintenance, such as an overhaul or replacement, were not always entered or reasonable. Our test of the alert parameters for 21 critical parts disclosed that 3 of these parts were not recorded in MxManager and, as a result, no related alerts were in the system. In addition, the alert parameter for 1 other part was not set to allow sufficient time to order a replacement part or to take other appropriate action. Specifically, the alert parameter for a tail gearbox–that must be overhauled every 3,000 flight hours or 24 months–was set at 25 hours, leaving an extremely short time for procurement.

- Our testing showed that not all completed work was entered into the automated records. As a result, the Command would not be able to effectively track all maintenance efforts for the fleet. Our test of 162 work orders completed during fiscal years 2006 and 2007 disclosed that 7 work orders were not entered into MxManager; 4 of the 7 work orders related to routine, required inspections, such as work performed to complete a standard 50-hour inspection.

13. **The Command should ensure that MxManager software is current and access to the automated records is properly restricted** –The Command did not ensure that the most recent version of the MxManager software had been downloaded from the vendor and

[13] Two of the bulletins were one-time safety inspections related to the hoists and the third was a daily inspection of the tail gearbox oil levels and tail rotor hub pitch for cracks.

installed on all applicable computers. For example, we noted that the most current release was issued by the vendor on June 8, 2007 to correct certain reporting deficiencies, including alert reports that did not display the proper number of hours or months before a part was due for overhaul, inspection, or retirement. However, the Command did not update its computers for this version until September 27, 2007. Furthermore, our review of three other updates issued in fiscal years 2005 and 2006 disclosed that two of the updates were installed on Command computers 53 and 212 days after release. These updates included modifications affecting areas such as maintenance alert reports, aircraft status indicators, purchase order reporting, and changes to inventory tracking.

In addition, 26 maintenance employees had access to the inventory and work order modules that did not need complete access to all menu options in these modules to perform their routine job duties. This access would permit them to delete or make other adjustments to inventory. It would appear there is little the Command can do to immediately limit access since we were advised by a vendor representative that the software was not designed to restrict access below the module level (such as to specific menu options within a module); however, the representative indicated that a modification might be possible.

Adequacy of Physical Controls Over Parts and Supplies Inventories

Background

The Command maintains a stock of parts and supplies (such as medical supplies) necessary to keep the helicopters in flight and able to perform missions. The majority of parts and supplies inventories are maintained at the Command's headquarters location at Martin State Airport. As of November 2007, the value of inventory on hand (excluding controlled drugs) totaled $4.8 million.

14. Parts and supplies (including controlled drugs) should be routinely inventoried – The Command needs to improve processes used to account for parts and supplies.

- We were unable to determine when the Command completed a physical inventory of helicopter parts and supplies as well as certain medical supplies (non-controlled drugs) maintained in the central supply room. Although we were advised that cycle counting is used, there was no documentation of the items counted and resulting

actions taken, if any (such as adjustments to the records, approval of differences), as required by the Department of General Services' *Inventory Control Manual*.

- Inventories of controlled drugs maintained at headquarters were taken sporadically. Our review of inventory records for calendar year 2007 (through November 15) for the seven controlled drugs stocked by the Command disclosed that the Command could only document that inventory counts had been taken between two and five times for each drug. An October 2006 draft update to the Command's operating manual specified that the inventories of all controlled drugs should be completed monthly. However, we were advised that, while this update had been transmitted to all sections of the Command, it had not been formally adopted.

- Inventory records for parts and supplies often did not accurately reflect amounts on hand. Our counts of 40 items disclosed variances from the inventory records for 14 items (such as rotor blades), and 2 items that were not recorded in the inventory records at all. In addition, our test of inventory purchases found that items were frequently inaccurately recorded in the inventory records. Although quantities received were generally accurate, we noted 9 instances, out of 20 purchases tested (valued at $1.81 million), in which the $454,000 in costs were not accurately recorded in the inventory records. In order to properly account for helicopter maintenance costs, the costs of parts and supplies must be accurately recorded.

15. **Access to the central parts and supplies storeroom should be properly restricted and controlled** – Access to the main parts and supplies (other than controlled drugs) storeroom at Martin State Airport was not adequately restricted. The Command did not maintain a record of who had been issued keys to one of two doors to the supply room, which is kept locked at all times, and was unaware of the total number of keys issued. In addition, while the other door to the supply room was open during the normal working day when the custodian was on duty and locked at all other times, the combination to this door's lock was known by a majority of Command staff. Furthermore, we noted that three employees had keys to the medical supplies maintained in a locked area within the general supply room (not including controlled drugs, which are secured elsewhere) that did not need access as part of their job duties.

16. **Controls over inventory withdrawals should be enhanced** – Command policy requires that any withdrawal of helicopter parts and supplies from inventory be recorded in MxManager and be associated with an existing helicopter maintenance work order. Normally, it is the inventory clerk's responsibility to record this information into MxManager as withdrawals are made during the day. However, because of the need to perform weekend maintenance work when the inventory clerk is not on duty, we were advised that maintenance technicians were given access to the inventory storeroom and that the related withdrawals were not always recorded in MxManager. In Finding 14, we noted differences between MxManager and actual on-hand quantities. Furthermore, our test of 61 work orders recorded in MxManager and our review of other documents, disclosed that 4 parts (such as an antenna and an emergency landing switch) used for 3 work orders had not been recorded in MxManager.

Manuals and Policies

Background

The Command maintains an FAA-approved *Repair Station Manual*. This *Manual* documents how the repair station functions and its structure, and includes maintenance and quality control procedures. Various manufacturer manuals also exist, including the American Eurocopter avionics manuals for its helicopter fleet (describing the electric systems of the helicopters). Separate manuals also exist for each version of the Dauphin helicopter.

17. **A process should be established to ensure that operational and maintenance manuals are kept current** –The Command's FAA-approved *Repair Station Manual* and the American Eurocopter avionics manuals were not always adhered to and kept current. For example, we noted the following conditions:

    - Our review disclosed a number of instances where current practices differed from that contained in the approved *Repair Station Manual*. For example, the Command's current organizational structure and documented job responsibilities of the maintenance unit did not meet that of the *Manual* or that required by FAA regulations. We noted that the Command's current structure includes a number of necessary positions not included in its approved *Manual*. The *Manual* should also include the job duties and responsibilities assigned to these positions. In addition, a number of current operational practices were not incorporated in the *Repair Station*

Manual, as required, such as the training program and the use of contract maintenance for certain inspections.

- Our review of 10 helicopter avionics manuals disclosed that 4 had not been updated for manufacturer revisions for periods ranging from 5 to 14 years. In addition, the Command had never received final wiring schematics for its 12 helicopters; rather, it operated using schematics marked as "preliminary." We were advised by Command management that subsequent to our review of this area, they received the appropriate wiring diagrams for the helicopters.

18. **A continuous repair station self-improvement process should be established as recommended by the FAA** – Although not required, the FAA guidelines recommend that a repair station establish a continual and structured internal evaluation process for identifying areas of noncompliance with FAA regulations and areas in need of improvement. Command staff advised that, although such a process is desirable, staffing limitations did not provide sufficient personnel resources to initiate such a process, although certain limited informal internal reviews had been conducted in the past. According to FAA guidelines, a formal internal evaluation process should be independent, have well-defined responsibilities, receive attention from upper management, evaluate high-risk areas, include defined schedules of activities, establish corrective action procedures, and document work performed and related results. The overall internal evaluation program procedures should be documented and followed. FAA examples of areas that should be considered for an internal evaluation program include

    - facilities and equipment;
    - personnel qualifications, training, and staffing levels;
    - supplier selection, approval, and surveillance;
    - inspection and quality control processes;
    - tool adequacy and calibration;
    - process for returning an aircraft to service after maintenance;
    - defect reporting; and
    - records and recordkeeping procedures.

    Many of these areas are commented on in this report as being in need of improvement and could benefit from the continual oversight envisioned with an internal evaluation process.

Other Findings

19. Accountability and controls over tools need to be improved –

Certain tools used to maintain the helicopters must be calibrated within standards acceptable to the FAA. These tools are calibrated every 12 months in accordance with Command policy. This calibration ensures the tools meet exacting standards critical to maintenance and safe operation of the helicopters. The Command uses outside vendors to calibrate tools; these vendors provide a certificate to document the work done and place a tag on the tool to indicate the date, the vendor, the tool number, and the next calibration due date. The Command maintains tool calibration information in MxManager. Our test of tool calibrations revealed that the last calibration date was not always properly recorded in the automated records. For example, for 2 of the 20 tools tested, the Command could not locate the calibration certificate, and for 1 of these tools the last calibration date was not recorded in MxManager. The same employee both monitors and updates all records for tool calibration and tool disposals, and there was no periodic independent review, which might have detected these omissions.

While the Command has a policy for accountability of tools, it was not sufficiently comprehensive. The policy requires that toolboxes be appropriately organized so that missing tools can easily be identified after maintenance is performed; however, no employee, other than the employee servicing a helicopter, was responsible for ensuring that all tools were accounted for. We were advised that, during calendar year 2007, the Command identified three instances in which tools were left in helicopters after maintenance was performed; these situations were not discovered until later inspections (usually by the pilot prior to starting a shift). On December 26, 2007, a Command employee reviewed 10 toolboxes for organization in compliance with its policy and found that 9 of the tested toolboxes were not organized in a manner to allow an employee to easily identify missing tools.

Recommendations

6. No recommendation

7. No recommendation

Maintenance Costs

8. We recommend that the Command develop a system for tracking detailed cost data for helicopter operations, including a process to track labor hours for specific maintenance and inspection tasks. We also recommend that the Command use these data, as well as any other reputable sources, to create performance benchmarks and to monitor unit and employee performance. We further recommend that the Command use these data to perform an analysis of the adequacy of the size and composition of the maintenance staff.

9. We recommend that the Command evaluate the costs and benefits of using contractors for inspections rather than in-house maintenance staff.

10. We recommend that the Command track maintenance and repair costs associated with safety incidents.

Maintenance Information Systems

11. We recommend that the Command implement procedures to help ensure the timeliness of parts delivery. Specifically, MxManager should be used to determine the appropriate stock levels for critical parts and supplies, to order critical parts and supplies using the appropriate stock levels, and to track the timeliness of parts deliveries. In addition, the Command should continue its periodic contact with parts manufacturers in conjunction with a process to account for all open orders, and should consider establishing a guaranteed maintenance program with manufacturers to obtain parts in a timely manner.

12. We recommend that the Command establish a process to ensure, at least on a test basis, the completeness, accuracy, and reasonableness of all critical information entered into MxManager and inspection checklists.

13. We recommend that the Command install system updates in a timely manner and restrict system access to those employees who need such

access to perform their assigned job duties, including revising system security, if warranted.

Adequacy of Physical Controls over Parts and Supplies Inventories

14. We recommend that the Command maintain accurate inventory records and conduct physical inventories on a periodic basis in accordance with the requirements of the DGS *Inventory Control Manual*. All physical inventory counts should be documented.

15. We recommend that the Command restrict access to the central storeroom to those employees who require such access and maintain a record of those with access.

16. We recommend that the Command comply with existing policy and ensure that all inventory withdrawals are properly documented and recorded in MxManager.

Manuals and Policies

17. We recommend that the Command establish a process to maintain its FAA-approved *Repair Station Manual* and the American Eurocopter avionics manuals on a current basis. We also recommend that the Command operate in accordance with these manuals and FAA regulations.

