

**THE CALL FOR ONE LEVEL OF SAFETY**

**FLIGHT TIME AND DUTY TIME ISSUES IN AIR CARGO OPERATIONS**

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### **FLIGHT TIME AND DUTY TIME ISSUES IN AIR CARGO OPERATIONS**

Air Line Pilots Association, International  
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#### **EXECUTIVE SUMMARY**

The Air Line Pilots Association, International (“ALPA”) is encouraging the FAA and the Air Cargo Industry to move quickly to require all U.S. licensed cargo airlines to comply with the principles established by the FAA’s Single Level of Safety program, especially with regard to modernization and harmonization of the flight time/duty time regulations.

The present flight time/duty time rules applicable to cargo flying are a patchwork of domestic, supplemental and flag regulations that have been developed over the past fifty years. The rules usually applied to cargo operations – the supplemental rules -- were developed over 50 years ago for unscheduled freight operations using piston-powered aircraft. Many of these post WW-II vintage aircraft had unpressurized cabins, cruise speeds in the 200-knot range, and flight crews consisting of at least two pilots and often a flight engineer. In the 21<sup>st</sup> Century, carriers have used modern technology to decrease cockpit crew size and increase pilot and aircraft utilization. This has put additional pressures on flight crews. As the overall system complexity continues to increase, the hazards associated with pilot fatigue in the industry are as great as they have ever been.

Because the Federal Aviation Administration’s (“FAA”) duty time rules are antiquated and dated, they are frequently augmented by collective bargaining agreements. However, such agreements affect only a part of the industry and may not result in uniform treatment of the same issues at all carriers. This puts pressure on operators to reduce crew rest due to a belief that this results in “productivity” increases that are necessary for economic survival. These contract rules are subject to modification without the scrutiny and industry involvement afforded by the rulemaking process. Pressures are especially acute in economic downturns. The FAA last proposed to modernize the flight time/duty time regulations in 1995. That attempt stalled for a number of reasons. Industry, Labor and the regulators were unable to reach a consensus and the industry-wide reform proposed in 1995 was not implemented. Nearly a decade later, the need for industry-wide reform in flight time/duty time rules is still apparent – but the need in the Air Cargo Industry is particularly acute. The NTSB’s 2004 Most Wanted Transportation Safety Improvements includes “[s]et working hour limits for flight crews.” Domestic pilots have a flight time maximum of 30 hours in seven days, while Flag pilots are allowed up to 32 hours in the same seven days. Supplemental pilots can fly 48 hours in a six day period or 60 percent more than domestic pilots. The clear weight of scientific evidence supports the case that

modernization of the flight time/duty time rules in the cargo industry is overdue, and needed to enhance safety.

ALPA believes there is a pressing need to provide rational working hour limits for cargo pilots; and for unification of the passenger, cargo, and domestic and international flight time/duty time regulations to provide for a single standard, or “One Level of Safety.” The two phrases mean the same thing, that certain basic rules should be established to provide a baseline for all operations. To maintain “One Level of Safety,” certain unique aspects of cargo operations must ultimately be addressed by rules tailored to those operations. Some of the specific areas that are unique or predominant in cargo are fatigue and rest issues due to the scheduling nature of all-cargo operations and heavy assignment of back-side-of-the-clock (window of circadian low) schedules; human factors challenges introduced by non-standardized airport infrastructure, crew support and rest facilities, increased workload due to aging aircraft; and the use of Part 91 operations (e.g., tail-end ferry) to position aircraft. Several case studies will be introduced to illustrate these unique and dominant flight time/duty time issues associated with cargo operations. But at a minimum, the Supplemental pilots need pre-flight rest rules that are harmonized with the domestic passenger rules.