18. We recommend that the Command consider implementing a formal internal evaluation program for repair station operations to identify areas of noncompliance with FAA guidelines, and to identify areas in need of improvement.

Other Findings

19. We recommend that the Command ensure, at least on a test basis, that all tool calibration information is accurately recorded in MxManager. We also recommend that the Command periodically inspect toolboxes to account for all tools.

Objective 3

Personnel, Staffing, and Training

Conclusion

Our audit objective was to determine the adequacy of the Command's staffing structure and personnel practices and its training policies. As part of our audit, we met with more than 110 of the Command's employees to identify areas of potential concern or other issues of relevance to the Command's operations. Determining the adequacy of the Command's staffing (organizational) structure proved challenging because our research found few truly comparable law enforcement organizations or other entities that operated a helicopter fleet and that had a very similar mission profile. However, based on the information available and our comparisons with entities whose responsibilities included both medevac and law enforcement mission, we determined that the Command's organizational structure seems reasonable. Although other local and state law enforcement agencies entities we contacted made mention of the Maryland State Police Aviation Command as a model for such organizations, we identified several staffing issues impacting operations. The most significant personnel issue confronting the Command is turnover in key positions and addressing the apparent causes for this turnover.

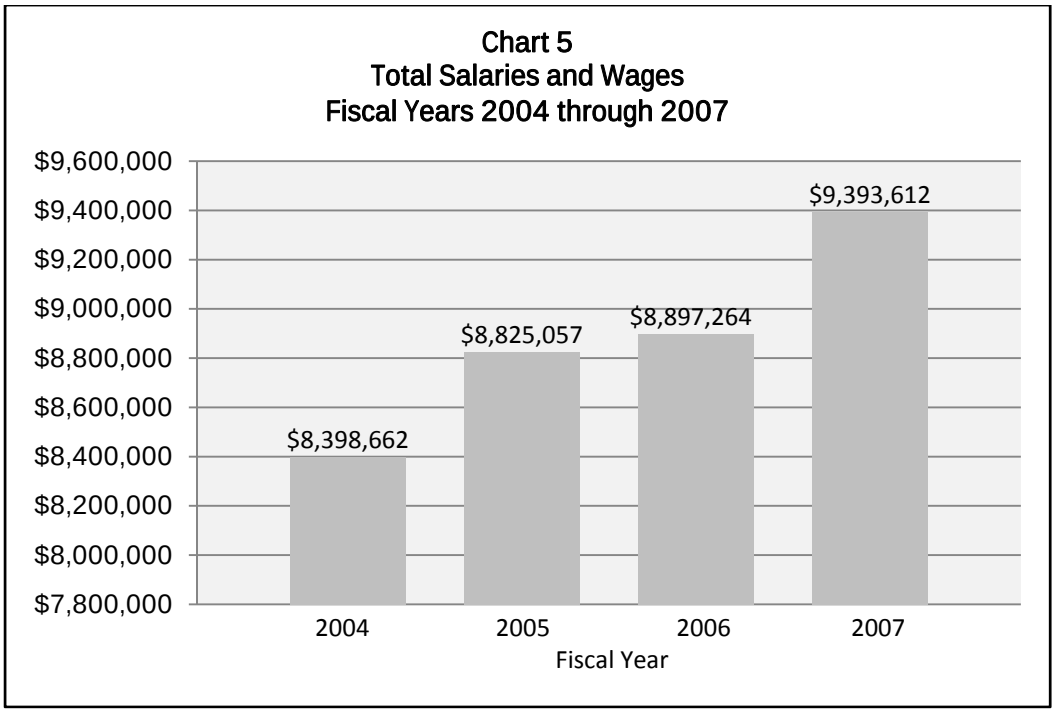
Our review disclosed that, over a recent five-year period, the Command had 13 personnel changes involving 5 senior management positions. The primary causes for the management turnover were transfers between positions within the Command and to other positions within the Department, as well as retirements. One underlying factor contributing to this turnover—the frequency of which the Department did not deem to be excessive or unusual—was the Department's practice to rely almost exclusively on troopers (with or without appropriate prior aviation experience or technical expertise) to fill management positions within the Command. Although we found this practice provides troopers with an opportunity for advancement, it does limit civilian employee opportunities, an issue brought to our attention by several Command employees. Perhaps most significant is that this turnover can affect the continuity and consistency of leadership.

In addition to management, turnover was found to have been significant among pilots and technicians, especially during fiscal years 2006 and 2007. Also, we found some positions were understaffed (due, in part, to military

deployments), which has contributed to a rise in overtime costs from $538,000 (6.4 percent of total salaries) in fiscal year 2004 to $1,171,000 (12.5 percent of total salaries) in fiscal year 2007. Nevertheless, the turnover experienced within the civilian pilot and technician positions appears to have been primarily the result of the Command's generally low salaries, compared to industry survey data and other entities. One key impact of high turnover, at numerous positions and levels, has been a reduction in institutional knowledge, as many current employees have limited experience with the Command. For example, 8 of the 21 maintenance technicians employed by the Command as of June 30, 2007 had one year or less of service with the Command. Another real impact is financial, as we estimated that it costs the Command more than $100,000 to train a pilot to its standards. Although, during the latter stages of our audit fieldwork and subsequent to that, the Command has initiated some actions to address turnover issues, more needs to be done. Finally, we determined that the Command's training program appears reasonable and that trooper/flight paramedics and pilots generally received required training, although certain enhancements should be undertaken by the Command.

Background

According to the Command's records, as of December 1, 2007, the Command employed 143 individuals, which comprised 79 civilians and 64 sworn police officers (troopers). These employees included 36 helicopter pilots assigned to sections, 4 helicopter pilots in initial training or on restricted duty, 37 trooper/flight paramedics assigned to sections, 22 aircraft maintenance technicians, and 44 others including management, supervisors, and support personnel. The Command also had 18 vacant positions, including 6 helicopter pilots and 6 trooper/flight paramedics. Fiscal year 2007 salaries and wages, excluding fringe benefits, totaled approximately $9.4 million; see Chart 5 on the following page. Pilots and trooper/flight paramedics are typically assigned to one of the eight helicopter sections located throughout Maryland. Technicians and support employees are assigned to Command headquarters, located at Martin State Airport in Middle River. Command policy is that all trooper/flight paramedics are sworn State Police officers, while helicopter pilots include both civilians and sworn officers, of which approximately 90 percent are civilians. All technicians are civilians.



Source: Aviation Command
Note: Elsewhere in this report, we comment that overtime has increased about $600,000 from fiscal year 2004 to fiscal year 2007, which accounts for the majority of the salary and wages increase in this Chart.

Salary Schedules

Since the Command employs both troopers (of various ranks) and civilians, two separate salary scales are in use. The civilian employees fall under the Department of Budget and Management's (DBM) salary schedule for regular State employees, while the troopers are under the Department of State Police (DSP) salary plan. Additionally, retirement benefits differ: Troopers are eligible for full retirement after 22 years of creditable service, and civilians, which receive regular State employee benefits, are eligible for full retirement benefits after 30 years of service. As commented upon later in this objective, the Department's salary plan does provide greater salary potential for the troopers than for the civilian employees.

Employee Interviews

During the course of our audit fieldwork, we interviewed more than 110 Command employees (including administration personnel, pilots, trooper/flight paramedics, and technicians) to identify their issues and concerns about the operation of the Command. Through this process, numerous concerns affecting maintenance, flight operations, and human

resources were identified. Below are the most common issues raised by the Command's employees:

- Inadequate vendor support for parts and delays in receiving ordered parts
- Discord between civilian and sworn personnel resulting from differences in pay, benefits, and promotional opportunities
- Low pay for all types of staff
- Shortage of technicians to maintain the helicopters
- High rate of management turnover
- Lack of training or irrelevant training (due to funding issues and/or the unavailability of helicopters for training missions)
- Lack of aviation experience among Command management staff
- Inadequate funding for spare parts, equipment, and supplies
- Helicopter downtime, impacting the number of helicopters available for missions

A number of these concerns appear to be legitimate issues with actual or perceived (by Command personnel) impact on the Command's operations. We comment upon most of the above issues as findings in this objective and elsewhere in this report.

Findings

20. **While it was difficult to assess the adequacy of the Command's staffing (organizational) structure due to the lack of truly comparable entities, based on the information available, the Command's structure appears reasonable -** To assess the adequacy of the Command's organizational structure, we surveyed other law enforcement entities that operate helicopters. We identified four state police departments whose missions included both medevac and law-enforcement. We identified differences in the organizational structures of these units, which were the result of differences in the methods used to address certain functions that would be expected to be performed in connection with an airborne law enforcement entity. Specifically, some common functions were performed by using internal aviation command staff, by relying on centralized staff at the oversight organization level, or by using contractors. When these four entities used internal aviation command staff for major functions, the applicable personnel were organized in divisions similar to the Command. Considering this and other

observations we made, the Command's organizational structure seemed reasonable.

As an example of the differences in how other states handle common functions, we noted that none of the other four state aviation units employed trooper/flight paramedics or other medical employees. Rather, the on-board medical services were performed by others, such as vendors that contracted with the states, or volunteer medical personnel. In addition, the other state aviation units typically received more support services (such as personnel and information technology) from their respective oversight organizations.

The most comparable state aviation unit that we identified has 13 helicopters that operate from five bases, has a mission profile similar to the Command and generally performs its own maintenance (although contractors are used in a manner somewhat similar to the Command). The unit's aircraft maintenance department is organized similarly to the Command's maintenance department in that there are a limited number of supervisory personnel for the maintenance technicians. In addition, similar to the Command's operation, this unit has a commander at each base and the base commanders also fly on missions.

On the other hand, this unit does not employ trooper/flight paramedics or other medical personnel and, rather than have its own administrative personnel, it receives these support services from its state police headquarters. For these reasons, this unit has only 67 employees compared to the Command's 161 employees (including vacancies). This unit has four senior management employees (Director, Chief Pilot, Assistant Chief Pilot, and Director of Aircraft Maintenance) overseeing its operations, which is comparable to the Command's five senior management employees. The extra Command senior management position recognizes that, unlike this other unit, the Command uses its own personnel to perform recruiting and training, as well as to supervise and evaluate 43 trooper/flight paramedic positions.

Given the functions performed by the Command, its organizational structure seemed reasonable. The Command has five employees in senior management: a commander, a deputy commander, and three division directors. Each division has as an independent function—operations, support, and maintenance. In addition, the Command has eight helicopter section supervisors and four regional supervisors, as well as numerous other support and administrative employees. All of the section and regional supervisors regularly perform missions as pilots or

trooper/flight paramedics, and some other administrative employees (such as the personnel director, the director of procurement and logistics) may also perform these duties, as needed.

21. Action should be taken to address the frequency of management turnover within the Command – Our review of personnel actions over the past several years disclosed an apparent lack of continuity in certain of the Command's management positions. Specifically, we identified five positions that we believed were critical to the overall management of the Command or to specific key segments of the Command's operation. From a review of human resource files, we quantified the turnover experienced by these positions for a recent five-year period and identified the reasons for the turnover. (See Table 19.)

Table 19
Management Turnover - Fiscal Years 2003 through 2007

	Commander	Assistant Commander	Commander Flight Operations	Commander Support Operations	Maintenance Operations Director	Totals
Number of different employees in position during five-year period	**3**	**4**	**3**	**4**	**4**	**18**
Resigned/ Terminated	-	1	-	-	1	2
Retired	2	_	-	1	-	3
Reassigned in Command	-	_	1	1	2	4
Reassigned out of the Command	-	2	1	1	-	4
Currently in Position❶	1	1	1	1	1	5

Source - DSP human resource files
Note: A simplified organizational chart is included as Exhibit E.
❶ At the time of fieldwork, all of these positions were filled by troopers.

Despite the uniqueness of the Command's operations, Department and Command management did not consider this turnover to be excessive and considered it to be typical for a police organization. Given the Superintendent's authority to assign personnel to positions and duties as he sees fit to achieve the goals, mission, and objectives of the

Department, it is an accepted practice within the Department to frequently transfer employees between units, matching employee capabilities with Departmental needs. As Table 19 indicates, such transfers, both within and outside the Command, were the most common reasons for position turnover, followed by retirements.

The transfers appear to be related, either directly or indirectly, to the near-exclusive use of troopers to fill key Command management positions. For example, during the course of our audit fieldwork, paramedic sergeants filled the Command's director of maintenance position (which is included in Table 19) and personnel director position (which falls under the Director of Support Operations and is not included in Table 19). This use of troopers is understandable, given the nature and culture of the Department, and it does provide the Department the opportunity to internally promote staff who have demonstrated supervisory abilities; however, it might come at the expense of expertise in the unique areas or challenges related to operating an aviation organization. In fact, the qualifications for employees to successfully perform these jobs, such as the professional and/or technical expertise, including aviation experience, had not been formally established. For example, although the current Assistant Commander has relevant technical experience having served as a trooper/flight paramedic, DSP does not require senior Command management personnel to have prior aviation experience, as management skills are deemed to be more critical. Similarly, prior maintenance experience is not a requirement for the Director of Maintenance position. Although management personnel can be expected to obtain necessary, specialized knowledge while working at the Command, frequent reassignments or transfers could have an impact on overall Command operations.

Another identifiable cause of the management turnover was retirements. We believe that this is also associated with the almost exclusive use of troopers. Specifically, by the time troopers demonstrate or otherwise obtain appropriate management skills, they often might be close to retirement, as only 22 years of creditable service are required to be eligible for full retirement.

We cannot quantify or otherwise conclude as to the impact of the observed turnover. However, considering the uniqueness of the Command to the Department of State Police, the resultant specialized knowledge needed by Command management, and the feedback received from employees, we maintain that minimizing management turnover is desirable to establish leadership continuity and consistency.

There are issues confronting the Command, as highlighted in this report (such as the need to improve information management systems, to maximize helicopter availability by reducing downtime, to ensure an adequate supply of helicopter parts, and to ensure the timely completion of helicopter maintenance on an aging fleet), that require a sustained and consistent leadership commitment to institute needed changes.

22. **The Command should take action to address significant non-management staff turnover and vacancies** – The Command has experienced non-management staffing issues, due primarily to turnover and vacancies in key operational positions. Our analysis of staffing trends for fiscal years 2003 to 2007 indicates that turnover of key non-management positions (pilots, trooper/flight paramedics, and technicians) has become more prevalent (see Table 20), especially among pilots and technicians.

Table 20
Turnover Percentage By Position
Fiscal Years 2003 through 2007

Fiscal Year	Pilots	Trooper/ Flight Paramedics	Technicians
2003	8.25%	0.00%	0.00%
2004	4.08%	6.12%	4.65%
2005	8.33%	2.06%	9.52%
2006	5.94%	2.00%	28.57%
2007	16.67%	5.66%	16.00%

Source: DSP personnel records

Note: OLA calculated turnover rates by dividing the average total positions by the number of separations from the Command during the year. Most of the turnover was not caused by retirements.

In addition to turnover, Command staffing has been impacted in recent years by vacancies and military leave. For example, as of December 1, 2007, the Command had budgeted 89 pilots and trooper/flight paramedic positions for its eight helicopter sections. (Note that technicians are not assigned to sections.) We independently estimated that at least 85 pilots and trooper/flight paramedics were required to fully staff the eight helicopter sections.[14] During fiscal year 2007, when compared to our estimate of 85 positions, those sections were still, on average, understaffed by the equivalent of nine positions. To address

[14] This is a minimum estimated number, based on the assumption that certain off duty staff assigned at one location could fill in at another nearby location. The Command's preference is that trooper/flight paramedics and pilots be assigned full-time to a single section since travel time to multiple sections could be onerous.

this situation and to maintain required coverage, the Command has increasingly relied on paying overtime to pilots and trooper/flight paramedics. Between fiscal years 2004 and 2007, the Command's annual overtime expenditures, for all employees, roughly doubled, from $538,000 (6.4 percent of total salaries) to $1,171,000 (12.5 percent of total salaries), and consistently exceeded budgeted amounts for overtime. Given the persistent vacancies and the requirement to maintain a certain level of service, the increase in overtime costs is not unexpected, although the current annual expenditures and upward trend are clearly causes for concern.

Another impact of the high turnover of personnel is the resultant large proportion of employees, especially technicians, with minimal experience with the Command. (See Table 21.) For example, as of June 30, 2007, 11 of the 21 technicians had fewer than 5 years of service with the Command, including 8 employees with less than one year of service.

Table 21
Years of Service in the Command as of June 30, 2007

Years	Pilots	Paramedics❶	Technicians
25 to 30	2 (5%)	0	1 (5%)
20 to <25	2 (5%)	0	1 (5%)
15 to <20	6 (16%)	4 (11%)	1 (5%)
10 to <15	9 (24%)	7 (19%)	1 (5%)
5 to <10	12 (32%)	12 (33%)	6 (29%)
1 to < 5	6 (16%)	11 (31%)	3 (14%)
Less than 1	1 (2%)	2 (6%)	8 (38%)
Total Filled Positions❷	**38**	**36**	**21**

Source: RightCAD and DSP personnel records

❶ Trooper/flight paramedics, as troopers, can retire after 22 years of creditable service or at age 50. In addition, when trooper/flight paramedics are promoted they may be transferred to other positions outside of the Command. Primarily for these reasons, there are no trooper/flight paramedics with more than 20 years of experience.

❷ "Total Filled Positions" does not equal the number of budgeted positions, which were 46 pilots, 43 trooper/flight paramedics, and 25 technicians as of December 1, 2007 (see Table 1 on page 13).

Based upon documented employee exit interviews (conducted by the Command for pilots), comments from pilot applicants (reviewed by OLA), OLA discussions with Command management, and our interviews with numerous Command personnel, the primary cause for pilot turnover was the Command's low salaries for civilian positions. From our discussions with pilots, we also found a general dissatisfaction with a lack of advancement by civilian employees into Command management positions.

Given the assertion of low salaries, we attempted to identify the salaries paid by other entities for similar employees. Although we experienced difficulty in identifying comparable entities, and then in obtaining salary information, ultimately, we obtained salary data from several sources and compared it to the Command's fiscal year 2008 salary schedule. This comparison disclosed that the salaries of the Command's employees are generally below industry survey averages and below those paid by other entities, especially with regard to civilian positions. (See Table 22 on the following page.)

Table 22 Salary Survey Results ❶		
Position	Salary Range	
	Low	High
Pilots		
MD State Police - Civilian Pilot I and II ❷	***$52,146***	***$68,626***
MD State Police - Trooper	***$51,169***	***$84,222***
Survey Average ❸	$59,752	$99,919
U.S. Corporate Helicopter ❹	$73,000	$113,000
U.S. Police Helicopter ❹	$68,000	$92,000
Chief Pilot Public Service ❺	Up to	$160,000
Chief Pilot Corporate ❺	Up to	$200,000
Technicians		
MD State Police - Civilian ❻	***$48,881***	***$60,222***
Survey Average ❸	$55,108	$72,720
U.S. A&P Mechanic Public Service ❺	$10,000	$120,000
U.S. A&P Corporate ❺	$10,000	$100,000
(A&P – combined airframe and power plant)		
Paramedics		
MD State Police – Trooper	***$47,657***	***$78,494***
Survey Average ❸	$57,249	$87,147
U.S. EMS Helicopter ❹	$58,000	$83,000

❶ Command salaries are those paid during fiscal year 2008.

❷ Effective July 1, 2008, a one-grade increase was approved for this position increasing the maximum salary to $74,725, including a two percent cost of living adjustment.

❸ In November and December 2007, we contacted entities operating helicopter missions (both government and private sector). We ultimately obtained 12 responses for pilots, 7 responses for technicians, and 4 responses for trooper/flight paramedics from entities located throughout the country. There are few truly comparable entities to the Command, limiting the number of responses received. For example, other police units might conduct law enforcement missions, but not medevac, and private entities that provide medical transport or medevac response do not conduct law enforcement or search and rescue.

❹ *Professional Pilot* magazine June 2007

❺ Averages per *Rotor and Wing* magazine (rotorandwing.com) published August 2006. The low income ($10,000) appears unrealistic for full-time employment; however, we were unable to obtain an explanation for that salary.

❻ Effective July 1, 2008, a one-grade increase was approved for this position increasing the maximum salary to $65,568, including a two percent cost of living adjustment.

From this limited salary survey, which did not consider fringe benefits, the Command's helicopter pilot salaries appear to be substantially below industry survey data and those paid by other entities, even though the Command's missions are frequently more challenging than missions flown by most helicopter organizations. For example, the Command's pilots are frequently called upon at night to land in unfamiliar areas on highways, parking lots, and fields. These landing zones may contain dangerous obstacles such as unlit towers and wires. Conversely, pilots in entities that only perform law enforcement missions generally take off and land at the same airport.

The Command conducts exit interviews of all employees prior to termination from service; however, only statistics for the reasons for leaving the Command given by pilots are documented. Based on Command records, low pay was indicated for 11 of the 21 pilots that separated from service during the period July 1, 2002 through June 30, 2007. As previously noted, low salaries was frequently mentioned during our interviews with numerous employees as an issue facing the Command. In addition to employee retention, low salaries impact recruitment efforts. According to the records maintained by the Command's personnel office, during the period from April 2004 through October 2007 it received 100 applications for civilian pilots, including several persons that sent more than one application. Fifty-three qualified[15] pilots were offered a position, 16 accepted employment, and 37 declined. Of the 37 that declined, 24 stated that the low starting salary was the main reason for declining. Low salary could play an even more significant role in the future, since a large number of the current helicopter pilots are over the age of 50. Specifically, 33 pilots are over the age of 50, with 5 of those over 60 years of age. With eventual retirements, hiring qualified pilots to replace these current pilots might prove difficult given the salary structure.

During the course of our audit fieldwork, the Command had initiated action to address low civilian pilot salaries. In conjunction with its exit interviews and after a study of other entities' pilot salaries, a pay plan adjustment request was submitted by the Department to DBM in July 2007. The pay plan adjustment requested that civilian pilot salaries be adjusted to be comparable to trooper pilot salaries, which would equate to more than a 20 percent increase in the top salary. According to DBM,

[15] The Command requires pilots to have FAA commercial and instrument helicopter ratings, 2,000 helicopter flight hours as pilot in command and a current medical certificate. Although not required by the Command's FAA license, this extensive flight experience is deemed by the Command to be a safety issue.

approval was granted for the Department to increase civilian helicopter pilot salaries in fiscal year 2009 by one grade, which is approximately a seven percent salary increase (resulting in a maximum civilian helicopter pilot salary of $74,725, including a two percent cost of living adjustment). However, this adjustment still leaves the Command's civilian pilot salaries significantly below the salaries paid in the industry and below the salaries paid to the Command's trooper pilots. Similar action was taken to address low technician salaries and, likewise, approval was granted to increase these salaries in fiscal year 2009 by one grade, increasing the maximum salary to $65,568. As with the pilots, replacing or retaining experienced technicians in the future could be problematic with the low salaries.