A regulatory regime for supplemental air cargo carriers that lies upon a common baseline with the rules presently applicable to domestic passenger carriers is directly supported by authoritative and peer-reviewed scientific studies, consensus and evidence. The proposal to harmonize the air cargo carrier flight time/duty time rules with the baseline provided by the current domestic rules is supported by outstanding government and NTSB safety recommendations. While ALPA is by no means suggesting that the rules applicable to passenger carriers are perfect, it is clear that harmonization of the two sets so as to establish a minimum common baseline is a step forward towards compliance with the NTSB’s mandate and in accordance with the “One Level of Safety” principle.

## **1. INTRODUCTION**

During the mid-1990’s, a number of high-profile aircraft accidents attracted public and media attention to questions of aviation safety. In response to this public interest, the Administration helped direct the FAA towards a regulatory system for commercial aviation based upon the principle of a “Single Level of Safety.” In January 1995, former DOT Secretary Federico Pena convened an unprecedented aviation safety summit that called together over 1,000 officials from government, airlines, airline labor, and other segments of the industry to establish joint priorities and strategies for enhancing aviation safety. These events led to the landmark FAA ruling on the “Single Level of Safety” (“Commuter Rule”). The Commuter Rule required all 14 CFR Part 135 operators to transition to 14 CFR Part 121 by March 20, 1997.

This standard, which has been applied to large airlines and regional airlines (formerly “commuters”) alike, has become one of the FAA’s guiding regulatory principles during the last decade and has been a widely heralded success. There are, however, still a number of aircraft engaged in missions both involving transport of passengers and/or cargo which are not subject to the same Federal Aviation Regulations, and which now do not operate at a Single Level of

Safety. The FAA regulations covering cargo carriers provide a lower standard and a lower level of safety than those covering passenger airlines; most cargo carriers continue operating under the less restrictive supplemental rules.

Regulators have historically ignored cargo operations – until something goes wrong. This treatment is inconsistent with the guiding principle of a single standard of safety. With two groups of pilots operating essentially the same airplanes in the same airspace doing the same job, there is no basis for one group of pilots to have longer weekly flying limits.

Currently, air cargo operations are subject to different safety standards in a variety of areas. Under the current system, there are aircraft operating without collision avoidance systems, without the benefit of licensed dispatchers, and with more relaxed rules for pilot rest requirements. The fact that large aircraft sharing the same airspace can have vastly different requirements for pilot rest, aircraft dispatch, and cockpit collision avoidance, is a departure from FAA’s doctrine of “Single Level of Safety.” As air carrier operations have grown dramatically and as air cargo operators trend toward operating the same aircraft in the same airspace as their passenger-carrying counterparts, the need for consistent air safety regulation becomes more acute.

For over a decade, the industry has been aware that scientific research has supported an improvement in the flight and duty time limits for cargo pilots. Applying the supplemental rules to today’s large jet two-pilot aircraft operating regular transcontinental flights is not consistent with a “Single Level of Safety.” Safety would be enhanced by implementing scientifically based hours-of-service regulations that set limits on hours of service, provide predictable work and rest schedules, and consider human sleep and rest requirements for the air cargo industry. Such scientifically based rules would necessarily include of a reserve rest requirement for cargo pilots. Also, some consideration must ultimately be given to mandating the use of scientific principles to schedule the rest periods associated with long-haul (trans- meridian) flag operations and back-side-of-the-clock (midnight to 6:00 a.m.) operations. Even if an industry-wide overhaul of the air carrier flight time/duty time regulations is not possible at this time, there are lesser but important adjustments in policy and/or regulation that this Administration can make that would progress towards a single level of safety, and a lower risk of accidents. It is our belief that the supplemental air cargo rules regarding duty limits should be harmonized with the rules applicable to the domestic passenger air carriers -- carriers that operate the same aircraft in the same air space. The practice of applying different standards in the presumed but unproven interest of granting certain types of air carriers some apparent flexibility is simply no longer justified.

## **2. SCIENTIFIC EVIDENCE SUPPORTS, AT A MINIMUM, “HARMONIZATION” OF THE CARGO RULES WITH THE DOMESTIC PASSENGER RULES**

In 1995, the FAA proposed to update the flight time/duty time regulations by issuing a notice of proposed rulemaking, NPRM 95-18, 60 Fed. Reg. 65, 951 (Dec. 20, 1995). The FAA proposed to amend the existing regulations, including the regulations applicable to airline cargo operations

“to establish one set of duty period limitations, and rest requirements for flight crewmembers engaged in air transportation.”