Regarding the second issue potentially influencing the retention of civilian employees—a lack of advancement for civilian employees into management—the Command had not taken formal action. Historically, virtually all Command management positions have been filled by troopers from within the Department. As previously noted, senior Command management positions are routinely filled by troopers, even though all maintenance technicians and about 90 percent of the Command's helicopter pilots are civilian employees. In addition to all of senior management, as of December 1, 2007, we noted that all four of the regional supervisors (each region comprises two helicopter sections), and all eight helicopter section supervisors, were either trooper pilots or trooper/flight paramedics.

According to the Department's management, although there is no requirement that supervisory or management personnel be troopers, they acknowledge that it has been a long-standing practice to generally fill management and supervisory positions from within the trooper ranks. Subsequent to the conclusion of our audit fieldwork, the Department advised us that, in May 2008, a civilian was appointed as the director of maintenance and that, in April 2008, three technician positions were reclassified to supervisory positions within the maintenance section.

In addition to possibly affecting the Command's operational effectiveness, there are large financial costs of excessive turnover. For example, training provided to new pilots and technicians is extensive and time-consuming and there is a considerable period before employees, especially pilots, are fully acclimated to the Command. To the extent that salary increases reduce turnover, the increased salary expenditures could be at least partially offset by reduced training expenditures. For example, the Command requires that pilots have 2,000 hours of

helicopter flying time before they are hired, and requires that pilots complete further extensive training before they can work at a section. This training includes one week in ground school training in Texas provided by the manufacturer of the Command's helicopters (American Eurocopter). The training also includes flying in Command helicopters with instructor pilots. The training takes several months to complete and, according to our calculations, is estimated to cost more than $100,000 per pilot. Finally, opening up or creating management opportunities for civilian staff could free up existing troopers for other law enforcement duties.[16]

23. **Although supportive of the Command, certain Department personnel actions impacted operations -** During the course of our fieldwork we became aware of certain personnel decisions that, while not a violation of policy, could have an adverse impact on either Command operations or related morale of Command staff.

- As of January 10, 2008, four qualified paramedics functioning in law enforcement roles at State Police barracks had requested transfers to fill trooper/flight paramedic vacancies. Three of these four requests were made during the period from April 2007 through June 2007. These four requests were denied based on a consideration of the staffing needs of the entire Field Operations Bureau. However, since it is Command policy that flight paramedics be troopers (due to the dual law enforcement role of the helicopters), this limits the Command's opportunities to fill its trooper/flight paramedic vacancies.

- As previously noted, the Command's technician salary range is generally lower than that of other similar entities, which could impact the Command's ability to hire qualified technicians. In addition, during recruiting, neither the Command nor DSP have unilateral authority to adjust a salary offer above the midpoint on the salary scale when making an offer; rather, this requires DBM approval. Although an isolated occurrence, we noted one recent case in which a prospective candidate, who was deemed highly qualified by the

[16] This concept is not new. In January 2004, based on a request from the Chairmen of the Senate Budget and Taxation Committee and House Committee on Appropriations, the Office of Legislative Audits issued a performance audit report entitled "Department of State Police Workforce Civilianization." That report identified certain administrative and support positions filled by troopers, which could be civilianized to free up troopers to perform law enforcement-related activities.

Command, requested a starting salary of $5,000 more than the midpoint of the salary scale for the position; the Department chose not to pursue this salary offer with DBM and the person was not hired. Certainly, more flexibility and authority in setting compensation could affect recruiting success.

Command management did not dispute that these two instances impacted their operations. However, they maintain that the Department is generally supportive of the Command and that being part of the Department is beneficial. For example, as noted in the preceding finding, the Department has recently assisted the Command in increasing salaries (such as for civilian pilots).

24. **The Command's inspector supervisor position is not independent of the maintenance functions** – FAA regulations require that certified repair stations use both inspection and supervisory maintenance personnel and, although not specifically prescribed in regulations, the intent appears to be that these functions be independent from each other. However, the Command employs inspection supervisors who have inspection responsibilities and who also supervise maintenance technicians in the normal course of repairs. An inspector's main job duty is to inspect the quality of the maintenance staff's work to ensure it was completed properly, enabling the inspector to certify the helicopter as flight-worthy. Because they perform both functions, Command inspection supervisors could be placed in the position of supervising maintenance work and certifying that same work. This does not establish the necessary separation of these functions to provide the desired independence. We were advised by representatives of the U.S. Coast Guard and U.S. Navy that, at their respective facilities, inspectors are prohibited from inspecting their own work, or work done by employees they supervise, and that independent personnel certify all aircraft as ready to return to service after maintenance is completed.

25. **Although the Command and its maintenance staff are recipients of FAA training awards, training enhancements are possible -** A maintenance technician training manual was developed by the Command, effective August 2006, and the FAA approved this manual in March 2007. The purpose of the manual is to "set forth the procedures for the Command to identify its training needs in a systematic manner, develop training, and/or identify existing training, select the training methods, provide training methods, record training

accomplishment, and measure the effectiveness of its training program." Our review of the training program and selected employee training files disclosed the following conditions:

- The Command had not developed a curriculum of training courses for technicians, as required. Although the Command had created a form which lists the various areas of proficiency for technicians, the Command had not formally identified the training curriculum necessary to achieve this proficiency (such as the associated courses or minimum course hours).

- Our review of the training files for ten randomly selected maintenance technicians disclosed that there had been no formal individualized assessments of training needs performed for nine out of ten technicians tested, even though these are required by the maintenance technician training manual as a means to tailor individual training programs.

  We did note that all ten technicians tested had a current Airframe and Powerplant Mechanics license as well as two years of helicopter experience or were graduates of an FAA part 147 school, as required by the Command. (Part 147 refers to the federal regulations that govern requirements for aircraft maintenance personnel.) Our test also included pilots and trooper/flight paramedics, which found that required training was provided.

Recommendations

A number of these recommendations might require actions that neither the Command nor the Department can take unilaterally. Consequently, the involvement or commitment of DBM and, in some cases, the General Assembly, might be necessary to affect the desired change.

20. No Recommendation

21. We recommend that the Department evaluate its practices with respect to management turnover and take steps to foster more stable leadership. We also recommend that the Command develop formal qualifications for its various management/supervisory positions.

22. We recommend that the Command develop a formal process to analyze the reasons for staff turnover and vacancies for all non-management positions and develop an appropriate strategy to address these issues.

For example, exit interviews should be conducted for all employees that resign and related summary statistics maintained. We also recommend that the Command and the Department continue their efforts to increase the salaries for its employees so that they are more competitive. Finally, we recommend that the Command analyze its organizational structure to determine whether opportunities for the advancement of qualified civilians into management and supervisory positions can be increased.

23. We recommend that the Department evaluate its staffing practices and decisions with respect to transfer requests and attempt to obtain more authority and flexibility in making hiring decisions.

24. We recommend that the Command take action to identify adequate personnel resources to separate the duties of inspection and maintenance supervisors.

25. We recommend that the Command comply with its FAA-approved technician training manual, including the implementation of a curriculum addressing maintenance technician training needs.

Objective 4

Reliability of the "Golden Hour" Performance Measure

Conclusion

This audit objective was to determine the reliability of the fiscal years 2005 and 2006 reported percentages of medevac missions completed within the "Golden Hour." For those years, the Department of State Police (DSP) reported that 94.81 percent (fiscal year 2005) and 94.36 percent (fiscal year 2006) of the missions were completed within the "Golden Hour." The Department's MFR (Managing for Results) goal is to complete 95 percent of its medevac missions within the "Golden Hour." However, as a result of the following deficiencies, we were unable to conclude with respect to the reliability of the reported MFR results for the "Golden Hour" for fiscal years 2005 and 2006.

Our audit disclosed that the Command had not formally defined the term "Golden Hour" and that the underlying data supporting these reported results were not consistent with the accepted definition of "Golden Hour." The University of Maryland Medical Center defines the "Golden Hour" as the hour between injury and delivery of a patient to a trauma center. This definition is consistent with the definition used by medical professionals. Since the Command does not know the time of injury, it uses the time that the section receives the medevac request from SYSCOM as the starting point of the "Golden Hour," which is always after the time of injury. Nevertheless, the Command should define the term and ensure its method of measurement conforms to this definition.

In addition, quality control procedures had not been established by the Command to verify the accuracy of the mission times recorded in the RightCAD database, which is the data source for MFR calculations. Furthermore, the Command did not retain documentation supporting its MFR calculations nor did it retain voice transmission data between SYSCOM and the helicopter sections, which would enable a verification of the recorded times in the RightCAD database.

Using the RightCAD database, we were able to recompile the information used by the Command to calculate the "Golden Hour" results for fiscal years 2005 and 2006. The Department's reported results were properly computed,

assuming the underlying data (such as the recorded times for each mission) were reliable. However, based on further analysis of these data, we identified certain questionable flight times pertaining to missions that were reportedly flown in one hour or less as well as those that took more than one hour.

Background

As part of its annual Managing for Results (MFR) submission, the Department reports the percentage of medevac patients delivered to the appropriate care facility within the "Golden Hour." According to the Command, the "Golden Hour" starts with the receipt of the initial request to a section for a medevac helicopter by SYSCOM. The Command's goal for this measure is the delivery of 95 percent of patients within the "Golden Hour." According to the Department's fiscal year 2008 budget submission, the following results were achieved for fiscal years 2005 and 2006 (most current actual results available at the time of our audit):

Table 23
Managing for Results (MFR)
Fiscal Years (FY) 2005 and 2006

	FY 2005	FY 2006
MFR Performance Goal	95%	95%
Reported medevac missions completed within "Golden Hour"	94.81%	94.36%
Total number of medevac missions flown by Command helicopters (based on OLA's compilation using the RightCAD database)	5,123	4,863
Total number of medevac missions completed within one hour (based on the reported measure)	4,857	4,589

Sources: Fiscal Year 2008 executive budget and RightCAD database

The underlying data for the measure contained in the RightCAD database based on transmissions between the flight crew and SYSCOM are key times manually recorded by SYSCOM staff. These include

1. the initial request for a medevac mission from the local responders,
2. the initial request to a section for a medevac mission from SYSCOM,

3. the helicopter lift-off from its base,
4. the helicopter arrival at the accident scene,
5. the helicopter lift-off from the accident scene, and
6. the helicopter arrival at a trauma hospital.

To calculate the "Golden Hour" measure, the Command extracts information from RightCAD for a given fiscal year and runs a report of all medevac missions performed, as well as a report of all missions where the total time between a section receiving notification from SYSCOM (2 above) and the arrival time at a trauma hospital (6 above) is determined not to be completed within the "GoldenHour" (non-compliant missions). The total non-compliant missions is divided by the total number of medevac missions (also from RightCAD) and the resultant percentage is subtracted from 100 to arrive at the number of missions completed within the "Golden Hour."