The reasons for harmonizing the regulations to a “Single Level of Safety” in 1995 remain valid today.

As the FAA recognized in 1995, the aviation industry of today requires 24-hour activities to meet operational demands. Growth in global long haul, regional, overnight cargo, and short-haul domestic operations was increasing round-the-clock requirements. Flight crews need to be available to support 24-hour a day operations to meet these industry demands. Both domestic and international aviation frequently require crossing multiple time zones. Therefore, shift work, night work, irregular work schedules, unpredictable work schedules, and time zone changes were becoming the norm and will continue to be commonplace components of the aviation industry. The FAA recognized that these factors affect human physiology by causing performance-impairing fatigue that can affect the level of safety. The FAA believed in 1995 that it was critical, whenever possible, to incorporate scientific information on fatigue and human sleep physiology into regulations on flight crew scheduling. The FAA believed in 1995 that scientific information could help to maintain the safety margin and promote optimum crew performance and alertness during flight operations.

Over the past 40 years, scientific knowledge about sleep, sleep disorders, circadian physiology, fatigue, sleepiness/alertness, and performance decrements has grown significantly. Some of this scientific knowledge, gained through field and simulator studies, confirms that aviators experience performance-impairing fatigue from sleep loss resulting from current flight and duty practices. The FAA’s position in 1995 was that incorporation of scientific knowledge on fatigue into operations *would greatly benefit safety*.

Yet, despite the pendency of this accumulated knowledge, and the FAA’s recognition of many changes in the airline transportation industry over the 40+ years before 1995, the rules governing flight time limitations and rest requirements for air cargo operators -- the flag and supplemental rules -- remained virtually unchanged.

The regulations proposed in 1995 failed to become final, in part because of well-aired differences within industry stakeholder groups as to exactly what would be an acceptable final form for the new regulations.

In the near-decade since the proposed revised regulations were promulgated, the scientific research has only continued to validate several basic concepts underlying the then proposed rules.

1. That some form of daily duty limit opposed to a purely flight time limitation is justified;
2. That standby (or reserve) duty should be counted towards the daily duty limit; and
3. That some provision should be included in the regulations to compensate irregular and late night operations for both domestic and overseas operations.

With the increased reliability of modern aircraft, crews are expected by operators to deliver more and more productivity. For the carriers, this means that the utilization of available crews and aircraft must be maximized. Unfortunately, as several recent accident investigations have highlighted, all too human crews have been pushed past the limits of safe performance.

### **3. ACCIDENT INVESTIGATIONS AND NTSB RECOMMENDATIONS**

Despite remarkable progress in aviation safety in other areas, fatigue remains a lurking danger. While the Board made an exhaustive study of fatigue in the Guantanamo Bay crash, and a point of it in the American International accident in Kansas City, fatigue has been a factor in Part 121 passenger accidents also. Pilot fatigue was found to be a factor in 1999 in the Little Rock, Arkansas accident and again in 2001 in Zurich, Switzerland. The lessons of the danger of fatigue to pilots are repeated over and over: From the October 2003 Swiss Aircraft Accident Investigation Bureau (CRX 3597) Report: 3.2 “Causes...The commander’s ability to concentrate and take appropriate decisions as well as his ability to analyse complex processes were adversely affected by fatigue...” “Safety Recommendation 4.2.4 ... Safety Deficiency ...prescribed rest time not complied with ...the commander of the aircraft ... exhibited signs of fatigue in his behavior...Safety recommendation no.97 ...The Federal Office for Civil Aviation, together with the operator, should check how a complete check on total flying duty time and rest time can be guaranteed.”

#### **3.1. What is Fatigue?**

According to the NTSB:

Traditionally, fatigue was viewed as a simple condition related to the amount of time spent working on a given task. Scientific research, however, has shown that fatigue is related to much more than just the time on a task. Researchers have studied factors that affect fatigue, such as duration and quality of sleep, shift work and work schedules, circadian rhythms, and time of day. Others have examined the influence of drugs and alcohol on fatigue and compared performance impaired by fatigue to performance impaired by alcohol. Sleep disorders and the characteristics of sleep patterns at different ages have also been studied. Cumulative sleep loss and circadian disruption can lead to a physiological state characterized by impaired performance and diminished alertness. Fatigue can impair information processing and reaction time, increasing the probability of errors and ultimately leading to transportation accidents. A summary of sleep and circadian rhythms was originally completed for the Safety Board’s investigation of the 1995 American International Airways accident in Kansas City and the 1993 accident in Guantanamo Bay, Cuba.

#### **3.2. Scope of the Fatigue Problem.**

Again, according to the NTSB:

Fatigue has remained a significant factor in transportation accidents since the Safety Board’s 1989 recommendations were issued. Although generally accepted as a factor in transportation accidents, the exact number of accidents due to fatigue is difficult to determine and likely to be

underestimated. The difficulty in determining the incidence of fatigue-related accidents is due, at least in part, to the difficulty in identifying fatigue as a causal or contributing factor in accidents. There is no comparable chemical test for identifying the presence of fatigue as there is for identifying the presence of drugs or alcohol; hence, it is often difficult to conclude unequivocally that fatigue was a causal or contributing factor in an accident. In most instances, one or more indirect or circumstantial pieces of evidence are used to make the case that fatigue was a factor in the accidents. This evidence includes witness statements, hours worked and slept in the previous few days, the time at which the accident occurred, the regularity or irregularity of the operator's schedule, or the operator's admission that he fell asleep or was impaired by fatigue.

Despite the difficulty in identifying fatigue as a causal factor, estimates of the number of accidents involving fatigue have been made of the different modes of transportation; the estimates vary from very little involvement to as high as about one-third of all accidents. This is what decades of study and research has told us is the truth.

### **3.3. Fatigue in Aviation.**

The Federal Aviation Administration (FAA) recently reported that 21 percent of the reports in the Aviation Safety Reporting System (ASRS) were related to general issues of fatigue. This includes reports that mentioned fatigue directly or indirectly. When only reports that directly mention fatigue are included, the percentage drops to 3.8 percent. Other research (e.g., NASA TM 110380) tells us that pilots who perform poorly on laboratory tests at the end of a duty period believed themselves to be fully alert.

### **3.4. Overview of Safety Board Activity Since 1989.**

The Board issued three recommendations to the DOT in 1989 following completion of several accidents involving operator fatigue:

Expedite a coordinated research program on the effects of fatigue, sleepiness, sleep disorders, and circadian factors on transportation system safety. (I-89-1)

Develop and disseminate educational material for transportation industry personnel and management regarding shift work; work and rest schedules; and proper regimes of health, diet, and rest. (I-89-2)

Review and upgrade regulations governing hours of service for all transportation modes to assure that they are consistent and that they incorporate the results of the latest research on fatigue and sleep issues. (I-89-3)

Since 1989, the Safety Board has issued more than 70 fatigue-related safety recommendations, which were the result of major accident investigations, special investigations, or safety studies that identified operator fatigue as a factor (see table). This includes 11 accident reports or studies in aviation operations conducted under Parts 91, 121, and 135.