Findings

26. The Command has not formally defined the term "Golden Hour," and the accepted definition of the "Golden Hour" is not consistent with the Command's MFR reporting

- The Command's use of "Golden Hour" is not consistent with the term's accepted definition, nor has the Command provided its own definition of the term. The accepted definition of the "Golden Hour" is the first hour after the occurrence of a serious accident and resultant trauma; however, the Command does not measure the time between the occurrence of the accident and the delivery of a patient to a trauma center, because it does not know when the trauma occurred. Rather, the Command actually measures the amount of time between SYSCOM's notification to a section that a medevac mission is needed and the time a patient is delivered to the trauma center, which represents actions wholly under the Command's control. Specifically, the Command has no knowledge of the amount of time lapsed from the occurrence of an accident to the decision of a local emergency response team to contact SYSCOM to request a medevac transport. Furthermore, often neither the Command nor the initial responding ground EMT can reliably determine the precise time that an accident occurred, which precludes the use of the accepted "Golden Hour" definition. Nevertheless, the Command should define the term and ensure its method of measurement conforms to this definition.

27. **The Command should establish a quality control process over its MFR reporting process and should retain documentation supporting the reported results** - The Command did not have a quality control review process in place to ensure the reliability of reported MFR results, as required by the Department of Budget and Management. Specifically, the Command did not have a system in place to validate mission times manually recorded by SYSCOM staff in the RightCAD database. The only independent source available to validate the times recorded in the database is voice transmissions, which provide a secondary time source. Voice transmissions between SYSCOM and the helicopter sections (both via telephone while on the ground prior to liftoff and via radio while in-flight) are recorded and include automatically generated time stamps. The Command did not use these voice transmissions to independently validate data recorded in RightCAD, nor were we able to validate data recorded during fiscal years 2005 and 2006 since the voice transmissions generally were only retained for a period of six months.

Our test results using voice transmission information for completed missions during May and June 2007 (which were available when we conducted our test in December 2007) suggest that verification of the database entries is needed. Our tests of mission times for 61 medevac missions flown during those months identified time recording errors affecting 10 missions. Although the time differences were not significant to the point of impacting the timeliness of those missions (that is, none of the errors would have changed a timely mission to a non-compliant mission), the tests results show that time recording errors do occur.

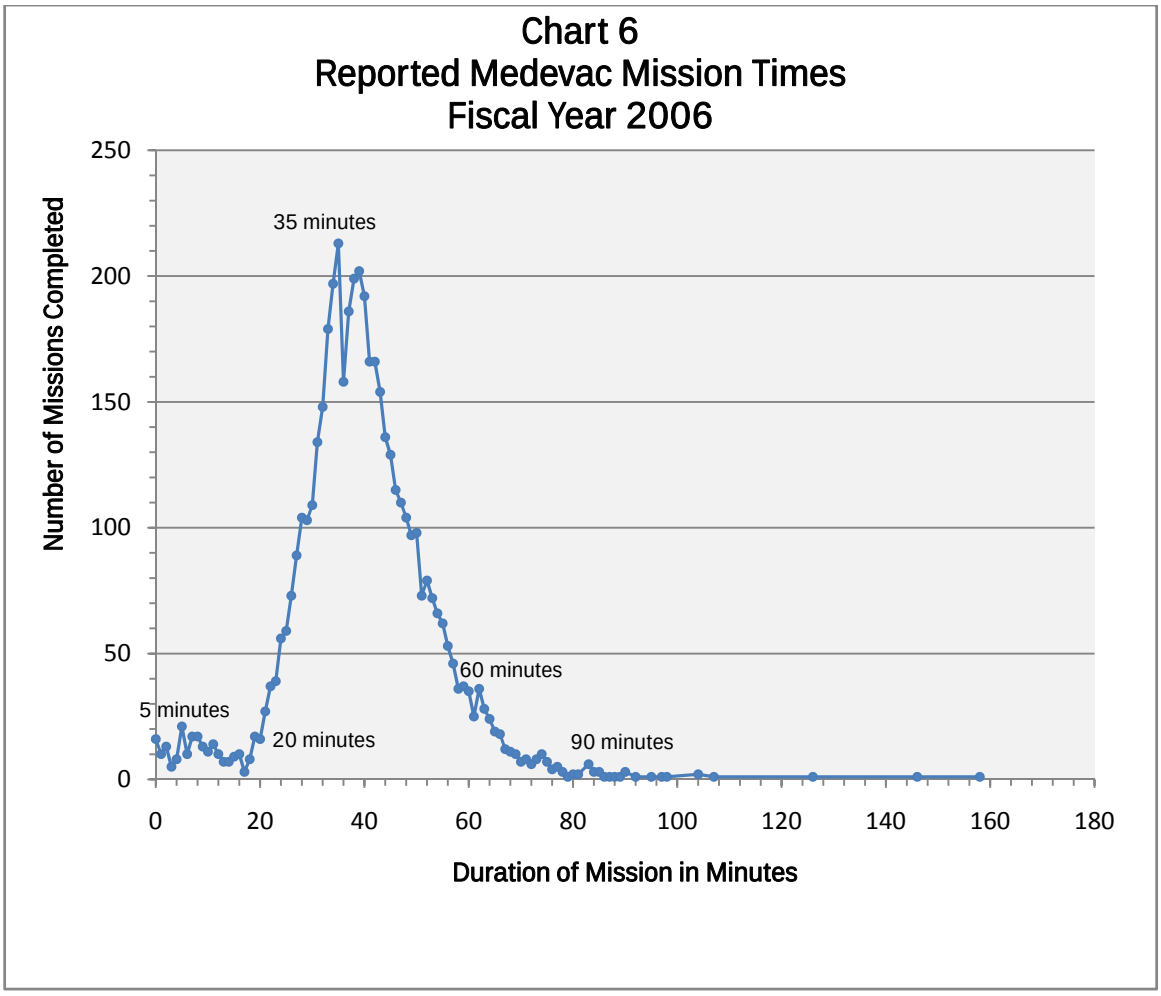
Furthermore, the Command did not retain any documentation to support its MFR calculations for fiscal years 2005 and 2006. Using the RightCAD database we were able to recompile the components used in calculating the MFR results, and arrived at similar results. However, based on further analysis of these data, we identified a number of questionable mission times pertaining to missions that were reportedly flown in one hour or less as well as those that took more than one hour, which could impact data reliability.

For example, Chart 6 on page 86 is a graphic representation of the total number of medevac missions flown during fiscal year 2006 on which that year's "Golden Hour" reported result was based – with 35 minutes being the most common mission length. Although not shown, the respective fiscal year 2005 medevac mission profile is similar, also with 35 minutes being the most common mission length. Our review of the

underlying mission times for both years disclosed a number of missions completed in significantly less time than is typical. For example, the mission times for fiscal year 2006 included 242 completed missions of 20 minutes or less in duration (141 of those were completed in 10 minutes or less), out of 4,863 total completed missions. Accordingly, we inquired of the Command as to what times might be considered implausibly short. Command management advised us that a normal mission consists of four distinct components: helicopter launch from its base, flight time to the accident site, time on the ground at the site, and flight time to the trauma center. Each of the four segments has an expected time duration; approximate durations are as follows:

Launch procedures	7 minutes
Flight time to scene	6 minutes
Time on ground at scene	10 minutes
Flight time to trauma center	6 minutes
Total approximate mission duration	29 minutes

Although these times are subject to number of factors (including more time on the ground due to patient extraction from a vehicle or performance of an advanced medical procedure on the ground by the trooper/flight paramedic), they should represent a typical scenario for a completed mission. Additionally, launch and flight times could be shortened if a call is received if a helicopter is already airborne and is returning to its base from a previous mission. Nevertheless, the reliability of missions completed in less than 10 or even 20 minutes, as recorded in RightCAD, based on the above times is questionable. Command management advised us that such abnormally short missions could likely be due to incorrectly recording cancelled missions as completed missions. A further cause for these abnormally short mission times could be incorrect time recordings as disclosed in the results of our aforementioned test of completed missions.



Source: RightCAD database

With respect to the fiscal years 2005 and 2006 missions that reportedly exceeded one hour, we identified several data recordation errors as well as a logic problem; however, collectively these errors did not significantly impact the reported MFR results for fiscal years 2005 and 2006. For example, we identified three missions for fiscal year 2005 with total mission times that exceeded 21 hours each (an obvious error). Accordingly, the Command should establish quality control procedures, independently verify critical RightCAD data, and retain documentation to support its MFR calculations.

Recommendations

26. We recommend that the Command define the term "Golden Hour" used in its MFR submission and ensure that the information actually measured and reported is in agreement with the definition.

27. We recommend that the Command establish a quality control process to ensure the accuracy of the reported MFR results. For example, the Command should periodically conduct independent tests to verify critical RightCAD data (for example, using secondary time sources such as voice transmissions to verify mission times). We also recommend that the Command retain documentation to support its MFR calculations and related tests.

EXHIBITS

EXHIBIT A

Comparison of Federal Aviation Administration Regulations

Requirements	Part 91	Part 135
Operating Requirements	General Operating and Flight Rules	Commuter and On Demand Operations (Commercial Operations).
Certification Requirements	Appropriate and current airworthiness certificate; U.S. Registration Certificate; No operating certificate is required	Appropriate and current airworthiness certificate; U.S. Registration Certificate; Aircraft Carrier Certificate or an Operating Certificate under Part 119.
Operations Manual Requirement	An operations manual is not required under this Part.	Certificate holders with more than one pilot must maintain and keep a current operations manual. The manual should include policies for flight, ground and maintenance personnel. Part 135.23 discusses the manual contents.
Flight Operations	States general flight rules when operating an aircraft.	In addition to the flight operations regulation in Part 91, the operator must comply with flight operations in Part 135. This includes maintaining records for certain documents.
Recordkeeping Requirements	There are no specific recordkeeping requirements governing the aircraft and flight crewmembers.	The following records are required: operating certificate, operations specifications, a list of aircraft used/available and reason for use, individual pilot and flight crew records, list of crewmembers and position assignments, and the aircraft registration number.
Pilot Requirements	One pilot crew is acceptable unless certified for more than one pilot[17]	Two Pilot Crew required for eligible on-demand operations; Pilot experience: Pilot in command must have 1,500 flight hours and the second pilot in command must have 500 flight hours.
Previously Trained Crewmember Requirements	There are no requirements for previously trained crewmembers	Previously trained crewmembers must comply with certificate holder's training requirements.
Flight Crew Duty Time Limitations and Crew Duty Rest Requirements	No specific flight crew duty time or rest requirements	Has specific flight crew duty time and rest requirements.
Drug and Alcohol	A crewmember cannot operate an aircraft within eight hours of consumption; Alcohol and drug testing is performed upon request	The operator must have a formal drug testing program.

[17] Note: Per DSP policy, only helicopter pilots with at least 2,000 hours of flight time are considered for employment.

EXHIBIT A

Comparison of Federal Aviation Administration Regulations

Requirements	Part 91	Part 135
Maintenance Requirements - In General	The owner of the aircraft is responsible for ensuring interval inspections are performed, discrepancies are repaired, and the maintenance records indicate the aircraft is returned to service. Maintenance requirements do not vary based on the number of passenger seats aboard an aircraft.	Aircrafts with nine or less passenger seats are required to follow Part 91, maintain additional documents, and have an FAA approved, formal documented inspection program when Part 91 requirements are not sufficient for operation. Aircrafts with ten or more passenger seats are required to maintain specific maintenance documents and have more stringent maintenance requirements.
Inspections	A 100 hours inspection and annual inspection are required	The operator must follow an FAA approved, formal documented inspection program. No specific inspection intervals are stated in the regulations under Part 135.
Inspection Personnel	Inspection personnel must possess the appropriate certifications.	Only certified inspectors may inspect an aircraft. The inspector must be supervised and controlled by an inspection unit.
Internal Evaluations	This does not pertain to this Part.	Requires the operator to evaluate their inspection and maintenance programs and make appropriate changes.
Maintenance Personnel Certifications	This does not pertain to this Part.	The person directly in charge of maintenance and other maintenance personnel must have the appropriate airmen certifications.
Maintenance Records	A description of the maintenance work performed, compliance with airworthiness directives, appropriate signatures, and a statement returning the aircraft to service must be included in the maintenance records.	A description of the maintenance work performed, compliance with airworthiness directives, appropriate signatures, and a statement returning the aircraft to service must be included in the maintenance records.
Aircraft Equipment Requirements	Lists aircraft equipment requirements.	Lists aircraft equipment requirements in addition to the equipment requirements listed in Part 91.
Compensation or Hire for Intrastate Operations	This does not pertain to this Part.	Contracts or memorandums of understandings must be maintained for at least one year for intrastate operations by commercial operators.

EXHIBIT B

Aircraft Mission Statistics By Detail Code
Fiscal Years 2003 through 2007

Code	Mission Type❶	Fiscal Year				
		2003	2004	2005	2006	2007
1a	Scene Trauma	4,582	5,005	5,016	4,614	4,235
1b	Scene Medical	69	89	96	77	80
1c	Scene Multi-aircraft	106	50	11	34	18
1d	Double Patient Transport	0	0	0	131	298
1x	Undispatched Scene, WX	0	0	0	6	5
	Subtotal – Medevac	**4,757**	**5,144**	**5,123**	**4,862**	**4,636**
2a	Inter-hospital Trauma	84	118	117	87	25
2b	CIP Medical	11	13	27	8	8
2c	Inter-hospital Medical	79	96	98	84	34
2f	Neonatal	80	54	41	48	28
2g	Perinatal	0	5	3	3	1
	Subtotal – Patient Transfers	**254**	**286**	**286**	**230**	**96**
3a	Tracking	480	546	502	558	468
3b	Enforcement	7	14	26	25	14
3c	Photographic	18	24	43	43	33
3d	Reconnaissance/Patrol Check	176	980	493	798	259
3e	Personnel Transport	28	36	49	57	45
3f	Extradition	0	0	0	0	0
3g	Patrol	41	119	89	234	176
3h	Surveillance	8	7	21	41	21
3i	Civil/Criminal Disturbance	10	2	4	1	3
3j	Stolen Property	0	3	0	3	1
3k	Stolen Vehicle	2	1	1	0	5
3l	FAA Violation	0	1	2	2	3
3m	Environmental Violations	2	0	0	0	1
3o	Tactical Med Support	20	20	28	40	48
3x	Undispatched LE, WX	0	0	0	4	0
	Subtotal – Law Enforcement	**792**	**1,753**	**1,258**	**1,806**	**1,077**
4a	Persons	219	234	244	210	221
4b	Aerial Rescue	13	16	16	21	16
4c	Property	3	1	2	2	2
4d	Aircraft/Vessels	52	55	83	64	62
4e	SAR Support	0	0	0	8	6
4f	Firefighting	17	8	16	18	12
	Subtotal – Search and Rescue	**304**	**314**	**361**	**323**	**319**

❶ See Exhibit C for mission code explanations.

EXHIBIT B

Aircraft Mission Statistics By Detail Code
Fiscal Years 2003 through 2007

Code	Mission Type❶	Fiscal Year				
		2003	2004	2005	2006	2007
5a	Pilot Training	312	244	320	363	291
5b	Medic Training	18	19	14	22	8
5c	Other Training (Agency)	12	7	19	14	9
5d	Other Training (Non-Agency)	10	4	24	28	29
5e	Demonstration	159	219	286	241	237
5f	Maintenance Missions	589	536	520	466	455
5g	Executive Transports	2	2	2	9	7
5h	Medical Relay	67	53	41	33	22
	Subtotal – Maintenance/Training	**1,169**	**1,084**	**1,226**	**1,176**	**1,058**
6a	HS Recon-Coincidental	0	0	0	45	100
6b	HS Recon-Deliberate	0	0	0	5	66
6c	HS Surveillance, Covert	0	0	0	2	0
6d	Homeland Security Escort	0	0	0	0	1
6f	HS Support, General	0	0	0	46	149
	Subtotal – Homeland Security	**0**	**0**	**0**	**98**	**316**
	Total	**7,276**	**8,581**	**8,254**	**8,495**	**7,502**

Source: RightCAD

❶ See Exhibit C for mission code explanations.

NOTES:

1. EXHIBIT B, like Table 5 on page 20, excludes mission statistics for the Command's fixed-wing aircraft and for commercial and other providers. Fixed-wing aircraft primarily conduct law enforcement, prisoner extradition, and homeland security missions, and commercial and other providers primarily conduct medevac missions and law enforcement missions. For additional comments on services provided by other entities, see Objective 1.

2. EXHIBIT B does not differentiate between critical and non-critical missions. For this reason, and because of certain minor differences in mission subcode classifications, minor differences exist between this exhibit and Table 5 in this report.

EXHIBIT C
Mission Code Explanations

Code	Mission Type❶	Explanation
	Medevac	
1a	Scene Trauma	Medevac for scene trauma
1b	Scene Medical	Medevac for scene medical
1c	Scene Multi-Aircraft	Medevac involving two or more aircraft at scene
1d	Double Patient Transport	Medevac for two patients transported in same aircraft from scene
1x	Undispatched Scene, WX	Any mission request received that did not involve a launch (standby, unavailable due to weather)
	Patient Transfers	
2a	Inter-hospital Trauma	Transport of trauma patient from a hospital environment (not physician office) to a tertiary care receiving center
2b	CIP Medical	Critical Intervention patient
2c	Inter-hospital Medical	Transport of medical patient from a hospital environment (not physician office) to a tertiary care receiving center
2f	Neonatal	Transport of neonatal patient maintained in a transport isolette
2g	Perinatal	Transport of high risk, near term mother
	Law Enforcement	
3a	Tracking	Flight in support of ground law enforcement units in apprehension attempt
3b	Enforcement	Flight in support of general law enforcement activities
3c	Photographic	Flight to facilitate airborne photography of incident or event
3d	Recon/Patrol Checks	Flight to facilitate reconnaissance and/or specific site check
3e	Personnel Transport	Movement of the Governor or senior elected officials
3f	Extradition	Movement of prisoners from one jurisdiction to another
3g	Patrol	Airborne patrol activities
3h	Surveillance	Flight in support of covert surveillance activities
3i	Civil/Criminal Disturbance	Airborne support during large group incidents
3j	Stolen Property	Airborne search for stolen property
3k	Stolen Vehicle	Airborne search for stolen vehicle
3l	FAA Violation	Flight to provide visual identification of aircraft committing violations of FAA directives
3m	Environmental Violations	Flight in support of natural resource/environmental law compliance
3o	Tactical Medical Support	Standby in support of TMU operations
3x	Undispatched LE, WX	Any mission request received that did not involve a launch (standby, unavailable due to weather)

❶ See Exhibit B for mission statistics by code.

EXHIBIT C
Mission Code Explanations

Code	Mission Type❶	Explanation
	Search and Rescue	
4a	Persons	Airborne search for lost victim
4b	Aerial Rescue	Flight with intent to provide aerial extraction of victim
4c	Property	Airborne search for stolen property
4d	Aircraft/Vessels	Airborne search for lost aircraft or waterborne vessel
4e	SAR Support	Flight in support of aerial rescue operations, HEAT, or support personnel transport
4f	Firefighting	Airborne support for firefighting operations (woodland, structural) including TI, visual spotting, hoist and utility operations
	Maintenance/Training	
5a	Pilot Training	Training mission for Command pilot training
5b	Medic Training	Training mission for Command flight paramedic training
5c	Other Training (Agency)	Training mission for DSP personnel
5d	Other Training (Non-Agency)	Training mission for non-DSP personnel not covered by 5a, 5b, or 5c above
5e	Demonstration	Demonstration mission for non-DSP personnel not covered by 5a, 5b, 5c, or 5d above
5f	Maintenance Missions	Flight required to maintain airworthiness (not mission capable)
5g	Executive Transport	Movement of the Governor or senior elected officials
5h	Medical Relay	Transport of medical personnel and equipment to an incident scene or sending hospital
	Homeland Security (HS)	
6a	HS Recon - Coincidental	Flight in support of HS mission
6b	HS Recon - Deliberate	Flight in support of specifically assigned HS reconnaissance flight
6c	HS Surveillance, Covert	Flight in support of covert airborne surveillance
6d	HS Escort	Flight in support HS specific escort or movement
6f	HS Support - General	Mission in support of any general HS event

Source: SYSCOM

❶ See Exhibit B for mission statistics by code.

EXHIBIT D
25 Hour Inspection Form – N3 Model

MSP 365N3 | 25 HOUR INSPECTION | Rev. 1/25/2008

	DESCRIPTION	REFERENCE/TASK NO.	MECH	INSP
Prepare lists				
_	Defects indicated in A/C logbook		XXXXXXXXX	_____
	Assys. & Equipment items approaching TBO or O/H Maintenance Program Manuals		XXXXXXXXX	_____
_	Modifications to be completed (SB)		XXXXXXXXX	_____
_	Assys. To be drained per Maintenance Program Manuals		XXXXXXXXX	_____
_	Equipment items requiring special checks per Maintenance Program Manuals		XXXXXXXXX	_____
Preliminary steps				
_	Remove or open cowlings and fairings as required		_____	_____
_	Comply with ALF (AFTER LAST FLIGHT) checks	05-21-00-603	_____	_____
Main Gearbox				
_	Magnetic plug for metal particles	12-00-00-601	_____	_____
_	Electrical chip detector: short electrode, check the chip light	365MMS of STC /12-00-00-601 (ALF//10hrs)	_____	_____
Main rotor mast				
_	Magnetic plug for metal particles	12-00-00-601	_____	_____
_	Magnetic sensor: Pre-Mod 62B69	12-00-00-601	All MSP N3's Version are Post –Mod at this time.	
Tail Gear box				
_	Magnetic plug for metal particles	12-00-00-601	_____	_____
_	Electrical chip detector: short electrode, check the chip 1light	365MMS of STC 12-00-00-601	_____	_____
_	Oil Level & Locking of filler plug (absence of red zone) **T/Gear Box** oil level check/service	AD 2007-25-08	_____	_____
Engines			#1 #2	#1 #2
_	Oil tank magnetic plug for metal particles	12-00-00-601	_____I_____	____I_____
_	Mechanical Mag. Plug Check: Module 5	72-15-00-900-001 Page block 701/799	_____I_____	____I_____
	Module 1	72-61-00-906-001 pge 701/799	_____I_____	____I_____