**Fatigue-related investigations and studies conducted by the National Transportation Safety Board since May 1989, by mode.**

Location of accident or topic of the study that identified fatigue-related issues	Accident date	NTSB report Number
<b>Aviation</b>		
<b>Accident investigation:</b>		
Molokai, Hawaii	10/28/89	AAR-90/05
Brunswick, Georgia	04/05/91	AAR-92/03
Pine Bluff, Arkansas	04/29/93	AAR-94/01/SUM
Guantanamo Bay, Cuba	08/18/93	AAR-94/04
Kansas City, Missouri	02/16/95	AAR-95/06
Cheyenne, Wyoming	04/11/96	AAR-97/02
Everglades, Florida	05/11/96	AAR-97/06
Little Rock, Arkansas	06/01/99	AAR-99/60
<b>Special Investigation:</b>		
Commercial space launch incident, Cape Canaveral, Florida	08/17/93	SIR-93/02
<b>Safety study:</b>		
Flight crew-involved accidents	02/03/94	SS-94/01
Commuter airline safety	11/30/94	SS-94/02
Aviation safety in Alaska	12/01/95	SS-95/03

In addition to the accident reports indicated above, in 1992 the Board also acknowledged that fatigue can result in degraded performance in flight crews and that disruption of the sleep/rest cycle may have played a role in the Air Transport International (Swanton, OH) crash on 2/15/92 (AAR92/05).

Operator fatigue has been on the Safety Board's list of Most Wanted Transportation Safety Improvements since the list's inception in 1990. Other, more specific, recommendations have followed.

**3.5. Open NTSB Safety Recommendations.**

A-94-194 (FAA)  
 Issued November 30, 1994  
 Status: Open-Unacceptable Response

Revise the Federal Aviation Regulations contained in 14 CFR Part 135 to require that pilot flight time accumulated in all company flying conducted after revenue operations – such as training and check flights, ferry flights and repositioning flights – be included in the crewmember’s total flight time accrued during revenue operations. (Source: *A 1994 Safety Study on Commuter Airline Safety [NTSB/SS-94-02]*)

A-95-113 (FAA)  
Issued November 14, 1995  
Status: Open – Unacceptable Response

Finalize the review of current flight and duty time regulations and revise the regulations, as necessary, within 1 year to ensure that flight and duty time limitations take into consideration research findings in fatigue and sleep issues. The new regulations should prohibit air carriers from assigning flight crews to flights conducted under 14 CFR Part 91 unless the flight crews meet the flight and duty time limitations of 14 CFR Part 121 or other appropriate regulations. (Source: *An Uncontrolled Collision with Terrain Accident, Air Transport International, DC-8-63, at Kansas City, Missouri, February 16, 1995 [NTSB/AAR-95-06]*)

I-99-1 (U.S. DOT)  
Issued June 1, 1999  
Status: Open – Acceptable Response

Require the modal administrations to modify the appropriate codes of Federal regulations to establish scientifically based hours-of-service regulations that set limits on hours of service, provide predictable work and rest schedules, and consider circadian rhythms and human sleep and rest requirements. Seek Congressional authority, if necessary, for the modal administrations to establish these regulations. (Source: *A 1999 Intermodal Safety Study of Fatigue in Transportation [NTSB/SR-99-01]*)

### **3.6. Summary of FAA Action.**

In a May 1999 Report, the NTSB concluded, “None of the hours-of-service regulations or statutes have been modified since the Board first issued its intermodal recommendations in 1989. Fatigue in the transportation environment continues to be a factor in the cause of accidents. It has always been expected that this issue would require a long period of time to bring about the needed changes.” The scientific research required to support these changes is now available.

### **3.7. Flight Crews.**

The FAA issued a notice of proposed rulemaking (NPRM) in December 1995 to update the flight and duty regulations for airline pilots; however, in the intervening 8 years, the regulations have not been revised. FAA has attempted on three occasions to reach consensus with the industry on a proposed rule.

The FAA indicated that it had planned to issue a supplemental NPRM (SNPRM) in spring 2001 that would take into consideration the technical and operational concerns that were raised during

the NPRM comment period. The SNPRM would prescribe a maximum duty period linked to a maximum flight time restriction that is associated with a minimum rest period based on the number of pilots. The FAA has not issued an SNPRM, however.

FAA staff advised Safety Board staff that as of the end of January 2003, the SNPRM was being reviewed by the Office of the Secretary of Transportation prior to submission to the Office of Management and Budget and then publication in the *Federal Register*.