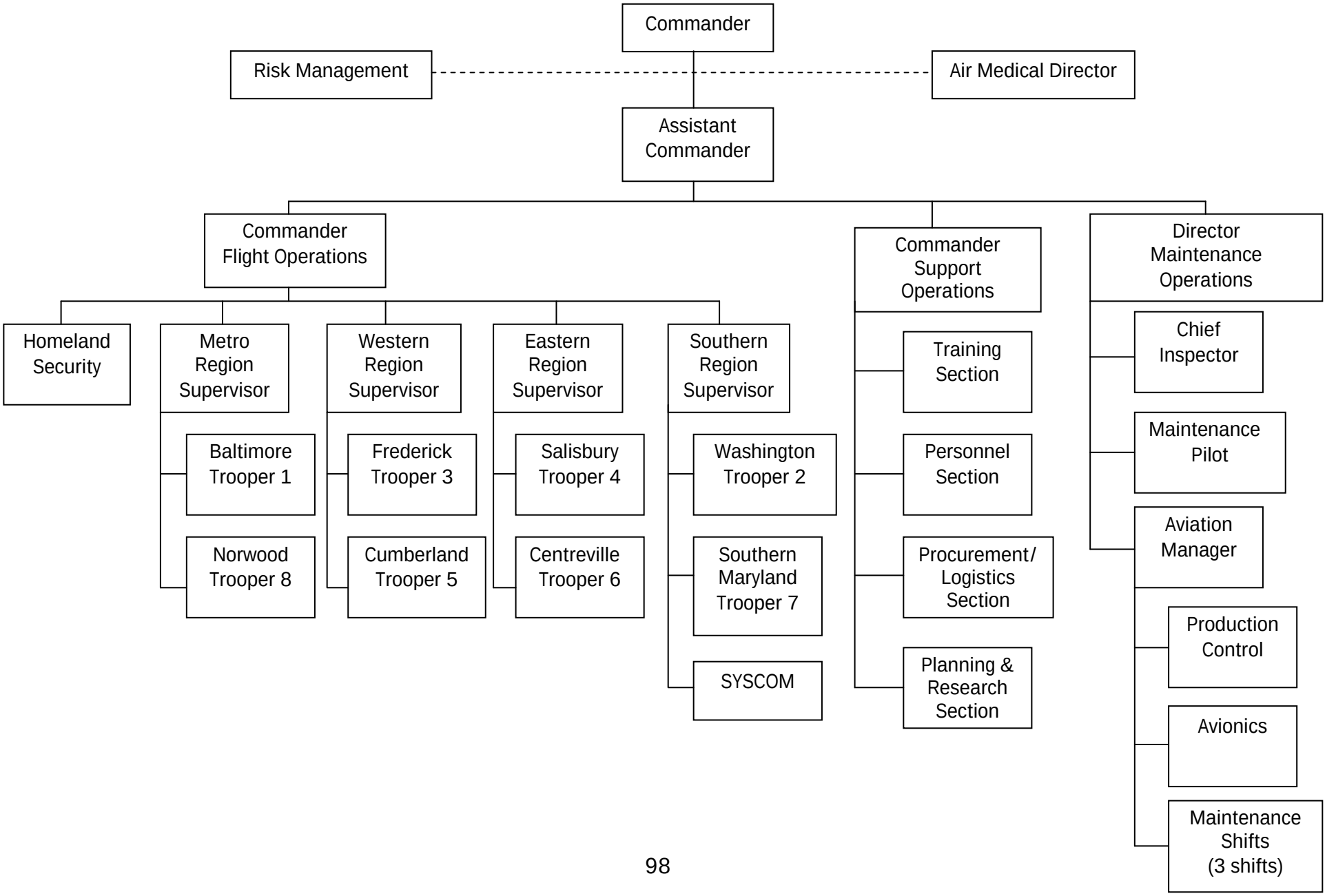
EXHIBIT D
25 Hour Inspection Form – N3 Model

ATA	DESCRIPTION	REFERENCE	MECH	INSP
	25degre frame-upper attach area: Perform visual inspection for cracking of the doublers and doublers area	MSP Requirement	_____	_____
	M/R Hub Assy:	05.21.00.603 (10 hrs 2**stars item)		
	_ Spherical thrust bearings	parag. 14.4	_____	_____
	_ Frequency Adapter	parag 14.3	_____	_____
	M/R Mast Assy: Pitch-Change Rod	parag 14.2	_____	_____
	Main gearbox :			
	MGB to engine couplings		**#1 #2**	**#1 #2**
	_ No cracks, no separation > 1mm, and for presence of locking pins: MGB side	05-21-00-603 parag 5, 13 (10 hrs 2**stars item)	_____I_____	____I____
	_ Engine couplings visual check via the inspection holes: absence of cracks & no fretting or breakage of screws	05-21-00-603	_____I_____	____I____
	_ Engine front support. Search for cracks	72-61-00-217-001(MSP req)	_____I_____	____I____
	MGB-to fixed ring gear of the Epicyclic Reduction Module: Check for cracks. **No leakage is acceptable And this area shall be kept clean**	SL 1603-63-03	_____	_____
	MGB Base Plate: Check for absence of cracks **within 55 hr- AD 2004-16-15R1/SB Alert 05.00.45**		_____	_____
	MGB Planet Gear Carrier Boroscope Inspection (50 hrs) **AD 2005-03-09**		_____	_____
	Tail Rotor –			
	OPERATION OF T/R CONTROL PEDALS IS PROHIBITED WHEN THE ROTOR IS NOT SPINNING, EXCEPTIONS: UPON SB 05-00-34 Para 2B AND MWC 05-21-00-301 Para 4.2.			
	UPON VERSION : Inspection applies on 11 blades fenestron assembly :			
	- Check of All the blades root suction face using the tapping method	64-21-01-602 para 2.8.3 Area D AD 2003-08-53	_____	_____
	_ Clearance between blade tips and tunnel is > or equal to 3 mm		_____	_____
	_ Inspector sign-off AD's in log book	AD 2003-08-53	XXXXXXXX	_____
	T/Gear Box oil level check/service	AD 2007-25-08	_____	_____
	Final steps			
	_ Check that defects have been satisfactorily repaired		XXXXXXXXX	_____
	_ List all defects for which repair has been postponed with approval of Responsible authority		XXXXXXXXX	_____
	_ Update aircraft log book & add MSR requirements as necessary		XXXXXXXXX	_____
	_ Install or close cowlings and fairings as required		_____	_____

----------NOTHING FOLLOWS----------

EXHIBIT E

Simplified Command Organization Chart — December 1, 2007



APPENDIX

MARTIN O'MALLEY
GOVERNOR

ANTHONY G. BROWN
LT. GOVERNOR

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TDD: 410-486-0677
August 11, 2008

COLONEL
TERRENCE B. SHERIDAN
SUPERINTENDENT

Mr. Bruce A. Myers, CPA
Legislative Auditor
State of Maryland
Office of Legislative Audits
301 West Preston Street – Room 1202
Baltimore MD 21201-2305

Dear Mr. Myers:

In accordance with State Government Article, Section 2-1224, *Joint Audit Committee's Policy on Agency Responses to Legislative Audit Reports*, please find enclosed the Department of State Police's responses to the draft performance audit of the Department's Aviation Command. The Department believed that it was a valuable experience to work with the audit team from your office to identify ways that the Aviation Command could improve efficiency and performance. The Department believes that it is always the duty of responsible government to constantly find ways to improve operations and make business processes more efficient.

The Department is extremely proud of the personnel and management staff assigned to the Aviation Command and the excellent international reputation that they have worked so hard to earn and maintain. It is clear in speaking with the audit staff and in reviewing this report, that the Department's Aviation Command remains the model that other states and programs use to create and improve their programs. This was confirmed when your audit staff contacted similar units in other states. In addition, the Command's safety record remains second to none.

Should your office need further information or clarification regarding any of the responses to audit findings made by the Department, please contact Captain J. Kenneth Hasenei, Commander of the Inspections and Compliance Division and Audit Liaison. Again, thank you for providing valuable information on how the Department may improve the effectiveness and efficiency of its operations.

Sincerely,

Terrence B. Sheridan
Superintendent

cc: Captain J.K. Hasenei, Commander, Inspection and Compliance Division
TBS:JKH

Maryland State Police Aviation Command's Response to Findings and Recommendations

Objective 1

Availability and Operational Use of the Command's Helicopter Fleet

Recommendations and Aviation Command's Response

1. Audit Report: No Recommendation

2. Audit Report: No Recommendation

3. Audit Report: We recommend that the Command issue guidance to help ensure consistent recording of section downtime and establish a process to independently verify, at least on a test basis, the accuracy of data recorded in the Section Downtime database.

   Aviation Command Response: The Aviation Command agrees with the recommendation.

   The Command will develop a policy and implement a process pertaining to the need to consistently enter accurate data into the section downtime database. The policy will contain a process to verify the accuracy of the data recorded in the database.

   Timeline: Begin- September 2008
   Complete- February 2009

4. Audit Report: We recommend that the Command formally track downtime by helicopter and determine the impact of maintenance on individual helicopter availability.

Aviation Command Response: The Aviation Command agrees with the recommendation.

The Command will develop a policy and implement a process to formally track downtime by helicopter and determine the impact of maintenance on individual helicopter availability.

Timeline: Begin- September 2008
Complete- February 2009

5. Audit Report: We recommend that the Command continue its efforts to purchase a flight simulator for training purposes.

Aviation Command Response: The Aviation Command agrees with the recommendation.

The Command is currently involved in a study to replace or extend the life of its current helicopter fleet. The Command intends to include a flight simulator in a future Request For Procurement to purchase a new fleet or extend the life of the current fleet. The Request For Procurement is expected to be advertised in October 2008.

Timeline: Efforts are ongoing and will continue through the upgrade/replacement process.

Objective 2

Effectiveness and Efficiency of the Inspection and Maintenance Policies and Practices

Recommendations

Maintenance Work and Costs

6. Audit Report: No recommendation

7. Audit Report: No recommendation

8. Audit Report: We recommend that the Command develop a system for tracking detailed cost data for helicopter operations, including a process

to track labor hours for specific maintenance and inspection tasks. We also recommend that the Command use these data, as well as any other reputable sources, to create performance benchmarks and to monitor unit and employee performance. We further recommend that the Command use these data to perform an analysis of the adequacy of the size and composition of the maintenance staff.

Aviation Command Response: The Aviation Command agrees with the recommendation.

The implementation of the recommendation will require extensive study and will most likely involve the need to identify additional funds to develop such a system. The Command will research the fiscal feasibility to develop a system for tracking detailed cost data for helicopter operations, including a process to track labor hours for specific maintenance and inspection tasks. Once developed, the Command will use these data, as well as any other reputable sources, to create performance benchmarks and to monitor unit and employee performance. The Command will also use these data to perform an analysis of the adequacy of the size and composition of the maintenance staff.

Timeline: Begin- September 2008
Complete- July 2009

9. Audit Report: We recommend that the Command evaluate the costs and benefits of using contractors for inspections rather than in-house maintenance staff.

Aviation Command Response: The Aviation Command agrees with the recommendation.

The Command, upon implementation of the system referenced in Recommendation #8, will evaluate the costs and benefits of using contractors for inspections rather than in-house maintenance staff.

Timeline: Begin- September 2008
Complete- July 2009

10. Audit Report: We recommend that the Command track maintenance and repair costs associated with safety incidents.

Aviation Command Response: The Aviation Command agrees with the recommendation.

The Command, upon implementation of the system referenced in recommendation #8, will track maintenance and repair costs associated with safety incidents.

Timeline: Begin- September 2008
Complete- July 2009

Maintenance Information Systems

11. Audit Report: We recommend that the Command implement procedures to help ensure the timeliness of parts delivery. Specifically, MxManager should be used to determine the appropriate stock levels for critical parts and supplies, to order critical parts and supplies using the appropriate stock levels, and to track the timeliness of parts deliveries. In addition, the Command should continue its periodic contact with parts manufacturers in conjunction with a process to account for all open orders, and should consider establishing a guaranteed maintenance program with manufacturers to obtain parts in a timely manner.

Aviation Command Response: The Aviation Command agrees with the recommendation.

The Command will develop a policy and implement a process to expand on its use of MxManager in order to determine the appropriate stock levels for critical parts and supplies, to order critical parts and supplies using the appropriate stock levels, and to track the timeliness of parts deliveries.

Additionally, the Command will continue its contacts with parts manufacturers in conjunction with a process to account for all open orders and will explore options and the willingness of manufacturers to offer a guarantee to supply parts in a timely manner.

Timeline: Begin- September 2008
Complete- February 2009

12. Audit Report: We recommend that the Command establish a process to ensure, at least on a test basis, the completeness, accuracy, and reasonableness of all critical information entered into MxManager and inspection checklists.

Aviation Command Response: The Aviation Command agrees with the recommendation.

The Command will develop a policy and implement a process to ensure, at least on a test basis, the completeness, accuracy, and reasonableness of all critical information entered into MxManager and inspection checklists.

Timeline: Begin- September 2008
Complete- February 2009

13. Audit Report: We recommend that the Command install system updates in a timely manner and restrict system access to those employees who need such access to perform their assigned job duties, including revising system security, if warranted.

Aviation Command Response: The Aviation Command agrees with the recommendation.

The Command will develop a policy and implement a process to install system updates in a timely manner and restrict system access to those employees who need such access to perform their assigned job duties, including revising system security, if warranted.

Timeline: Begin- September 2008
Complete- February 2009

Adequacy of Physical Controls over Parts and Supplies Inventories

14. Audit Report: We recommend that the Command maintain accurate inventory records and conduct physical inventories on a periodic basis in accordance with the requirements of the DGS *Inventory Control Manual*. All physical inventory counts should be documented.

Aviation Command Response: The Aviation Command agrees with the recommendation.

The Command will develop a policy and implement a process to maintain accurate inventory records and conduct physical inventories on a periodic basis in accordance with the requirements of the DGS Inventory Control Manual. Additionally, all physical inventory counts will be documented.

Timeline: Begin- September 2008
Complete- February 2009

15. We recommend that the Command restrict access to the central storeroom to those employees who require such access and maintain a record of those with access.

Aviation Command Response: The Aviation Command agrees with the recommendation.

The Command will develop a policy and implement a process to restrict access to the central storeroom to those employees who require such access and maintain a record of those with access.

Timeline: Begin- September 2008
Complete- February 2009

16. Audit Report: We recommend that the Command comply with existing policy and ensure that all inventory withdrawals are properly documented and recorded in MxManager.

Aviation Command Response: The Aviation Command agrees with the recommendation.

The Command will ensure supervisors periodically document their oversight of compliance of *existing policy and ensure that all inventory withdrawals are properly documented and recorded in MxManager.*

Timeline: Begin- September 2008
Complete- February 2009

Manuals and Policies

17. Audit Report: We recommend that the Command establish a process to maintain its FAA-approved *Repair Station Manual* and the American Eurocopter avionics manuals on a current basis. We also recommend that the Command operate in accordance with these manuals and FAA regulations.

Aviation Command Response: The Aviation Command agrees with the recommendation.

The Command will develop a policy and implement a process to maintain its FAA-approved Repair Station Manual and the American Eurocopter avionics manuals on a current basis. The Command will also operate in accordance with these manuals and FAA regulations.

Timeline: Begin- September 2008
Complete- February 2009

18. Audit Report: We recommend that the Command consider implementing a formal internal evaluation program for repair station operations to identify areas of noncompliance with FAA guidelines, and to identify areas in need of improvement.

Aviation Command Response: The Aviation Command agrees with the recommendation.

The Command will develop a policy and implement a formal internal evaluation program for repair station operations to identify areas of noncompliance with FAA guidelines, and to identify areas in need of improvement.

Timeline: Begin- September 2008
Complete- February 2009

Other Findings

19. Audit Report: We recommend that the Command ensure, at least on a test basis, that all tool calibration information is accurately recorded in MxManager. We also recommend that the Command periodically inspect toolboxes to account for all tools.

Aviation Command Response: The Aviation Command agrees with the recommendation.

The Command will develop a policy and implement a process to ensure that all tool calibration information is accurately recorded in MxManager. The policy will include procedures to ensure that toolboxes are periodically inspected to account for all tools.

Timeline: Begin- September 2008
Complete- February 2009

Objective 3

Personnel, Staffing, and Training

Recommendations

A number of these recommendations might require actions that neither the Command nor the Department can take unilaterally. Consequently, the involvement or commitment of DBM and, in some cases, the General Assembly, might be necessary to affect the desired change.

20. Audit Report: No Recommendation

21. Audit Report: We recommend that the Department evaluate its practices with respect to management turnover and take steps to foster more stable leadership. We also recommend that the Command develop formal qualifications for its various management/supervisory positions.

Aviation Command Response: The Aviation Command disagrees with the finding and the recommendation.

The Command has only had three commanders in the past 12 years. One of those commanders retired after serving seven and one half years as the commander and another retired after serving as the commander for approximately three years. The current commander has been assigned to the Command for over the past one and one half years. The Command does not consider this to be a high turnover rate and would be comparable to other professional and military organizations.

The turnover rate of experienced employees transferred out of the command is not significantly high. In most cases, these employees ultimately return to the Command as more well rounded managers after gaining invaluable experience on a more global operational perspective. There were four (4) instances over the period covered by the audit where former aviation employees returned to the command in senior management positions.

The Command has developed formal qualifications for many of its command, supervisory, and key positions that are technical in nature, and therefore require technical expertise or experience. Examples of these positions include chief pilot, instructor pilot, aviation manager (formally

known as director of maintenance), chief inspector, production control supervisor, material expeditor, and lead technician.

The qualifications of 19 key personnel holding key administrative/support positions are evident through the fact that they actively fly as primary crew members aboard Aviation Command aircraft. Seven of the 19 are pilots and the remaining 12 are trooper flight paramedics. On average, these individuals have 8-12 years experience as a flight crew member. This experience is mission/job specific flight experience providing insight and decision making skills applicable to all aspects of the Command's mission profile.

The Command has placed civilian and sworn pilots, trooper flight paramedics, and maintenance technicians in key staff positions and they all have direct access to the commander; this is reflected in the latest organizational structure. The Command has civilian and sworn pilots, trooper flight paramedics, and maintenance technicians, who serve as aviation advisors on the Standardization and Risk Management Council which is responsible for focusing on safety, training, and maintenance and flight operations policies. The Council is also responsible for providing recommendations for approval and implementation.

Additionally, the Secretary of the State Police, through his authority and responsibility detailed in Title 2 of the Public Safety Article, establishes the organization of the Department, and assigns and reassigns employees of the Department to the duties, units, and regional facilities of the Department as he considers necessary to serve the needs of the Department and the public. Senior management positions within the Command are administrative in nature and do not require technical expertise in order to perform these functions. Strong management skills are the most important prerequisite for these positions. Consequently, by law it is the Secretary's prerogative and under his authority to assign personnel to those senior management positions which he deems will serve in the best interest of the Command and the Department.

Finally, although the audit report does accurately state that civilian employees are eligible for full retirement benefits after 30 years of service, it should be noted that civilian pilots are eligible for retirement after 25 years.

22. We recommend that the Command develop a formal process to analyze the reasons for staff turnover and vacancies for all non-management positions and develop an appropriate strategy to address these issues. For example, exit interviews should be conducted for all employees that resign and related summary statistics maintained. We also recommend

that the Command and the Department continue their efforts to increase the salaries for its employees so that they are more competitive. Finally, we recommend that the Command analyze its organizational structure to determine whether opportunities for the advancement of qualified civilians into management and supervisory positions can be increased.

Aviation Command Response: The Aviation Command agrees with the recommendation.

The Command will develop a formal process to analyze the reasons for staff turnover and vacancies for all non-management positions and develop an appropriate strategy, if warranted, to address these issues. Exit interviews shall be conducted for all employees that resign and related summary statistics maintained.

Despite the fact that all civilian pilots and instructor pilots, and all maintenance technicians, lead technicians, and technician supervisors received a one grade increase in July 2008, the Command will continue to monitor recruitment and retention rates of employees to determine if salaries have a negative impact in the hiring and retention of employees in the future. If data exists in the future to indicate that salaries negatively impact recruitment and retention of qualified employees, the Command will take steps to request increase in salaries so that they are more competitive.

The Command has and will continue to analyze its organizational structure to determine whether opportunities for the advancement of qualified civilians into management and supervisory positions and other key positions can be increased. For example, the Command recently created a chief pilot position that was staffed by a civilian pilot, the Command created five lead maintenance technician positions that were staffed by civilian technicians, the Command created a production control supervisor position that was staffed by a civilian technician, and the Command is currently studying the creation of a director of operations position that would be filled by a civilian pilot.

Timeline: Begin- September 2008
Complete- Ongoing and continuous

23. We recommend that the Department evaluate its staffing practices and decisions with respect to transfer requests and attempt to obtain more authority and flexibility in making hiring decisions.

Aviation Command Response: The Department agrees with the recommendation.

The Department has and will continue to evaluate its staffing practices and decisions with respect to transfer requests to ensure optimal staffing levels to meet all to the Department's legal and mandated obligations. All hiring decisions are guided by personnel rule and law.

Timeline: Begin- September 2008
Complete- Ongoing and continuous

24. We recommend that the Command take action to identify adequate personnel resources to separate the duties of inspection and maintenance supervisors.

Aviation Command Response: The Aviation Command agrees with the recommendation.

The Command will take action to identify adequate personnel resources to separate the duties of inspection and maintenance supervisors.

Timeline: Begin- September 2008
Complete- February 2009

25. We recommend that the Command comply with its FAA-approved technician training manual, including the implementation of a curriculum addressing maintenance technician training needs.

Aviation Command Response: The Aviation Command agrees with the recommendation.

The Command will comply with its FAA-approved technician training manual, including the implementation of a curriculum addressing maintenance technician training needs.

Timeline: Begin- September 2008
Complete- February 2009

Objective 4

Reliability of the "Golden Hour" Performance Measure

Recommendations

26. We recommend that the Command define the term "Golden Hour" used in its MFR submission and ensure that the information actually measured and reported is in agreement with the definition.

    Aviation Command Response: The Aviation Command agrees with the recommendation.

    The Aviation Command's most recent MFR submission defined the "Dispatch to Hospital 60 Minute Threshold" as being the time it takes from when a helicopter Section receives a dispatch request from SYSCOM (dispatch time) until the time a patient arrives at a trauma center (hospital arrival time). The Command's goal or threshold is to accomplish this scene medevac mission within 60 minutes of SYSCOM dispatch time to hospital arrival time.

    Many factors beyond the control of the Aviation Command, such as the extrication of a patient entrapped in a vehicle, contribute to a patient's arrival time at a hospital.

    Timeline: *Recommendation has been implemented.*

27. We recommend that the Command establish a quality control process to ensure the accuracy of the reported MFR results. For example, the Command should periodically conduct independent tests to verify critical RightCAD data (for example, using secondary time sources such as voice transmissions to verify mission times). We also recommend that the Command retain documentation to support its MFR calculations and related tests.

    Aviation Command Response: The Aviation Command agrees with the recommendation.

    The Command will develop a policy and implement a process to establish a quality control process to ensure the accuracy of the reported MFR

results. A part of this policy will include the retention of documentation to support the Command's MFR calculations and related tests.

Timeline: Begin- September 2008
Complete- February 2009

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