### **3.8. Why Cargo? – Why Now?**

Thus, while it can be argued that industry-wide overhaul of the fatigue regulations is long overdue, there are a number of factors in the cargo industry that make the problem particularly acute. The supplemental regulations were generated nearly 50 years ago, when, one could argue, the air cargo flight crews were not expected to and did not conduct round-the-clock all weather operations with minimal flight crews in and out of busy airspace. Some things have changed, some have stayed the same in the freight hauling business, but it cannot be denied that the cargo airline flight crews of today face a combination of operational and environmental factors, beyond mere cockpit performance, or flying, that increase wear and tear on the flight crews and hence the tendency for fatigue to become a flight hazard.

The combination of non-scheduled and irregular operations result in the problem of fatigue being particularly acute in the air cargo industry.

1. The FARs governing cargo airlines differ in places from those governing passenger airlines.
  - a) Cargo airlines typically operate as FAR Part 121 “Supplemental carriers.”
  - b) The FARs for Part 121 “Supplemental” operations are less restrictive than those of “Domestic” or “Flag.”
  - c) “Supplemental” Flight Time/Duty Time rules differ significantly from those governing most passenger operations.
  - d) “Supplemental” carriers do not require flight dispatchers.
  
2. Irregular Operations – The Ground Support Network Typically Associations with Passenger Operations May Not Be Available; Flight Crews Often Must to Expend Time and Energy on Non-Cockpit Duties
  - a) Many cargo airlines outsource the cargo preparation and aircraft loading activities to private organizations not affiliated with the airline.
  - b) Frequently, these airlines utilize different cargo preparation and aircraft loading contractors at the different airports the airlines serve (“outstations”). This can require flight crews expending time and energy outside the cockpit on logistical details normally handling by station personnel in passenger operations. Some carriers have historically had flight engineers supervise the loading operations; however, the engineer’s position is being eliminated in the cargo industry as older airplanes are replaced by those with a two-pilot cockpits.
  - c) It is not unusual for the airlines and the FAA to exercise minimal or no oversight of these cargo preparation and aircraft-loading contractors at the outstations. The crews must

devote extra attention to preflight aircraft loading and preparation in an effort to ensure safety and regulatory compliance.

3. Aging Aircraft.

a) Typically, the aircraft in most cargo fleets are older than those in service with U.S. passenger airlines.

b) Typically, cargo aircraft may be older and less capable in terms of performance, reliability and automation.

c) Older aircraft and their subsystems (e.g. avionics, engines, etc.) require higher levels of maintenance, and greater attention to malfunctions and “raw data” on the part of crews.

4. A significant proportion of cargo flights occur at night.

a) Most human beings are less alert and cognizant during backside-of-the-clock periods, and are therefore more susceptible to making errors, failing to notice errors, and failing to quickly and accurately rectify errors.

b) NASA research shows that the effect of overnight operations imposes a number of physiological challenges not present during the day, resulting in lower performance.

c) NASA research also supports the belief held by flight crews that the quality of sleep during the day is inferior to that obtained at night.

d) Darkness-related factors such as restricted visibility, loss of depth perception, and decreased visual contrast also further reduce the margins of safety.

*RELEVANT ACCIDENTS: Air Transport DC-8 at Swanton, OH; American International DC-8 at Guantanamo Bay, Cuba; Air Transport International DC-8 at Kansas City, MO*

5. The route structures and destination airports of cargo airlines frequently differ from those of passenger airlines.

a) While the cargo airlines do maintain hub airports, they frequently change the destination cities as a function of market forces.

b) Cargo flight crews are exposed to a wide and changing variety of destinations, which decreases the safety margins afforded by route familiarization and/or the familiarity of repeated operations into the same airports.

c) Many airports served by cargo airlines offer less supporting infrastructure than those served by passenger airlines. Infrastructure can include such flight-related items as precision instrument approaches, runway lighting configurations, and aircraft ground support to flight crew physiological items such as comfortable crew briefing rooms, availability of dining facilities, and ease of access to crew hotels. At some airports, control towers are closed during late night or early morning cargo operations. Depending on their availability or lack thereof, all these factors can either increase crew workload directly, or decrease a crew’s ability to obtain adequate rest, and thus affect the margins of safety of the operation.

*RELEVANT ACCIDENTS: Air Transport International DC-8 at Swanton, OH; American International DC-8 at Guantanamo Bay, Cuba.*

6. Due to non-published operational schedules and the night operations associated with cargo operations, there is less opportunity for oversight of cargo operations by FAA inspectors;

government supervision of these operations, including flight time/duty time compliance, has historically been inadequate.

#### **4. WHY “HARMONIZATION” IN THE FLIGHT TIME/DUTY TIME REGULATIONS APPLICABLE TO AIR CARGO IS NEEDED NOW**

The U.S. has the most developed airfreight market in the world. The rising popularity of electronic commerce, mail-order retailing and faster, freer and more frequent international trade is creating exponential growth in demand for airfreight and express delivery. The former NTSB Chairman, in a September 2000 address, cited U.S. Department of Transportation (“DOT”) figures indicating that cargo-only flights make up almost 10 percent of domestic air carrier operations. The aircraft fleet dedicated to cargo flights is growing as well. Over 1500 large aircraft are in service now, with that number expected to grow by 50 percent or more over the next ten years. In addition, cargo feeders using smaller aircraft, such as the Cessna Caravan, are expanding into more and more market areas.

In 1999, 60 percent of the world’s cargo tonnage moved within the United States. One analytical consulting firm estimated that world airfreight tonnage increased by 38 percent in just five years – from 16.6 million tons in 1994 to 23 million tons in 1999. As economic globalization increases, and international commerce expands, we can expect airfreight traffic to grow as well. Cargo operators, such as Federal Express and United Parcel Service and DHL, are among the largest airlines in the world, and new carriers continue to appear.

This greater demand, while economically beneficial, presents increasing safety challenges that must be met on a daily basis. The first of these challenges is how we effectively deal with fatigue.

No one would disagree that sleep loss or a disturbed circadian rhythm has a direct relationship to errors, accidents and safety. However, identifying fatigue as a factor in an accident can be very difficult. We can test a piece of metal to find out whether it has been weakened, but human fatigue is elusive and subjective. There is no “fatigue” test for humans and we are poor judges of our own state of fatigue. In research done by NASA on international flight crews, pilots reported that they felt at their highest state of alertness just six minutes before they fell asleep. On the scientific scale, these pilots qualified as having a severe sleep debt, yet they felt very alert.

As NASA found in its 1996 Study of Psychological Responses to Overnight Cargo Operations:

The circadian cycle does not adapt completely to the inverted duty-rest schedule and therefore overnight cargo crews are working about the time of peak physiological sleepiness. Thus, even without sleep loss, it would be expected that the nighttime circadian factor would create more sleepiness compared to daytime short-haul operations.

Second, performance of tasks is well established to be consistently lowest on the night shift. Thus, even without sleep loss, overnight cargo crews would be expected to be more vulnerable to lower performance than their day-flying short-haul counterparts.

Third, the quality of the daytime sleep obtained by overnight cargo crew members is not comparable to that obtained by short-haul crew members sleeping at night. The daytime sleep of overnight cargo crews was often split into several episodes across the 24-hour day. The daytime sleep of overnight cargo crews was also displaced in the circadian cycle, relative to a normal night of sleep and it is well established that sleep quantity and quality vary across the circadian cycle.

Headaches were reported more than twice as often among overnight cargo crews as they were among short-haul fixed-wing crews and were approaching the numbers reported by helicopter crew members who flew in cockpits where overheating, poor ventilation, and high levels of vibration were common. Overnight cargo crews more frequently reported congested nose than short-haul fixed-wing crews and reported an incidence of burning eyes that was comparable to that of helicopter crews. Overnight cargo crews also reported a more negative effect of trips on appetite than did daytime short-haul fixed-wing crews. This may have been related, at least in part, to duty hours coinciding with the part of the circadian cycle not normally associated with eating (late evening through early morning).

Flying at night simply imposes a number of physiological challenges that are not present in comparable daytime operations. The daytime sleep of crewmembers was truncated in many instances by the circadian wake-up signal. Depending on the duration of the layover, they were often unable to sleep again before going back on duty. In addition, their daytime sleep was reported as being lighter and less restorative than nighttime sleep. Thus crewmembers were working around the circadian low point with an accumulating sleep debt. In laboratory studies, this combination produces lowest performance. Field data from other 24-hour shift work operations and accident rates in other modes of transport also consistently indicate worse performance at night.

Yet, cargo pilots operating under the supplemental regulations can fly 60 percent more than domestically regulated pilots, and there is no limitation at all as to the amount of time they can remain on reserve duty, or standby. This situation is unacceptable.

The FAA rules require passenger airlines to provide reserve pilots with a pre-scheduled and protected 8-hour rest period sometime during the 24-hour period prior to completion of a flight assignment. Because these regulations weren't enforced, airlines could require their reserve pilots to be "on call" 24 hours a day for several consecutive days without giving them the legally mandated crew rest. The FAA, in 1999, fixed this problem with a simple change in policy. It can do the same for thousands of cargo pilots. We do not, here at least, take a position on how the FAA should cure this problem, whether by policy change, interpretation, adjustment to the existing regulations, removing cargo operators from the supplemental flight time/duty time rules or a combination of the above. We can say to the FAA however, that time has come to lift the lower boats and provide sane and rational flight time limits for cargo pilots, to provide a "Single Level of Safety."

The ALPA Flight Time/Duty Time Committee has established two reasonable principles to guide the definition of flight time limitations in civil aircrew:

1. The first is that the duty schedule should not prevent the aircrew from ensuring that they are fully rested at the start of each duty period. Particular problems can arise when duty periods encroach on the normal sleep time, or when the normal sleep pattern is disturbed by time zone transitions. In these circumstances the provision of adequate time for rest is essential.
2. The second principle is that the duration and timing of the individual duty periods must enable the aircrew to maintain acceptable levels of alertness at all times.

## **5. CONCLUSION AND RECOMMENDATIONS**

Improving the safety of all-cargo airlines and of passenger airlines' cargo operations has been a long-term goal for ALPA members. When we began our campaign for One Level of Safety in 1995, we tried to include both cargo and supplemental airline operations within the FAA's purview. The agency's focus then was aimed solely toward small Part 121 airlines that, indeed, required much improvement in their safety cultures.

### **Recommendations**

1. Set a weekly maximum flight time limitation for domestic cargo operations that is consistent with the rules for pilots at domestic passenger carriers.
2. Require that cargo pilots receive a mandatory pre-flight rest in a manner that is consistent with the rules for pilots at domestic passenger carriers.
3. Require that time spent on standby duty by cargo pilots with a present responsibility for work should work arise (reserve duty) be counted towards a daily duty period of a maximum of 16 hours, (or less).
4. Decrease the number of hours of daily flight time and duty time that may be required of pilots in the event that the pilot operates in the time period from midnight to dawn. This recommendation, while potentially applicable to all air carrier pilots, is especially pertinent to cargo pilots due to the large percentage of night operations.
5. Decrease the number of hours of daily flight time and duty time that may be required of a pilot in the event that the pilot operates across six or more time zones. This recommendation, while potentially applicable to all air carrier pilots, is especially pertinent to cargo pilots due to predominance of international deadheading to "meet the airplane" in the international cargo industry.

The need for a harmonized policy that results in a weekly maximum flight hour limits for supplemental cargo pilots, with minimum required pre-flight and reserve rest is particularly acute. Harmonization of the rules in these two areas would be a good start to providing the Air Cargo Industry with the Single Level of Safety that the NTSB recommends, the public expects and the pilots demand.

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